AS 5100.6—2004
AP-G15.6/04
(Incorporating Amendment Nos 1 and 2)

Australian Standard®

Bridge design

Part 6: Steel and composite construction

This Australian Standard® was prepared by Committee BD-090, Bridge Design. It was approved on behalf of the Council of Standards Australia on 2 December 2003.
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The following are represented on Committee BD-090:

- Association of Consulting Engineers Australia
- Australasian Railway Association
- Austroads
- Bureau of Steel Manufacturers of Australia
- Cement and Concrete Association of Australia
- Institution of Engineers Australia
- Queensland University of Technology
- Steel Reinforcement Institute of Australia
- University of Western Sydney

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Standards Australia wishes to acknowledge the participation of the expert individuals that contributed to the development of this Standard through their representation on the Committee and through the public comment period.

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PREFACE

This Standard was prepared by the Standards Australia Committee BD-090, Bridge Design, to supersede HB 77.6—1996, *Australian Bridge Design Code*, Section 6: *Steel and composite construction*.

This Standard incorporates Amendment No. 1 (May 2010) and Amendment No. 2 (December 2010). The changes required by the Amendment are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.

The AS 5100 series represents a revision of the 1996 HB 77 series, *Australian Bridge Design Code*, which contained a separate Railway Supplement to Sections 1 to 5, together with Section 6, *Steel and composite construction*, and Section 7, *Rating*. AS 5100 takes the requirements of the Railway Supplement and incorporates them into Parts 1 to 5 of the present series, to form integrated documents covering requirements for both road and rail bridges. In addition, technical material has been updated.

This Standard is also designated as AUSTROADS publication AP-G15.6/04.

The objectives of AS 5100 are to provide nationally acceptable requirements for—

(a) the design of road, rail, pedestrian and bicycle-path bridges;

(b) the specific application of concrete, steel and composite construction, which embody principles that may be applied to other materials in association with relevant Standards; and

(c) the assessment of the load capacity of existing bridges.

These requirements are based on the principles of structural mechanics and knowledge of material properties, for both the conceptual and detailed design, to achieve acceptable probabilities that the bridge or associated structure being designed will not become unfit for use during its design life.

Whereas earlier editions of the *Australian Bridge Design Code* were essentially administered by the infrastructure owners and applied to their own inventory, an increasing number of bridges are being built under the design-construct-operate principle and being handed over to the relevant statutory authority after several years of operation. This Standard includes clauses intended to facilitate the specification to the designer of the functional requirements of the owner to ensure the long-term performance and serviceability of the bridge and associated structure.

Significant differences between this Standard and HB 77.6 are the following:

(i) *Classification of sections* For the purpose of determining bending moment resistance, the classifications of sections have been changed to be either compact or not compact. Not-compact sections now include the previous classification of slender section, as well as non-compact.

(ii) *Analysis for bending moment resistance* For compact sections, the bending moment resistance is determined using plastic analysis; for not-compact sections, the bending moment resistance is determined using elastic analysis.

A1 (iii) *Deflection limits for beams* Deflection limits for beams in road bridges is now covered by AS 5100.2. Where deflections exceed the guideline limits given in AS 5100.2, the onus is on the designer to demonstrate that the serviceability of the bridge or related structure is not adversely affected.

(iv) *Steel reinforcement in composite deck slabs* The requirements for minimum longitudinal concrete deck reinforcement to control heat of hydration and differential shrinkage effects in steel/concrete composite bridge decks have been expanded. The requirements in this Standard allow for a rigorous analysis procedure based on limiting crack widths, in addition to the existing deemed to comply rules.

In line with Standards Australia policy, the words ‘shall’ and ‘may’ are used consistently throughout this Standard to indicate respectively, a mandatory provision and an acceptable or permissible alternative.

Statements expressed in mandatory terms in Notes to tables are deemed to be requirements of this Standard.

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the appendix to which they apply. A ‘normative’ appendix is an integral part of a Standard, whereas an ‘informative’ appendix is only for information and guidance.

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SECTION 1 SCOPE AND GENERAL

1.1 SCOPE AND APPLICATION

1.1.1 Scope

This Standard sets out minimum requirements for the design of the structural steelwork in bridges. Wrought and cast iron structures may be checked in accordance with this Standard, using the appropriate material properties and capacity reduction factors.

In addition, this Standard applies to the design of other steel components of bridges including steel piers, steel railings and sign structures.

In the design of composite steel and concrete members, the general requirements of AS 5100.5 pertaining to the design of concrete shall apply, where relevant, in addition to the requirements of this Standard.

This Standard does not cover the steelwork of the following structures, members and materials:

(a) Bridges with orthotropic plate decks.

(b) Cold-formed members other than those complying with AS 1163.

(c) Steel members for which the value of yield stress (f_y) used in design exceeds 450 MPa.

(d) Steel elements, other than packers, less than 3 mm thick.

1.1.2 Application

The requirements for bridges, members and materials specified in Items (a) to (d) of Clause 1.1.1, and for new and unusual bridge types shall be designated by the relevant authority.

The design of structural elements using non-ferrous metals such as aluminium alloys is not covered in this Standard. Where such components are to carry calculated stress, the applicable specification to be used in their design shall be designated by the relevant authority.

1.2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

A1 | 1110 ISO metric hexagon bolts and screws—Products A and B—Bolts

1111 ISO metric hexagon bolts and screws—Product C—Bolts

1112 ISO metric hexagon nuts

1112.1 Part 1: Style 1—Product grades A and B

