AS 5100.2:2017
(Incorporating Amendments up to and including No. 2)

Australian STANDARD®

STANDARDS Australia

Bridge design

Part 2: Design loads

AS 5100.2:2017

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Australian Industry Group
Australian Steel Institute
Austroads
Bureau of Steel Manufacturers of Australia
Cement and Concrete Association of New Zealand
Cement Concrete & Aggregates Australia-Cement
Concrete Institute of Australia
Consult Australia
Engineers Australia
New Zealand Heavy Engineering Research Association
Rail Industry Safety and Standards Board
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Reissued incorporating Amendment No 2 (June 2024).

Preface

This Standard was prepared by the Standards Australia Committee BD-090, Bridge Design, to supersede AS 5100.2—2004.

This Standard incorporates Amendment No. 1 (August 2017) and Amendment No. 2 (June 2024). The start and end of changes introduced by the Amendment are indicated in the text by tags including the Amendment number.

This Standard is also designated as Austroads publication AP-G51.2-17.

The objectives of the AS(AS/NZS) 5100 series are to provide nationally acceptable requirements for—

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

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

(c) the assessment of the load capacity of existing bridges; and

(d) the strengthening and rehabilitation of existing bridges.

The objective of this Part (AS 5100.2) is to specify minimum design loads and load effects for road, rail, pedestrian and cyclist path bridges, and other associated structures.

The requirements of the AS(AS/NZS) 5100 series 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.

Significant differences between this Standard and AS 5100.2—2004 are the following:

(i) Changes and clarifications to the provision for collision loads from rail traffic.

(ii) Changes to dynamic load allowance for rail traffic load effects.

(iii) Addition to provisions for bridge collision from waterway traffic.

(iv) Updated bridge traffic barrier loads to more closely reflect vehicles currently using the road network. Barrier test levels and minimum effect heights were adopted from the AASHTO *Manual for Assessing Safety Hardware* (MASH 2009) which replaced NCHRP Report 350 (1993).

(v) Earthquake design procedures for bridges rewritten to align with the current earthquake loading Standard AS 1170.4—2007, *Structural design actions*, Part 4: *Earthquake actions in Australia*. New displacement-based earthquake design procedures were included.

(vi) Improvement to serviceability and fatigue limit states for road signs and lighting structures.

(vii) Expansion of water flow forces to include impact from large moving objects during flood events.

(viii) Addition of light rail vehicles.

Other differences between this Standard and AS 5100.2—2004 are the following:

(A) Improved pedestrian and cyclist path barrier loads.

(B) Expanded dynamic loads for pedestrian and cyclist path bridges.

(C) New table for unfactored vertical pressure due to design rail traffic loads.

(D) Inclusion of super-t girders in the calculation of bridge thermal effects.

(E) Clarification of loads and load factors for construction loads.

(F) Addition of protective screen design for wind load and robustness.

(G) New fire effect load case.

A number of new or revised appendices have been added to this edition of the Standard, which provide additional information and guidance as follows:

(1) Update to special performance level bridge barrier loads.

(2) New alternative force-based earthquake design procedures.

(3) Bending moment and shear force for SM1600 and 300LA loads for simply supported spans.

(4) A summary of load factors and load combinations.

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

[A2] [Text deleted.] [A2]

The term 'informative' has been used in this Standard to define the application of the appendix to which it applies. An 'informative' appendix is only for information and guidance.

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1 Scope and general

1.1 Scope

This Standard sets out minimum design loads, forces and load effects for road, rail, pedestrian and cyclist path bridges, and other associated structures.

1.2 General

Structures shall be proportioned for the design loads, forces and load effects in accordance with Clauses 6 to 26, as appropriate.

NOTE If the relevant authority approves, the designer may vary any of the loads set out in this Standard, provided the provisions of AS 5100.1 are complied with.

The design loads and forces shall be considered as acting in combinations as set out in Clause 23.

NOTE A summary of load factors is tabulated in Appendix D.

Each individual bridge shall be assessed to ascertain whether any other loads, forces or load effects are applicable for that particular design. The magnitude of these additional forces or load effects and their combination with other loads shall be consistent with the principles set out in AS 5100.1.

On the front sheet of the bridge drawings, the following details relating to design loads shall be shown, where relevant:

(a) The Standard used.

(b) Any significant variation to the minimum design loads as set out in this Standard.

(c) Traffic load, e.g. 300LA and SM1600, including lateral position, if critical, and the number of design lanes.

(d) Design traffic speed.

(e) Fatigue criteria, including number of cycles and route factor.

(f) Pedestrian loads, both horizontal and vertical.

(g) Collision load on the structure (e.g. substructure and superstructure where applicable) or alternative load paths provided.

(h) Design wind speeds.

(i) Flood data, e.g. design velocities, levels, debris, and the like.

(j) Earthquake criteria.

(k) Differential settlements and mining subsidence effects allowed for in the design.

(l) Foundation data where not shown elsewhere.

(m) Barrier performance level.

(n) The construction loads, methods and sequence, and any other specific limitations.