

AS 4100—1990

Australian Standard<sup>®</sup>

---

**Steel structures**

---

This Australian Standard was prepared by Committee BD/1. It was approved on behalf of the Council of Standards Australia on 6 August 1990 and published on 26 October 1990.

---

The following interests are represented on Committee BD/1:

Association of Consulting Engineers Australia  
Australian Construction Services  
Australian Institute of Steel Construction  
AUSTROADS  
Building Management Authority, WA  
Bureau of Steel Manufacturers of Australia  
CSIRO, Division of Building, Construction and Engineering  
Confederation of Australian Industry  
Institution of Engineers, Australia  
Metal Trades Industry Association of Australia  
Public Works Department, NSW  
Railways of Australia Committee  
University of New South Wales  
University of Queensland  
University of Sydney  
Welding Technology Institute of Australia

---

**Review of Australian Standards.** To keep abreast of progress in industry, Australian Standards are subject to periodic review and are kept up to date by the issue of amendments or new editions as necessary. It is important therefore that Standards users ensure that they are in possession of the latest edition, and any amendments thereto. Full details of all Australian Standards and related publications will be found in the Standards Australia Catalogue of Publications; this information is supplemented each month by the magazine 'The Australian Standard', which subscribing members receive, and which gives details of new publications, new editions and amendments, and of withdrawn Standards.

Suggestions for improvements to Australian Standards, addressed to the head office of Standards Australia, are welcomed. Notification of any inaccuracy or ambiguity found in an Australian Standard should be made without delay in order that the matter may be investigated and appropriate action taken.

---

*This Standard was issued in draft form for comment as DR 87164.*

© Copyright — STANDARDS AUSTRALIA

Users of Standards are reminded that copyright subsists in all Standards Australia publications and software. Except where the Copyright Act allows and except where provided for below no publications or software produced by Standards Australia may be reproduced, stored in a retrieval system in any form or transmitted by any means without prior permission in writing from Standards Australia. Permission may be conditional on an appropriate royalty payment. Requests for permission and information on commercial software royalties should be directed to the Head Office of Standards Australia.

Standards Australia will permit up to 10 percent of the technical content pages of a Standard to be copied for use exclusively in-house by purchasers of the Standard without payment of a royalty or advice to Standards Australia.

Standards Australia will also permit the inclusion of its copyright material in computer software programs for no royalty payment provided such programs are used exclusively in-house by the creators of the programs.

Care should be taken to ensure that material used is from the current edition of the Standard and that it is updated whenever the Standard is amended or revised. The number and date of the Standard should therefore be clearly identified.

The use of material in print form or in computer software programs to be used commercially, with or without payment, or in commercial contracts is subject to the payment of a royalty. This policy may be varied by Standards Australia at any time.

AS 4100—1990

Australian Standard<sup>®</sup>

---

## Steel structures

---

For history before 1990, see Preface.  
AS 4100 first published 1990.

Incorporating:  
Amdt 1—1992  
Amdt 2—1993  
Amdt 3—1995

PUBLISHED BY STANDARDS AUSTRALIA  
(STANDARDS ASSOCIATION OF AUSTRALIA)  
1 THE CRESCENT, HOMEBUSH, NSW 2140

ISBN 0 7262 6493 8

## PREFACE

This Standard was prepared by the Standards Australia Committee on Steel Structures to supersede AS 1250—1981, *SAA Steel Structures Code*, and AS 1511—1984, *SAA High-Strength Structural Bolting Code*, which are to be withdrawn 12 months after publication of this Standard.

AS 4100 for Steel Structures was first published in part as AS CA1 of 1933. The second edition of AS CA1 was published in 1939. In 1952, this Standard was revised and issued as Interim Standard SAA Int. 351. This Interim Standard was revised in 1968 and redesignated as AS CA1. The last edition of AS CA1, which was in imperial units, was published in 1972 and withdrawn in 1976. It was published as a parallel code to the metric version which was designated AS 1250 of 1972. These two Standards were amalgamated and published in a new edition of AS 1250 in 1975 with a second edition in 1981.

Also incorporated in the new AS 4100 is AS 1511 of 1984. This was originally published in 1966 as AS CA45, the *SAA Code for High Strength Bolting*. The second edition of AS CA45 was published in 1970 and withdrawn in 1976. It was superseded by and ran concurrently with the metric version, AS 1511 of 1973. The second edition of AS 1511 was published in 1984.

AS 1250 of 1981 (to run concurrently for 12 months after publication of the new Standard) and AS 1511 of 1984 were revised, amalgamated and redesignated AS 4100 in 1990.

During the preparation of this Standard, the limit state steel structures Standards of other countries, notably Canada, the United States, and the United Kingdom, and Eurocode No.3 produced by countries of the European Economic Community were considered. Of those countries, Canada has had a limit state steel structures code since 1974, while those in the UK and USA are of more recent origin (1985 and 1986 respectively).

Other technical documents considered or referred to in the preparation of individual Clauses or Sections of this Standard are cited in the Commentary to this Standard.

This Standard differs from the previous Standard in both the design approach and the content. The following brief outline gives some indication of the nature and extent of the differences to be found.

