

Preface

This book captures the state of the art of the durability of strain-hardening cement-based composites (SHCC) and the durability of structures or structural elements that are manufactured in full or in part with this class of modern construction materials. It has been compiled by the RILEM Technical Committee (TC) 240-FDS: A Framework for Durability Design with SHCC. This TC was active from 2010 to 2015. The TC proposal was developed in November 2009 in Stellenbosch, South Africa, on the occasion of the International Conference on Advances in Cement-based Materials (ACM 2009), hosted by Gideon P.A.G. van Zijl. After acceptance by RILEM in March 2010, yearly meetings were held in Dresden, Germany, hosted by Viktor Mechtcherine (September 2010); in Rio de Janeiro, Brazil, at SHCC-2 hosted by Romildo Toledo Filho (November 2011); in Guimarães, Portugal, at BEFIB (September 2012); in Toledo, Spain, at FRAMCOS-8 (March 2013); in Paris, France, at the RILEM Week (September 2013); in Delft, The Netherlands, at SHCC-3 hosted by Erik Schlangen (November 2014); in Stuttgart, Germany, at HPFRCC-7 (June 2015); and in Leipzig, Germany (October 2015).

The book is subdivided into ten chapters, authored by various members:

Chapter 1 Introduction: Crack Distribution and Durability of SHCC, by Gideon P.A.G. van Zijl, William P. Boshoff, Christian Wagner and Volker Slowik.

Chapter 2 Transfer of Fluids, Gases and Ions in and Through Cracked and Uncracked Composites, by Christian Wagner, Volker Slowik, Gideon P.A.G. van Zijl, William P. Boshoff, Suvash C. Paul, Viktor Mechtcherine and Koichi Kobayashi.

Chapter 3 Fibre Durability, by Flavio A. Silva, Alva Peled, Bartosz Zukowski and Romildo D. Toledo Filho.

Chapter 4 Chemical Processes, by Erik Schlangen, Gideon P.A.G. van Zijl and Petr Kabele.

Chapter 5 Influence of Low Temperatures, by Koichi Kobayashi and Folker H. Wittmann.

Chapter 6 Influence of Elevated Temperatures, by Flavio A. Silva, Barzin Mobasher, Alva Peled, Dimas A.S. Rambo and Romildo D. Toledo Filho.

Chapter 7 Abrasion, by Volker Slowik, Steffen Müller, Christian Wagner and Viktor Mechtcherine.

Chapter 8 Behaviour of Bonded SHCC Overlay Systems, by Volker Slowik, Mladena Luković, Christian Wagner and Gideon P.A.G. van Zijl.

Chapter 9 Reinforcing Bar Corrosion, by Koichi Kobayashi, Suvash C. Paul and Gideon P.A.G. van Zijl.

Chapter 10 Durability and Service Life Design Concepts for Structures and (Non-)Structural Members Made of or Strengthened/Repaired with SHCC, by Viktor Mechtcherine, Frank Altmann and Gideon P.A.G. van Zijl.

A process of review was followed. Independent experts were appointed to review each chapter. We gratefully acknowledge the review performed by Prof. Flavio A. Silva (Chap. 1), Dr. Mladena Luković (Chaps. 2 and 10), Prof. Gideon P. A.G. van Zijl (Chaps. 3, 6 and 7), Prof. Hirozo Mihashi (Chap. 4), Prof. Volker Slowik (Chap. 5), Prof. Viktor Mechtcherine (Chap. 8), and Prof. Faiz Uddin Shaikh (Chap. 9).

An important development during the life of this TC 240-FDS is the SHCC series of conferences. The *International RILEM Workshop on High Performance Fiber Reinforced Cementitious Composites in Structural Applications*—hosted in Hawaii by Prof. Gregor Fischer in May 2005—and the *International Conference on Advances in Cement-based Materials (ACM 2009)*—hosted in Stellenbosch, South Africa, by Prof. Gideon P.A.G. van Zijl in November 2009—were followed by SHCC-2—hosted in Rio de Janeiro by Prof. Romildo D. Toledo Filho in 2011—and SHCC-3—hosted in Dordrecht, The Netherlands, by Prof. Erik Schlangen in November 2014. Following on from this groundwork, a three-year cycle is envisaged, and SHCC-4 will be held in Dresden, Germany, in 2017—hosted by Prof. Viktor Mechtcherine and co-chaired by Profs. Volker Slowik and Petr Kabele.

Finally, informed by this State-of-the-Art Report, the appropriate application of SHCC as construction material is encouraged to enhance structural durability and overall lifespan performance. By means of the SHCC conference series, continuation of research on this class of materials is envisaged. Field application and performance monitoring are considered imperatives for the validation of structural and durability design models and guidelines.

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