AS 3990 (Int)

AS 3990 (Int)—1991
(Expires 9 December 1993)

Interim Australian Standard®

Steelwork for engineering applications

STANDARDS AUSTRALIA

This Interim Australian Standard was supported by Committee ME/5, Cranes. It was approved on behalf of the Council of Standards Australia on 5 September 1991 and published on 9 December 1991.

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AS 3990 (Int) first published in part as AS CA1—1933.
Second edition 1939.
Revised and issued as SAA Int. 351—1952.
Revised and issued as AS CA1—1968.
Fourth edition 1972.
AS 1250 first published 1972.
AS CA1—1972 and AS 1250—1972 revised, amalgamated and issued as AS 1250—1975.
AS CA1—1972 withdrawn 1976.
Third edition AS 1250—1981.
Revised and redesignated in part as AS 3990 (Int)—1991.

PUBLISHED BY STANDARDS AUSTRALIA
(STANDARDS ASSOCIATION OF AUSTRALIA)
STANDARDS HOUSE, 80 ARTHUR ST, NORTH SYDNEY NSW
ISBN 0 7262 7123 3

PREFACE

This Interim Standard was prepared by Standards Australia with the support of the Standards Australia Committee for Cranes to provide a working stress method for the design of general engineering steelwork. AS 1250—1981, *SAA Steel Structures Code*, which provided a working stress method, was superseded by AS 4100—1990, *Steel structures*, which provides the limit state design method.

This Interim Standard is for use when the application Standard allows a working stress design method, e.g. for cranes, boilers and pressure vessels, cold-formed steel structures and bulk handling equipment. Where Standards allow the working stress design method by reference to AS 1250, this Interim Standard is deemed to apply.

This Interim Standard will be effective for a period of 2 years only from the date of publication. During this time, a working stress design Standard for general engineering will be developed as a replacement. The committee to develop this Standard will be represented by those who see a need for the continued use of working stress design.

This Interim Standard incorporates the minimum changes necessary to AS 1250—1981. The editorial style has not been updated and the layout remains the same. Amendments 1 and 2 have been incorporated into the text. Referenced Standards have been updated to current editions. Section 10 has been deleted, Section 11 renumbered and new Appendices F and G added. Clauses 1.1, 2.2, 3.3.1, 3.3.5, 9.5.2, 10.1.1, 10.1.4 and 10.1.5; and Appendix C have been revised.

Several Standards Australia Committees (Boilers and Unfired Pressure Vessels, Cranes, and Bulk Handling Equipment) have requested a working stress method for designing steelwork be retained.

The working stress method is considered more appropriate for a number of general engineering design applications including torsion, combined bending and torsion, point loads, complex details, and fatigue. The allowance of the principle of superposition in stress calculation will be of benefit, particularly where no computer is available. AS 4100 permits some yielding and higher working stresses than are appropriate for cranes which can be subject to high duty cycles.

The continued use of the working stress design method for cranes is in accordance with ISO 8686-1, *Cranes—Design principles for loads and load combinations*. Part 1: *General*, which permits both limit state and working stress design methods.

Attention is drawn to the following Australian and British Standards and other documents which may be required for use in connection with this Standard:

AS
1110 ISO metric hexagon precision bolts and screws

1111 ISO metric hexagon commercial bolts and screws

1112 ISO metric hexagon nuts, including thin nuts, slotted nuts and castle nuts

1163 Structural steel hollow sections

1170 SAA Loading Code
1170.1 Part 1: Dead and live loads and load combinations
1170.2 Part 2: Wind loads
1170.3 Part 3: Snow loads

1252 High strength steel bolts with associated nuts and washers for structural engineering

1275 Metric screw threads for fasteners

1302 Steel reinforcing bars for concrete

1303 Steel reinforcing wire for concrete

1391 Methods for tensile testing of metals

1418 SAA Crane Code

1480 SAA Concrete Structures Code

1538 SAA Cold-formed Steel Structures Code

1554 SAA Structural Steel Welding Code
1554.1 Part 1: Welding of steel structures
1554.2 Part 2: Arc stud welding (steel studs to steel)
1554.5 Part 5: Welding of steel structures subject to high levels of fatigue loading

