

Approval for this bulletin

Subject to priorities defined by the Technical Council and the Presidium, the results of the *fib*'s work in commissions and task groups are published in a continuously numbered series of technical publications called *bulletins*. The following categories are used:

Category:	Approval by:
Technical report	Task group and chairpersons of the commission
State-of-the-art report	Commission
Manual / Guide to good practice / Recommendation	Technical Council
Model code	General Assembly

Any publication not having met the above requirements will be clearly identified as a preliminary draft.

fib Bulletin 106 was approved as a State-of-the-art report by the *fib* Commission 2 in 2021.

The *fib* Task Group 2.5 includes the following members:

Convenor: prof. Giovanni Plizzari (University of Brescia, Italy)

Secretary: Ph.D Giovanni Metelli (University of Brescia, Italy)

Members: Maria Antonietta Aiello (Italy, University of Lecce), Carmen Andrade (Spain, International Centre for Numerical Methods in Engineering), György L. Balázs (Hungary, Budapest Univ. of Techn. & Economics), Sergio Belucco (Italy, University of Padova), Mattias Blomfors (Chalmers University of Technology, Sweden), Emily Bonner (The Concrete Centre, UK), Josipa Bosnjak (Germany, Universität Stuttgart), John Cairns (United Kingdom, Heriot-Watt University), Dario Coronelli (Italy, Politecnico di Milano), Rolf Elsgehausen (Germany, IWB Universität Stuttgart), Flora Faleschini (Italy, University of Padova), Lisa Feldman (University of Saskatchewan, Canada), Pietro Gambarova (Italy, Politecnico di Milano), Giovacchino Genesio (Germany, Hilti group), Charles Goodchild (United Kingdom, The Concrete Centre), Anssi Laaksonen, (Tampere University, Finland), Marianovella Leone (Italy, Università del Salento), Remy Lequesne (United States, The University of Kansas), Karin Lundgren (Sweden Chalmers, University of Technology), Bruno Massicotte (Canada, Ecole Polytechnique de Montréal), Giovanni Metelli (Italy, University of Brescia), Giovanni Muciaccia (Italy, Politecnico di Milano), Juan Murcia-Delso (Spain, Universitat Politècnica de Catalunya), Aurelio Muttoni (Switzerland, École polytechnique fédérale de Lausanne), Fabrizio Palmisano (Italy, PPV Consulting Studio Palmisano Perilli Associati), Voula Pantazopoulou (Canada, York University), Carlo Pellegrino (Italy, Università di Padova), Miguel Prieto Rábade (Sweden, RISE Research Institutes), Janna Schoening (Germany, GMX), Roman Sedlmair (Germany, Karlsruhe Institut für Technology), Akanshu Sharma (United States, Purdue University), Benny Suryanto (Heriot-Watt, Edinburgh, UK), Francesco Tondolo (Italy, Politecnico di Torino), Margaritis Tonidis (United States, Purdue University)

Cover images: Figures 2-3a (top left), 14-2b (top right), Courtesy of Prof Metelli and Prof Plizzari (bottom row)

© Fédération internationale du béton (*fib*) 2022.

Although the International Federation for Structural Concrete / Fédération internationale du béton (*fib*) does its best to ensure that all the information presented in this publication is accurate, no liability or responsibility of any kind, including liability for negligence, is accepted in this respect by the organisation, its members, employees or agents.

All rights reserved. No part of this publication may be reproduced, modified, translated, stored in a retrieval system or transmitted in any form or by any means – electronically, mechanically, through photocopying, recording or otherwise – without prior written permission from the *fib*.

ISSN 1562-3610

ISBN 978-2-88394-163-2

<https://doi.org/10.35789/fib.BULL.0106>

Layout by Marie Reymond (*fib*).

Printed by P+K Solutions GmbH & Co. KG

Acknowledgements

This report was drafted by Task Group 2.5 “Bond and material models” within the *fib* Commission 2.

