AS 3600—2001
(Incorporating Amendment No. 1
and Amendment No. 2)

AS 3600—2001

Australian Standard™

Concrete structures

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The following are represented on Committee BD-002:

AUSTROADS
Australian Building Codes Board
Australian Pre-Mixed Concrete Association
Bureau of Steel Manufacturers of Australia
Cement & Concrete Association of Australia
Concrete Institute of Australia
Curtin University of Technology
Institution of Engineers Australia
Master Builders Australia
National Precast Concrete Association Australia
Steel Reinforcement Institute of Australia
The Association of Consulting Engineers Australia
The University of Adelaide
The University of Melbourne
The University of New South Wales
The University of Western Sydney

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PREFACE

This Standard was prepared by Standards Australia Committee BD-002, Concrete Structures, to supersede AS 3600—1994.

*This Standard incorporates Amendment No. 1 (*May 2002*) and Amendment No. 2 (*October 2004*). 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.*

Objective of the Standard

The principal objective of the Standard is to provide users with nationally acceptable unified rules for the design and detailing of concrete structures and elements, with or without steel reinforcement or prestressing tendons, based on the principles of structural engineering mechanics. The secondary objective is to provide performance criteria against which the finished structure can be assessed for compliance with the relevant design requirements.

Background to the Third Edition

Amendment No. 1 to the 1994 edition of the Standard was issued in August 1996 to take account of the low ductility of wire to AS 1303 and mesh to AS 1304. It also incorporated improvements based on user experience in implementing AS 3600.

Following a five-year review, further amendments to the Standard were approved by the Concrete Structures Committee in August 1999. These amendments take account of more recent revisions of key materials Standards, and incorporate additional improvements to the clarity and intent of particular requirements, based on user comments.

In view of the number and extent of the amendments to AS 3600 now involved, the SAI Concrete Structures Committee recommended that, rather than issuing further ‘green slip’ amendments, a Third Edition of AS 3600 be published which incorporated all published and approved amendments, Amendment 1 and 2.

Differences between the Second and Third editions of AS 3600

As noted in the opening paragraphs of the Preface, this Edition incorporates Amendment No. 1 of August 1996 and amendments approved in August 1999.

Areas of major change covered in Amendment 2, which have been incorporated into this edition, are as follows:

1 Introduction of 500 MPa reinforcing steel with AS/NZS 4671 covering the specification for the new grade of reinforcing steel. The carbon equivalent of the reinforcement has been held to a level so that current practices for site welding of reinforcement including ‘locational tack welding’ can continue to be used.

2 Increase in the maximum concrete compressive strength to 65 MPa.

3 Consistency of references and information within AS 1379—*Specification and supply of concrete*, including a change to the basic shrinkage strain value to reflect normal class concrete.

4 Fire-resistance periods for the structural adequacy for columns has been revised following research by BRANZ, and allowances for chases and recesses in concrete walls have been included and are consistent with those in AS 3700, *Masonry structures*.

5 Linear elastic analysis requirements have been reviewed with consideration of propping, effective stiffness, secondary effects and moment redistribution.

6 Beam strength and serviceability design requirements have been significantly reviewed with changes to the minimum strength requirements, deflection by simplified calculation, the deemed to comply span-to-depth ratios, crack control provisions and end anchorage of fitments among others. The maximum transvese bar spacing have also been increased.

7 Changes have been made to the rules for flexural crack control of slabs, including reduction of the maximum transverse bar spacing.

8 Development length and splicing of reinforcement has been revisited and include amendments to the deemed to comply lengths and the size of bars permitted in tension and compression lapped splices. Rules for welded and mechanical splices have been removed and new rules are under development.

9 Material requirements have been updated with reference to the current AS 1379 and the new reinforcing steels to AS/NZS 4671.

10 Section 20 has been deleted in its entirety, with all aspects of the testing and assessment of concrete referred to AS 1379.

11 Section 21, on the testing of members and structures, has been completely redrafted and relabelled as Appendix B.

The Committee is in the process of a major revision of AS 3600, which includes the areas of high-strength concrete, bond and anchorage requirements and application of mechanical and welded splices.

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 and construction of concrete structures and members that contain reinforcing steel, or tendons, or both. It also sets out minimum requirements for plain concrete members.

This Standard will be referenced in the Building Code of Australia by way of BCA Amendment No. 9 to be published by 1 July 2001, thereby superseding the previous edition, AS 3600—1994, which will be withdrawn 12 months from the date of publication of this edition.

1.1.2 Application

This Standard is intended to apply to concrete structures made of concrete—

(a) with a characteristic compressive strength at 28 days (f'_c) in the range of 20 MPa to 65 MPa; and

(b) with a saturated surface-dry density in the range 1800 kg/m^3 to 2800 kg/m^3.

The Standard also applies to reinforcing steels complying with—

(a) AS 1302, or having a yield strength (f_{sy}) of 500 MPa and Ductility Class N in accordance with AS/NZS 4671. These reinforcing materials may be used, without restriction, in all applications referred to in this Standard; and

(b) AS 1303 or AS 1304, or having a yield strength (f_{sy}) of 500 MPa and Ductility Class L in accordance with AS/NZS 4671. These reinforcing materials shall not be used in any situation where the reinforcement, is expected to undergo large deformation under strength limit state conditions. A1

NOTE: The use of Ductility Class L reinforcement is further limited by other clauses within this Standard.

(c) Prestressing tendons complying with AS 1310, AS 1311, or AS 1313, as appropriate.

For concrete road bridges and for concrete railway bridges, HB77.5 and HB77.8, respectively, shall be used where applicable.

The general principles of concrete design and construction embodied in this Standard may be applied to concrete other than that specified above, or to concrete structures or members not specifically mentioned herein.

This Standard is not intended to apply to the design of mass concrete structures. It is also not intended that the requirements of this Standard should take precedence over those of other Australian Standards.

NOTES:

1 It is intended that the design of a structure or member, to which this Standard applies, be carried out by, or under the supervision of, a suitably experienced and competent person.