AS 3600 Supplement 1— 1994

Concrete structures—Commentary

(Supplement to AS 3600—1994)

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Association of Consulting Engineers, Australia

Australian Construction Services

Australian Federation of Construction Contractors

Australian Precast Concrete Manufacturers Association

AUSTROADS

Bureau of Steel Manufacturers of Australia

Cement and Concrete Association of Australia

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University of New South Wales

University of Sydney

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PREFACE

This Commentary (AS 3600—Supplement 1) was prepared by Standards Australia Committee on Concrete Structures and first published in 1990 to replace MP 28, *Commentary on AS 1480—Concrete Structures Code*, which was withdrawn in January 1991. While it is intended that it be read in conjunction with AS 3600, *Concrete structures*, it does not form an integral part of that Standard.

Objective The objective of this Commentary is—

(a) to provide background reference material to the Clauses in the Standard;

(b) to indicate the origin of particular requirements;

(c) to indicate departures from previous practice; and

(d) to explain the application of certain Clauses.

The clause numbers and titles used in the Commentary are the same as those in AS 3600 except that they are prefixed by the letter C. To avoid possible confusion between Commentary and Standard clauses cross-referenced within the text, Commentary clauses are referred to as 'Paragraph C ...' in accordance with Standards Australia policy.

Gaps in the numerical sequence of Commentary Paragraphs indicate that either the technical requirements of the corresponding clauses in the Standard are essentially the same as those previously given in AS 1480, *Concrete Structures Code* or AS 1481, *Prestressed Concrete Code*, or the committee considered that commentary on these clauses was not needed.

Where appropriate, each Section of the Commentary concludes with a list of references which are cross-referenced numerically in the text, e.g. (Ref. 6) or (Refs 6, 7 and 8). In some Sections additional references for further reading, or as a lead to specialist literature, have also been listed.

As noted in the Preface to AS 3600, the Standard represents a comprehensive revision and amalgamation of AS 1480 and AS 1481. To put things in perspective, AS 1480 and AS 1481 largely dated back to 1973 and essentially represented the technology of the 1960s. Since then there have been considerable advances in materials and construction technology. Also, due to the increased application of computers to modelling and analytical techniques, an improved understanding of both material and member behaviour in complete structures has been realized. More sophisticated analysis and design procedures are now readily available to design-office staff via desktop computers, while complex formulas can be quickly evaluated using electronic calculators.

While the Standard inevitably reflects the abovementioned changes, a considerable amount of material and concepts have been retained from AS 1480 and AS 1481, particularly in those areas where the benefits of technical change seemed doubtful to the committee. However, in all such instances the opportunity was taken to edit retained requirements, in order to remove ambiguities which in the past have led to conflicting interpretations.

Background to second edition

The background to the second edition of this Commentary is essentially the same as that given in the Preface of the second edition of AS 3600, with respect to new and revised reference Standards. Furthermore, in agreeing to a second edition of the Standard rather than the usual 'green-slip' amendments, the Committee also agreed that the same philosophy should in addition apply to the Commentary so that consistency would be maintained between corresponding editions of the two documents.

As the Commentary had not been amended since its publication, the opportunity was taken to include improvements suggested in the interim by users, as well as the appropriate changes necessitated by the 1990 and 1994 amendments to AS 3600. All such changes are indicated by a single bar in the left-hand margin for the extent of the affected text or figure.

Objective of second edition

The objective of the second edition is to provide a clean, updated version of the Commentary that is consistent with the second edition of AS 3600.

Like the Standard itself, this Commentary is neither an immutable nor a perfect document. Suggestions for improvement to the Commentary, in either the content or extent of that provided, are therefore welcomed by Standards Australia.

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SECTION C1 SCOPE AND GENERAL

C1.1 SCOPE AND APPLICATION

C1.1.1 Scope The Standard sets out the minimum requirements for the design and construction of safe, serviceable and durable concrete structures. There may be other requirements, not covered by the Standard, which also have to be considered.

C1.1.2 Application A lower concrete strength limit of 20 MPa has been imposed, as strength grades less than this are not considered suitable for structures.

An upper concrete strength limit of 50 MPa has been adopted because much of the research on which the Standard is based involved concrete strengths at or below this value. Nevertheless, higher strength concretes are being used in Australia and overseas (Refs. 1 and 2). The Standard may possibly be applied without change to concretes with 28-day compressive strengths up to 65 MPa. However, beyond 50 MPa, concrete becomes increasingly brittle in its structural behaviour and, as indicated in Note 2, current detailing requirements may be inadequate for ensuring the necessary elastic and ductile behaviour assumed in the various design Sections.

Concretes made from naturally occurring Australian coarse aggregates have surface-dry densities falling in the range 2100 kg/m^3 to 2800 kg/m^3. Lightweight structural concretes in Australia generally use naturally occurring sands combined with manufactured lightweight aggregates, for which the surface-dry density is seldom less than 1800 kg/m^3. Density limits for structural concretes have been set accordingly.

Design of road and pedestrian bridges is covered by the 'Austroads Bridge Design Code'.

In the preparation of a Standard such as this, a certain level of knowledge and competence of the majority of users has to be assumed. As indicated by the Note, it was assumed that the predominant users of this Standard would be professionally qualified civil or structural engineers experienced in the design of concrete structures, or equally qualified but less experienced persons working under their guidance. It is therefore intended that the Standard be applied and interpreted primarily by such persons.

C1.2 REFERENCED DOCUMENTS The Standards listed in Appendix B are subject to revision from time to time. A check should be made with Standards Australia as to the currency of any Standard referenced in the text.

C1.3 INTERPRETATIONS AND USE OF ALTERNATIVE MATERIALS OR METHODS It is intended that where Committee Interpretations or Opinions are given, which may relate initially to particular projects but have general application, they will be collated and published in a separate document as 'Rulings', which will be updated on a regular basis. The Rulings will then form the basis for future amendments or revisions of the Standard or its Commentary and will be in line with similar 'Rulings' applying to other Australian Standards.