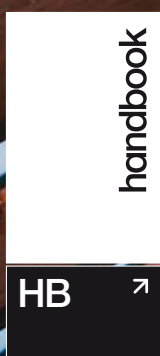




SA HB 108—2013
Timber design handbook

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SA HB 108—2013

TIMBER DESIGN HANDBOOK

In accordance with the
Australian Limit State Timber Design Standard
AS 1720.1—2010
Timber structures, Part 1: Design methods

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The information in this publication is intended for general guidance only. It represents the authors' individual interpretation of AS 1720.1—2010, *Timber structures, Part 1: Design methods*, and should not be interpreted to necessarily reflect the opinion of the joint Standards Australia/Standards New Zealand Committee TM-001, Timber Structures. While every effort has been made to ensure the correctness of the contents, no responsibility for its use can be taken by Standards Australia or the Authors.

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PREFACE

This Handbook has been specifically written to provide guidance on the use of AS 1720.1, *Timber structures*, Part 1: *Design methods* for Australian engineering students and practising engineers. The first edition of the Handbook was published in 1998. Since then, there has been a revision of the Standard, an increase in the range of structural timber products, and a move by the Australian building industry to embrace sustainable building products and systems. This second edition addresses these changes in a way that is relevant and practical for Australian designers.

Throughout history, people have used wood for many reasons and enjoyed its beauty, workability and practicality. As Australia moves to a low carbon economy, the advantages of timber are making it the material of choice for a growing range of applications. Structural timber has a secure place in the future of sustainable construction.

Structural timber products are available in a variety of forms including sawn timber, glued-laminated timber and engineered products such as LVL, plywood, I-beams, and cross-laminated timber (CLT). These products can be used in both well-established construction forms and innovative building systems as part of simple, large or iconic buildings and structures. This Handbook can be used to develop the understanding and confidence necessary to efficiently and effectively design in timber.

Information is presented in a way that helps readers develop a “feel” for the behaviour of timber, and an understanding of both what to do and why it has to be done. The Handbook uses an explanatory style that is appropriate for self-paced learning. It can be a text for undergraduate or postgraduate students in tertiary education, or a companion document to the Timber Structures Standard for practitioners, including those that may have received little formal education in timber structures. It provides:

- explanations of timber behaviour;
- mathematical expressions that model the material behaviour;
- easy-to-use tables that complement those in the Standard;
- step-by-step design summaries;
- illustrations and worked examples using Australian Standards; and
- practice problems to reinforce the understanding of behaviour and enhance design skills.

The chapters are organised in a logical sequence for learning: wood science, design actions, behaviour and design of members, and finally design detailing. The comprehensive index and table of contents will also help readers use the Handbook as a reference tool to find answers to specific questions. The appendices include a comprehensive list of cross-sectional properties for commonly used structural timber products and guidance on selecting design parameters.

The Handbook reflects the involvement of Geoff Boughton and Keith Crews in the development and revision of AS 1720.1, their experience as consultant engineers, and as university lecturers. It explains the use of AS 1720.1, and where appropriate, AS/NZS 1170. It provides support for the design of timber structures in Australia so that engineering students and practicing engineers have the skills to use structural timber with competence and confidence.



Boris Iskra
Forest & Wood Products Australia
National Manager, Codes & Standards

This Handbook is dedicated to Dr Robert (Bob) Leicester, formerly a Chief Research Scientist CSIRO, whose work over many years has underpinned much of the limit states Timber Design Standard, AS 1720.1.

ACKNOWLEDGEMENTS

This Handbook has evolved over several years, concurrently with the development of the limit state version of the Timber Structures Standard. Drafts of the first edition were circulated among the timber industry and academia, and the first edition has been used in teaching at a number of Australian universities. Many helpful comments and corrections have come from students and other academics during this time. Several of our colleagues who have also been involved in the development of AS 1720.1 have provided invaluable comment, which has enabled the text to reflect the intent and purpose of the Standard. The second edition has been developed to reflect changes to AS 1720.1 and to the loading standards since the publication of the first edition.

In particular, in conjunction with the first edition, we would like to thank:

Colin MacKenzie (Technical Director of Timber Queensland), Mick McDowel and Leigh Punton (then of EWPA) for their extensive review of the text. Bruce Hutchings (TimberBuilt P/L), John Carson (then of Pine Australia), and Dr Bob Leicester (then of CSIRO) also assisted with thoughtful comments from an industry perspective. Dr Stephan Bernard (then of University of Western Sydney) and Prof. Andy Buchanan (University of Canterbury, NZ), gave valuable feedback from a teaching perspective, and the late Prof. Borg Madsen (Vancouver, Canada), provided inspiration and guidance even before the Handbook was started. We are especially grateful for the continued support and encouragement of our families, during the development of the Handbook.

The second edition was developed with significant contribution from Debbie Falck and Julie Falck, Engineering assistants with TimberED Services Pty Ltd. The assistance of Chi-Nam Si, long time Standards Australia Project Manager for timber standards, is also gratefully acknowledged.

The timber engineering community in Australia has developed design and analysis methods that suit our collection of engineering products and service environments. The work of many people over almost a century in Australia has led to the understanding that has been captured in this book so that future generations of timber engineers can benefit from their work.

Geoff Boughton
Keith Crews

February, 2013

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