*Limit-states format* In keeping with current Standards Australia and ISO policy on structural design Standards, the appropriate functional states and the corresponding performance limits are presented generally in the format of design actions and corresponding design capacities, expressed generally in force units. This represents a major step towards a probabilistic approach to structural design Standards.

*General application* Where necessary, the requirements of the Standard have been broadened and modified to cover not only building structures but cranes and bridges. This Standard does not apply to steel for which the yield stress used in design is greater than 450 MPa.

The relevant provisions of the Standard have been widened so that it is now suitable for bridge design in conjunction with the AUSTROADS Bridge Design Code or the ANZRC Railway Bridge Design Manual. However, additional or more stringent provisions for some aspects of steel bridge design may still be required by the relevant Authority.

*New inclusions* The new Sections that have been included in the Standard are:

- Methods of analysis
- Brittle fracture
- Fatigue
- Fire
- Earthquake
- Modification of existing structures
- Testing of structures or elements

Some of these are entirely new Sections, while others are expansions of earlier notes or appendices, or are transferred from other codes.

*Major technical revisions.* Major technical revisions have been made in the design of members subject to bending, compression, tension, or combined actions. These changes reflect recent advances in research into structural behaviour and computational methods for analysis. The basis for each technical provision is discussed in the Commentary together with selected references from the published technical literature.

*Tiered approach* A tiered approach to design has been introduced to allow the designer more flexibility in the choice of a design method to suit a particular project. Simplified rules are generally presented first, with more complex but economical rules following.

*Editorial changes* Advantage has been taken of the current revision to rearrange the material contained in the Standard so that it is more readily usable by the practising design engineer.

## CONTENTS

	<i>Page</i>
SECTION 1. SCOPE AND GENERAL	
1.1 SCOPE .....	6
1.2 REFERENCED DOCUMENTS .....	6
1.3 DEFINITIONS .....	6
1.4 NOTATION .....	8
1.5 USE OF ALTERNATIVE MATERIALS OR METHODS .....	15
1.6 DESIGN .....	16
1.7 CONSTRUCTION .....	16
SECTION 2. MATERIALS	
2.1 YIELD STRESS AND TENSILE STRENGTH USED IN DESIGN .....	17
2.2 STRUCTURAL STEEL .....	17
2.3 FASTENERS .....	17
2.4 STEEL CASTINGS .....	17
SECTION 3. GENERAL DESIGN REQUIREMENTS	
3.1 DESIGN .....	20
3.2 LOADS AND OTHER ACTIONS .....	20
3.3 STABILITY LIMIT STATE .....	20
3.4 STRENGTH LIMIT STATE .....	21
3.5 SERVICEABILITY LIMIT STATE .....	21
3.6 STRENGTH AND SERVICEABILITY LIMIT STATES BY LOAD TESTING .....	22
3.7 BRITTLE FRACTURE .....	22
3.8 FATIGUE .....	22
3.9 FIRE .....	22
3.10 EARTHQUAKE .....	22
3.11 OTHER DESIGN REQUIREMENTS .....	22
SECTION 4. METHODS OF STRUCTURAL ANALYSIS	
4.1 METHODS OF DETERMINING ACTION EFFECTS .....	23
4.2 FORMS OF CONSTRUCTION ASSUMED FOR STRUCTURAL ANALYSIS .....	23
4.3 ASSUMPTIONS FOR ANALYSIS .....	23
4.4 ELASTIC ANALYSIS .....	24
4.5 PLASTIC ANALYSIS .....	28
4.6 MEMBER BUCKLING ANALYSIS .....	28
4.7 FRAME BUCKLING ANALYSIS .....	32
SECTION 5. MEMBERS SUBJECT TO BENDING	
5.1 DESIGN FOR BENDING MOMENT .....	34
5.2 SECTION MOMENT CAPACITY FOR BENDING ABOUT A PRINCIPAL AXIS .....	34
5.3 MEMBER CAPACITY OF SEGMENTS WITH FULL LATERAL RESTRAINT .....	36
5.4 RESTRAINTS .....	37
5.5 CRITICAL FLANGE .....	40
5.6 MEMBER CAPACITY OF SEGMENTS WITHOUT FULL LATERAL RESTRAINT .....	41
5.7 BENDING IN A NON-PRINCIPAL PLANE .....	45
5.8 SEPARATORS AND DIAPHRAGMS .....	46
5.9 DESIGN OF WEBS .....	46
5.10 ARRANGEMENT OF WEBS .....	46
5.11 SHEAR CAPACITY OF WEBS .....	47
5.12 INTERACTION OF SHEAR AND BENDING .....	49
5.13 COMPRESSIVE BEARING ACTION ON THE EDGE OF A WEB .....	50
5.14 DESIGN OF LOAD BEARING STIFFENERS .....	52
5.15 DESIGN OF INTERMEDIATE TRANSVERSE WEB STIFFENERS .....	53
5.16 DESIGN OF LONGITUDINAL WEB STIFFENERS .....	54

This is a free preview. Purchase the entire publication at the link below:

[Product Page](#)

- 
- Looking for additional Standards? Visit Intertek Inform Infostore
  - Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation
-