AS 4100 Supplement 1—1990

Steel structures—Commentary

(Supplement to AS 4100—1990)

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PREFACE

This Commentary is intended to be read in conjunction with AS 4100—1990, *Steel Structures*.

The purposes of this Commentary are to—

(a) provide background reference material to the clauses in AS 4100—1990;

(b) indicate the origins of particular requirements;

(c) explain the application of certain clauses; and

(d) provide some assistance in the use of AS 4100—1990.

AS 4100—1990 represents a comprehensive revision of AS 1250—1981, *SAA Steel Structures Code*, and AS 1511—1984, *SAA High-Strength Structural Bolting Code*. To put things into perspective, AS 1250—1981 essentially represented the technology of the 1970s. The considerable advances since then in materials and construction technology and the increased application of computers to modelling and analytical techniques has realized an improved understanding of both material and member behaviour in complete structures. This has led to more sophisticated design procedures which are now readily available to design-office staff.

While AS 4100—1990 inevitably reflects the abovementioned changes, a considerable amount of material and concepts has been retained from AS 1250—1981, particularly in those areas where the benefits of technical change seemed doubtful.

The clause numbers and titles used in this Commentary are the same as those in AS 4100—1990 except that the clause numbers are prefixed by the letter C, e.g. C7.2. In the Commentary, AS 4100—1990 is referred to as 'the Standard'.

Some Clauses in AS 4100—1990 are self-explanatory, and are therefore not discussed in this Commentary. In some cases, additional material is presented which is not directly related to a particular clause of AS 4100—1990.

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SECTION C1 SCOPE AND GENERAL

by T. J. Hogan

C1.1 SCOPE The Standard sets out the minimum requirements for the limit states design, fabrication, erection, and modification of safe, serviceable and durable steel structures. There may be additional requirements not specifically covered that may also have to be considered by designers.

Road bridges are covered by the AUSTROADS Bridge Design Code (currently written in limit states format), while railway bridges are covered by the Bridge Design Manual of the ANZRC (currently not written in limit state format). AUSTROADS uses the Standard as the basis of its steel bridge design provisions. Both organizations are represented on the Committee (BD/1) that drafted the Standard.

Steel elements less than 3 mm in thickness are excluded for reasons of practicality and concern about corrosion, and because members from thinner material are usually cold-formed and then fall within the scope of AS 1538. In addition, the connections in elements less than 3 mm thick are better handled by the provisions of AS 1538 than by the Standard.

The limit of 450 MPa for the yield stress used in design stems from a lack of research data on steel grades above this value, and the applicability of all of the member design provisions for a higher design yield stress cannot be confirmed. Australian steel standards generally contain no steel grades with a specified yield stress above 450 MPa, with the exception of one grade (XF500) in AS 1594. Additional provisions to those in the standards may be required for steels of higher yield stress.

The Clause does not preclude the use of steels having a specified yield stress greater than 450 MPa provided that the yield stress used in design (f_y) is limited to 450 MPa. Note, however, that the use of a steel having a specified yield stress greater than 450 MPa is specifically excluded from plastic design by Clause 4.5.2.

Hollow section members to AS 1163 are most commonly cold-formed, but have traditionally been designed using the previous editions of the Standard since they were for many years hot-formed. Tests carried out on members manufactured to AS 1163 confirm the applicability of the provisions of the Standard for such members. All other cold-formed members must be designed in accordance with AS 1538. Cold-formed hollow section members to AS 1163 with a wall thickness less than 3 mm should be designed in accordance with AS 1538, since the Clause excludes such members.

Composite steel-concrete members, including concrete encased steel members, should be designed using the provisions of AS 2327—SAA Composite Construction Code.

The Standard is not intended to be used for thin walled shell or plate structures since such structures are subject to failure modes not addressed in the Standard. It is, however, considered reasonable to design floor plates using the Standard. (See Introduction to Commentary on Section 5.)

C1.2 REFERENCED DOCUMENTS The Standards listed in Appendix A are subject to revision from time to time and the current issue should always be used. The currency of any standard may be checked with Standards Australia.

C1.3 DEFINITIONS Technical definitions are provided in the Clause. Some technical definitions which are applicable to only one Section are also given in the Section in which they are relevant. A number of the terms defined are common to other standards such as AS 1170.1 and AS 3600.

C1.4 NOTATION The change from the notation used in previous editions of the Standard to the ISO notation has been brought about by Standards Australia's policy of adopting the ISO recommendations on notation wherever practicable. This policy allows a unification of the notation used throughout all Australian Standards on structural design. The same basis has been used in AS 1170 and AS 3600.

The basis of the notation is generally in accordance with ISO 3898, Bases for Design of Structures — Notations — General Symbols.