

RILEM State of the Art Reports

Victor Saouma Editor

**Diagnosis & Prognosis
of AAR Affected Structures**

State-of-the-Art Report of the RILEM
Technical Committee 259-ISR

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Preface

With the aging of our infrastructure, ASR will become increasingly prevalent, more so than we have suspected so far. Whereas this particular aging process is unsightly and mildly disruptive for buildings, pavements, or railroad ties, ASR is a major societal problem when it affects dams, large bridges, or even nuclear structures. In those situations, one must decide whether to maintain the structure under continuous auscultation, or simply decommission it. The associated costs are enormous.

Given the increasing prevalence of ASR, this book is timely, pertinent, and necessary. While tools for assessing this particularly complex and confounding phenomenon have long existed, until now they have not been assembled into a single authoritative source. Unfortunately, in my own observation, the lack of organized information has already allowed inadequate assessments and poorly informed decisions about some critical ASR-infected infrastructures. Recently, for example, I evaluated the response by the U.S. Nuclear Regulatory Commission to a license amendment request submitted on behalf of a major nuclear power plant suffering from ASR. The agency's evaluation of the problem was shockingly simplistic and ill-informed, and yet the license for continued operation for an additional 30 years was approved¹. Thus, it is my hope, as a scientist and concerned citizen, that this book will strengthen government oversight of the risks posed by ASR in critical infrastructures by providing them with a comprehensive assessment methodology.

This volume represents four years of work by RILEM's Technical Committee 259-ISR Prognosis of Deterioration and Loss of Serviceability in Structures Affected by Alkali-Silica Reactions. I had the honor and pleasure to chair it and closely work with some of the world's best experts in the field.

As is often the case, the addressed topics do not represent what I anticipated during our first meeting in 2014. Our original focus was narrow and possibly ill defined, but after many, at times spirited, discussions I realized that the scope should be broadened. At times, this was based on committee discussions, and at others, I allowed myself to unilaterally seek additional participation. This led to substantial reshaping and enrichment of our original ideas.

¹ [293], [292] [267]

In the process of editing, I have avoided two major pitfalls. First, I realized the folly of trying to build a consensus on a proposed method of diagnosis/prognosis emanating from our committee, but have rather let “a hundred flowers blossom” for the benefit of allowing many perspectives. Secondly, I have refrained from constraining the content of solid contributions by some of the participants who wanted to dwell in more details than others. Likewise, I have at times curtailed some coverage, or simply not included others whose work was not yet sufficiently mature for inclusion.

There are twenty-six chapters, and four major appendices broken into four sections. Again, no chapter length was imposed, and one should not assume that those who embrace brevity are deficient in quality.

It is my hope that this book will be accessible as a mine for both engineers consulting it as a starting point of an investigation and for researchers starting with a literature survey.

I have reviewed each contribution, at times questioned the authors, and redone some of the figures. In so doing I have converted most of the submitted Word files into the more aesthetically pleasing format provided by \LaTeX . Likewise, each of the 380 citations found an entry in the Bib \TeX database. Finally, I have tried, albeit imperfectly, to index the book but am certain to have missed some key entries. In the end, I am pleased to provide our publisher with a copy-ready manuscript that would only require minimal editing before publication.

Finally, and on a personal level, whereas I am both indebted and humbled by the knowledge of all the contributors, my greatest satisfaction was not in assiduously editing this book, but in meeting so many interesting colleagues and getting to know them on a personal level. They have my deep appreciation.

Victor Saouma
Boulder, CO.
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RILEM Technical Committee 259-ISR

Prognosis of deterioration and loss of serviceability in structures affected by alkali-silica reactions

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This book is authored and edited under the auspices of RILEM Technical Committee TC 259-ISR. It presents technical contributions from RILEM members and international partners that provide an outline of the state-of-the-art in diagnosis and prognosis of concrete structures affected by alkali silica reaction (ASR).

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Chapter 27

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