AS 3600:2018 Sup 1:2022

Supplement

Concrete structures — Commentary (Supplement 1 to AS 3600:2018)

AS 3600:2018 Sup 1:2022

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Preface

This Supplement was prepared by Standards Australia Committee BD-002, Concrete Structures, to supersede AS 3600—2009 Supp 1:2014, *Concrete structures—Commentary (Supplement to AS 3600:2009*).

The objective of this document is to provide commentary to assist in the interpretation of the provisions of AS 3600:2018, *Concrete structures*, by —

(a) providing background reference material to the requirements in the Standard;

(b) indicating the origin of particular requirements;

(c) indicating departures from previous practice due to changes that have occurred in construction practice and theory since the previous edition of the Standard was published; and

(d) explaining the application of certain clauses.

In this document, AS 3600:2018 is referred to as "the Standard" or "the 2018 edition of the Standard" while this document is referred to as "this document". The numbers and titles of sections and clauses used in this document align with those in the Standard except that the numbers are prefixed with the letter "C". The figures in this document are numbered according to the clause in which they are referenced and also carry the "C" prefix. Therefore references to sections, clauses, tables, figures, equations and appendices that are not identified by the prefix "C" refer to the Standard unless indicated otherwise.

Documents referenced in the text and documents recommended for further reading are listed at the end of the applicable section or appendix to which they relate.

While it is intended that this document be read in conjunction with the Standard, it does not form an integral part of the Standard.

The opportunity has also been taken to include improvements suggested since the last edition by users. Like the Standard itself, this document is an ongoing work-in-progress. Suggestions for improvements to both the Standard and to this document, in regard either to content or to clarity of wording, are therefore welcomed.

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Section C1 Scope and general

C1.1 Scope and application

C1.1.1 Scope

Most concrete structures in Australia are designed and constructed to comply with the National Construction Code (NCC) (Ref. 1) and for such structures the design requirements are set out in the NCC and in AS/NZS 1170.0 (Ref. 2). AS 3600:2018 (the Standard) sets out minimum provisions for the design and construction of concrete structures in Australia. It is called up by the NCC so that compliance with the requirements of the NCC is deemed to be satisfied by following the provisions of the Standard.

The Standard covers reinforced and prestressed concrete structures. It does not provide rules for all plain concrete structures, except for plain concrete footings and pedestals. The exclusion of mass concrete structures recognizes the fact that they are generally outside the range of normal structures. The treatment of plain concrete members in the Standard is thus limited, and other design criteria, not covered therein, will usually need to be considered in the design of plain concrete members and structures.

Clause 1.1.1 Note 1 points out that much of the content of the Standard is based on general principles and therefore may be applicable to design situations not specifically covered by the Standard.

In the preparation of a standard such as the Standard, a certain level of knowledge and competence of the users has to be assumed. As indicated by Clause 1.1.1 Note 2, it is assumed that the users 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. Therefore it is intended that the Standard be applied and interpreted primarily by such persons. Similarly, it is intended that the construction of the structure be carried out and supervised by suitably qualified persons using appropriate quality control systems.

C1.1.2 Application

Clause 1.1.2 places various restrictions on the materials that can be used in conjunction with the Standard.

A lower limit on concrete compressive strength of 20 MPa is imposed because strength grades less than this are not normally suitable for structures. In the Standard, the upper limit for the concrete compressive strength is 120 MPa. The design procedures in the Standard apply to structures with concrete strengths within these limits. This is not to suggest that concretes with greater strength cannot be produced commercially or cannot be used in the construction of concrete structures. However, when used in such situations, the applicability of the rules given in the Standard needs to be checked.

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.

Chemical, mechanical and dimensional requirements for steel reinforcement having lower characteristic yield/proof stresses (f_{sy}) of 250 MPa or 500 MPa are given in AS/NZS 4671 (Ref. 3). The number corresponding to f_{sy} is also termed the strength grade. AS/NZS 4671 defines three ductility classes distinguished in requirements by the letters “L” (low), “N” (normal) and “E” (earthquake), placed immediately after the strength-grade number. For each ductility class, different minimum values for uniform elongation/strain and maximum stress-to-yield/proof-stress ratio apply. The latter class (E) is