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HOLLOW SECTIONS IN STRUCTURAL APPLICATIONS



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PREFACE

The global construction market requires a world-wide coordination of product-, testing-, design- and execution-standards, so that contracts for delivery of products and for engineering- and construction services can be agreed on a common basis without barriers.

The mission of CIDECT is to combine the research resources of major hollow section manufacturers in order to create a major force in the research and application of hollow steel sections world wide. This forms the basis of establishing coordinated and consistent international standards.

For the ease of use of such standards, it is however necessary to reduce their content to generic rules and to leave more object-oriented detailed rules to accompanying non-conflicting complementary information, that have the advantage to be more flexible for the adaptation to recent research results and to be useable together with any international code.

The book by J. Wardenier, J.A. Packer, X.-L. Zhao and G.J. van der Vegte "Hollow sections in structural applications" is such a source, developed in an international consensus of knowledge on the topic. It incorporates the recently revised design recommendations for hollow sections joints of the International Institute of Welding, IIW (2009) and CIDECT (2008 and 2009). Both are consistent with each other and are the basis for the Draft ISO standard for Hollow Section Joints (ISO 14346) and may form the basis for future maintenance, further harmonisation and further development of Eurocode 3 (EN 1993-1-8), AISC (ANSI/AISC 360) and the CISC recommendations.

For the use together with EN 1993-1-8 and ANSI/AISC 360, both being based on the previous IIW (1989) recommendations, the main differences to these rules are highlighted.

The authors are all internationally recognized experts in the field of tubular steel structures, three of them having been chairmen of the IIW-Subcommission XV-E on "Tubular Structures" since 1981. This committee is the pre-eminent international authority producing design recommendations and standards for onshore tubular structures.

This book should therefore be an invaluable resource for lecturers, graduate students in structural, architectural and civil engineering, explaining the important principles in the behaviour of tubular steel structures. It is also addressed to designers of steel structures who can find in it the special items related to the use of hollow sections, in particular joints, their failure modes and analytical models as supplements to more general design codes.

Aachen, Germany, August 2010

Prof. Dr.-Ing. Dr.h.c. Gerhard Sedlacek

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This book gives the background to design with structural hollow sections in general and in particular for joints to hollow sections. For the latter, the recently updated recommendations of the International Institute of Welding (IIW, 2009) and CIDECT (2008 and 2009) are adopted.

The background to design recommendations with the relevant analytical models is especially important for students in Structural and Civil Engineering, whereas the design recommendations themselves serve more as an example. Since the available hours for teaching Steel Structures, and particularly Tubular Structures, vary from country to country, this book has been written in a modular form. The presentation generally follows European codes, but the material is readily adapted to other (national) codes.

Since the first edition of this book was used not only by students but also by many designers, this second edition was needed due to the recent update of the recommendations by IIW and the subsequent revision of the CIDECT Design Guides Nos. 1 and 3 in 2008 and 2009.

The new IIW (2009) recommendations and the revised CIDECT Design Guides Nos. 1 and 3 (2008 and 2009) are consistent with each other and are the basis for the Draft ISO standard for Hollow Section Joints (ISO 14346). Although the current Eurocode 3 (EN 1993-1-8, 2005) and AISC (2010) recommendations are still based on the previous IIW (1989) and CIDECT (1991 and 1992) recommendations, it is expected that in the next revision these will follow the new IIW and CIDECT recommendations presented in this book.

Besides the static design recommendations and background for hollow section joints, information is given for member design in Chapter 2, composite structures in Chapter 4, and fire resistance in Chapter 5. These chapters fully comply with the latest versions of the Eurocodes (EN 1993 and EN 1994). Further, fatigue design of hollow section joints is covered in Chapter 14.

We wish to thank our colleagues from the IIW Sub-commission XV-E "Tubular Structures" and from the CIDECT Project Working Group and the CIDECT Technical Commission for their constructive comments during the preparation of this book.

We are very grateful that Prof. J. Stark and Mr. L. Twilt were willing to check Chapters 4 and 5 respectively on composite members and fire resistance.

Appreciation is further extended to the authors of CIDECT Design Guides Nos. 1 to 9 and to CIDECT for making parts of these Design Guides or background information available for this book.

Finally, we wish to thank CIDECT for the initiative to update this book.

Delft, The Netherlands, September 2010

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