

FIBRE-REINFORCED CONCRETE: FROM DESIGN TO STRUCTURAL APPLICATIONS - FRC 2014: ACI- FIB INTERNATIONAL WORK- SHOP *fib* BULLETIN 79

Title: Fibre-reinforced concrete: From design to structural applications - FRC 2014: ACI-fib International Workshop
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Abstract:

The FRC-2014 Workshop Fibre Reinforced Concrete: from Design to Structural Applications was the first ACI-fib joint technical event. The Workshop, held at Polytechnique Montreal (Canada) on July 24th and 25th 2014, was attended by 116 participants from 25 countries and 4 continents.

The first international FRC workshop was held in Bergamo (Italy) in 2004. At that time, the lack of specific building codes and standards was identified as the main inhibitor to the application of this technology in engineering practice. Ten years after Bergamo, many of the objectives identified at that time have been achieved. The use of fibre reinforced concrete (FRC) for designing structural members in bending and shear has recently been addressed in the fib Model Code 2010. Steel fibre reinforced concrete (SFRC) has also been used structurally in several building and bridge projects in Europe and North-America. SFRC has been widely used in segmental tunnel linings all over the world. Members of ACI544 and fib TG-4.1 have been involved in writing code based specifications for the design of FRC structural members.

More than fifty papers were presented at the Workshop from which forty-four were selected for this joint ACI/fib publication. The papers are organised in the document under six themes: Design guidelines and specifications, Material properties for design, Behaviour and design of beams and columns, Behaviour and design of slabs and other structures, Behaviour and design of foundations and underground components, and finally, Applications in structure and underground construction projects.



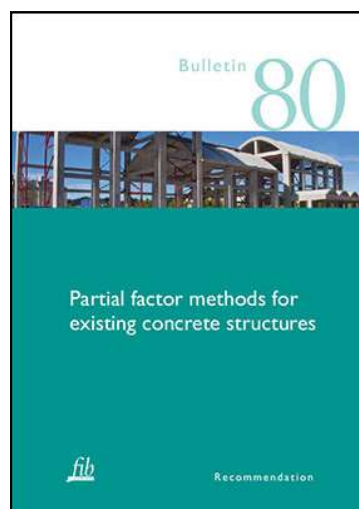
PARTIAL FACTOR METHODS FOR EXISTING CONCRETE STRUC- TURES *fib* BULLETIN 80

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Abstract:

For a large part of the existing buildings and infrastructure the design life has been reached or will be reached in the near future. These structures might need to be reassessed in order to investigate whether the safety requirements are met. Current practice on the assessment of existing concrete structures however needs a thorough evaluation from a risk and reliability point of view, as they are mostly verified using simplified procedures based on the partial factor method commonly applied in design of new structures. Such assessments are often conservative and may lead to expensive upgrades.

Although the last decades reliability-based assessment of existing concrete structures has gained wide attention in the research field, a consistent reliability-based assessment framework and a practically applicable codified approach which is compatible with the Eurocodes and accessible for common structural engineering problems in everyday practice is currently missing. Such an approach however allows for a more uniform, more objective and probably more widely applied assessment approach for existing concrete structures. Hence, in this bulletin two different partial factor formats are elaborated, i.e. the Design Value Method (DVM) and the Adjusted Partial Factor Method (APFM), enabling the incorporation of specific reliability related aspects for existing structures. The DVM proposes a fundamental basis for evaluating partial factors whereas the APFM provides adjustment factors to be applied on the partial factors for new structures in EN 1990. In this bulletin both methods are elaborated and evaluated and a basis is provided for decision making regarding the target safety level of existing structures.