Authors:

Giovanni A. Plizzari (Convener/Editor)

University of Brescia, Italy

John Cairns (Editor)

Heriot-Watt University, UK

Giovanni Metelli (Editor)

University of Brescia, Italy

Maria Antonietta Aiello

University of Salento, Italy

Giuseppe Centonze

University of Salento, Italy

Oan Chul Choi

Republic of Korea, Soongsil University

Antonio Conforti

University of Brescia, Italy

David Darwin

University of Kansas, USA

Nicola Fabris

University of Padova, Italy

Alessandro P. Fantilli

Politecnico di Torino, Italy

Pietro G. Gambarova

Politecnico di Milano, Italy

Josef Hegger

RWTH Aachen University, Germany

Kwang Yeon Kim

Purdue University, USA

Marianovella Leone

University of Salento, Italy

Francesco Lo Monte

Politecnico di Milano, Italy

Egidio Marchina

University of Brescia, Italy

Marianna Micallef

Imperial College London, UK

Stavroula J. Pantazopoulou

York University, Canada

Carlo Pellegrino

University of Padova, Italy

Zila Rinaldi

University of Rome Tor Vergata, Italy

Akanshu Sharma

University of Stuttgart, Germany

Josipa Bošnjak

University of Stuttgart, Germany

Francesca Ceroni

University of Napoli Parthenope, Italy

Hajin Choi

Republic of Korea, Soongsil University

Dario Coronelli

Politecnico di Milano, Italy

Rolf Elsgehausen

University of Stuttgart, Germany

Flora Faleschini

University of Padova, Italy

Ignasi Fernandez

Chalmers University of Technology, Sweden

Ghadir Haikal

North Carolina State University, USA

Jan Hofmann

University of Stuttgart, Germany

Hitesh Lakhani

University of Stuttgart, Germany

Andrés Lepage

University of Kansas, USA

Karin Lundgren

Chalmers University of Technology, Sweden

Konstantinos G. Megalooikonomou

Greek Ministry of Rural Development and Food,
Greece

Giovanni Muciaccia

Politecnico di Milano, Italy

Maria Rosaria Pecce

University of Napoli Federico II, Italy

Julio A. Ramirez

Purdue University, USA

Janna Schoening

RWTH Aachen University, Germany

John Silva

Hilti North America, USA

Mohammad Tahershamsi

Chalmers University of Technology, Sweden

Francesco Tondolo

Politecnico di Torino, Italy

Samir Yasso

University of Mosul, Iraq

Mariano Angelo Zanini

University of Padova, Italy

Souzana P. Tastani

Democritus University of Thrace, Greece

Robert L. Vollum

Imperial College London, UK

Kamyab Zandi

Chalmers University of Technology, Sweden

Contact details of Task Group members can be found in the members only section of the *fib* website,
www.fib-international.org.

DOI by chapter

Chapters	Authors	DOI
1	Choi, Choi	https://doi.org/10.35789/fib.BULL.0106.Ch01
2	Gambarova, Lo Monte	https://doi.org/10.35789/fib.BULL.0106.Ch02
3	Kim, Haikal, Ramirez	https://doi.org/10.35789/fib.BULL.0106.Ch03
4	Silva, Eligehausen	https://doi.org/10.35789/fib.BULL.0106.Ch04
5	Cairns, Eligehausen	https://doi.org/10.35789/fib.BULL.0106.Ch05
6	Lepage, Yasso, Darwin	https://doi.org/10.35789/fib.BULL.0106.Ch06
7	Schoening, Hegger	https://doi.org/10.35789/fib.BULL.0106.Ch07
8	Micallef, Vollum	https://doi.org/10.35789/fib.BULL.0106.Ch08
9	Metelli, Cairns, Conforti, Plizzari	https://doi.org/10.35789/fib.BULL.0106.Ch09
10	Pellegrino, Faleschini, Fabris, Zanini	https://doi.org/10.35789/fib.BULL.0106.Ch10
11	Lakhani, Hofmann	https://doi.org/10.35789/fib.BULL.0106.Ch11
12	Muciaccia	https://doi.org/10.35789/fib.BULL.0106.Ch12
13	Sharma, Bošnjak	https://doi.org/10.35789/fib.BULL.0106.Ch13
14	Tastani, Megalooikonomou, Pantazopoulou	https://doi.org/10.35789/fib.BULL.0106.Ch14
15	Coronelli, Rinaldi, Tondolo	https://doi.org/10.35789/fib.BULL.0106.Ch15
16	Lundgren, Tahershamsi, Fernandez, Zandi	https://doi.org/10.35789/fib.BULL.0106.Ch16
17	Ceroni, Leone, Aiello, Pecce	https://doi.org/10.35789/fib.BULL.0106.Ch17
18	Aiello, Centonze, Marchina, Metelli, Plizzari	https://doi.org/10.35789/fib.BULL.0106.Ch18
19	Fantilli, Tondolo	https://doi.org/10.35789/fib.BULL.0106.Ch19