PUNCHING SHEAR OF STRUCTURAL CONCRETE SLABS

fib BULLETIN 81

Title: Punching shear of structural concrete slabs

Category: Technical Report

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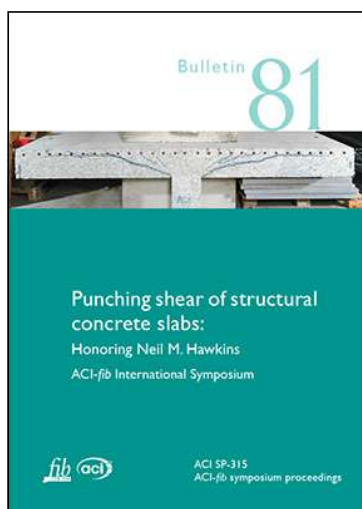
ISBN: 978-2-88394-121-2

Abstract:

fib Bulletin 81 reports the latest information available to researchers and practitioners on the analysis, design and experimental evidence of punching shear of structural concrete slabs. It follows previous efforts by the International Federation for Structural Concrete (fib) and its predecessor the Euro-International Committee for Concrete (CEB), through CEB Bulletin 168, *Punching Shear in Reinforced Concrete* (1985) and fibBulletin 12, *Punching of structural concrete slabs* (2001), and an international symposium sponsored by the punching shear subcommittee of ACI Committee 445 (Shear and Torsion) and held in Kansas City, Mo., USA, in 2005.

This bulletin contains 18 papers that were presented in three sessions as part of an international symposium held in Philadelphia, Pa., USA, on October 25, 2016. The symposium was co-organized by the punching shear sub-committee of ACI 445 and by fib Working Party 2.2.3 (Punching and Shear in Slabs) with the objectives of not only disseminating information on this important design subject but also promoting harmonization among the various design theories and treatment of key aspects of punching shear design. The papers are organized in the same order they were presented in the symposium. The symposium honored Professor Emeritus Neil M. Hawkins (University of Illinois at Urbana-Champaign, USA), whose contributions through the years in the field of punching shear of structural concrete slabs have been paramount.

The papers cover key aspects related to punching shear of structural concrete slabs under different loading conditions, the study of size effect on punching capacity of slabs, the effect of slab reinforcement ratio on the response and failure mode of slabs, without and with shear reinforcement, and its implications for the design and formulation in codes of practice, an examination of different analytical tools to predict the punching shear response of slabs, the study of the post-punching response of concrete slabs, the evaluation of design provisions in modern codes based on recent experimental evidence and new punching shear theories, and an overview of the combined efforts undertaken jointly by ACI 445 and fib WP 2.2.3 to generate test result databanks for the evaluation and calibration of punching shear design recommendations in North American and international codes of practice.



PRECAST SEGMENTAL BRIDGES

fib BULLETIN 82

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Abstract:

The concept of precast segmental bridges is not new: the first application documented was from the mid-1940s, designed by Eugene Freyssinet and built over the river Marne near Luzancy in France, between 1944 and 1946. Although innovative, it also contained traditional wet concrete joints between the members. The impressive breakthrough came slightly later with the introduction of match-cast joints by Jean Muller, first for a bridge near Buffalo (USA) in 1952, and later for a bridge across the River Seine at Choisy le Roi near Paris in 1962. This opened the way for a large number of new developments in terms of design, production approaches and construction techniques, and precast prestressed concrete segmental construction became rapidly one of the most efficient and successful bridge construction methods all over the world. These developments are still evolving, but the interaction between design, production and construction is a critical factor for success: the interaction creates opportunities to optimise the scheme, but at the same time is crucial to ensure safety, especially during construction, when large weights are moved, placed and secured, frequently at substantial heights. Engineers of all disciplines involved should interact during the development and realisation of precast segmental bridge (PSB) schemes, to conclude the optimum method statement and consequently check all the intermediate steps of the method statement in terms of stress, stiffness, stability, production and constructability. With the ongoing development of the PSB concept, and consequently moving limits in terms of dimensions, it was concluded to be appropriate to develop a Guide to good practice for the PSB construction method.

The present report was developed by an integrated team of engineers with roots in design, structural engineering, production and construction, and provides a valuable source of knowledge, experience, recommendations and examples, with particular emphasis on the fib Model Code for Concrete Structures 2010 and fib Bulletins 20, 33, 48 and 75.

I would like to thank all the members of Task Group 1.7, all the individual contributors from outside Task Group 1.7, and the reviewers of the Technical Council of the fib for their contribution to this Guide to good practice. In particular, I would like to thank Gopal Srinivasan and Marcos Sanchez, who, apart from their own contributions, did the final editorial work for this bulletin.

Prof. Aad van der Horst, M.Sc.