1559 Fasteners—Bolts, nuts and washers for tower construction

1594 Hot-rolled steel flat products

1627 Metal finishing—Preparation and pretreament of surfaces
1627.7 Part 7: Hand tool cleaning of metal surfaces

AS
1735 SAA Lift Code
2074 Steel castings
2121 SAA Earthquake Code
2214 SAA Structural Steel Welding Supervisors Certification Code
2312 Guide to the protection of iron and steel against exterior atmospheric corrosion
2812 Welding, brazing and cutting of metals—Glossary of terms
3678 Hot-rolled structural steel plates, floorplates and slabs
3679 Structural Steel
3679.1 Part 1: Hot-rolled bars and sections
3679.2 Part 2: Welded sections
4100 Steel structures
BS
5135 Metal-arc welding of carbon and carbon manganese steels
Supplement 1 (PD 3343) to BS 449,
Part 1: Recommendations for design (withdrawn)

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STANDARDS AUSTRALIA

Interim Australian Standard
Steelwork for engineering applications

SECTION 1. SCOPE AND GENERAL

1.1 SCOPE. This standard applies to the design, fabrication, erection, repair and alteration of steelwork associated with machinery, cranes, boilers, pressure vessels, bulk handling equipment, and cold-formed steel structures (code under revision), in accordance with the working stress design method.

The standard does not apply to the following structures and materials:

(a) Road and railway bridges.

(b) Material less than 3 mm thick.

(c) Steel for which the value F_Y used in design exceeds 450 MPa.

(d) Cold-formed members other than those complying with AS 1163.

NOTES:

1. The use of cold-formed steel sections in structures is covered by AS 1538.
2. Packings may be of any thickness.

1.2 STANDARDS. Unless otherwise noted, a standard referred to in this standard is the current edition thereof.

1.3 NEW MATERIALS OR METHODS. This standard shall not be interpreted to prevent the use of materials or of methods of design or construction not specifically referred to herein.

NOTE: It will be necessary to seek approval from the Building Authority for the use of new materials or methods.

1.4 DESIGN AND SUPERVISION.

1.4.1 Design. The design of a structure or the part of a structure to which this standard is applied shall be the responsibility of an engineer experienced in the design of such structures.

For the purposes of this standard the term 'Design Engineer' shall mean the engineer responsible for design and shall include his representative.

1.4.2 Supervision. All stages of construction of a structure or the part of a structure to which this standard is applied shall be adequately supervised to ensure that all the requirements of the design are satisfied in the completed structure. Supervision shall be the responsibility of either —

(a) the Design Engineer, or

(b) an engineer experienced in such supervision.

For the purposes of this standard, the term 'Supervising Engineer' shall mean the engineer responsible for supervision of construction and shall include his representative.

NOTES:

1. Although the execution of design and supervision may be delegated to other acceptable persons who need not necessarily be qualified, Clause 1.4 requires that design and supervision be the responsibility of qualified and experienced persons.
2. The Clause does not require the Design Engineer to be responsible for supervision also unless he has been assigned this responsibility specifically. The Design Engineer and the Supervising Engineer need not be the same person.
3. Welding inspectors should be qualified to the requirements of AS 2214.

1.5 DEFINITIONS.

1.5.1 General. For the purposes of this standard, the definitions in Clauses 1.5.2 to 1.5.4 shall apply.

NOTE: Other terms having special meanings are defined in the Clause in which they occur.

1.5.2 Administrative Definitions.

1.5.2.1 *Approved* — according to the context, approved either by the Engineer or the Building Authority.

1.5.2.2 *Building Authority* — a body having statutory powers to control the design and erection of buildings or structures in the area in which the building or structure concerned is to be erected.

1.5.2.3 *Contractor* — the person, persons or organization agreeing under a contract to execute the work.

1.5.2.4 *Engineer* — a person qualified for Corporate Membership of the Institution of Engineers, Australia. (See Clause 1.4.)

NOTE: The definition of 'engineer' does not require that an engineer be a Corporate Member of the Institution of Engineers, Australia.

1.5.3 Technical Definitions.

1.5.3.1 *Beam or girder* — a structural member, other than a triangulated frame, which supports load primarily by its internal resistance to bending.

1.5.3.2 *Dead load* — the actual weight of all permanent construction and all permanently installed plant, equipment, and services required for functional purposes.

1.5.3.3 *Footing* — a part of the building or structure in direct contact with and transmitting load to the supporting foundation.

1.5.3.4 *Foundation* — the soil, sub-soil or rock, either built up or natural, upon which a structure is supported.

1.5.3.5 *Gauge* — the transverse spacing between parallel adjacent lines of fasteners.

1.5.3.6 *High strength bolt*—a bolt manufactured to AS 1252 or an equivalent fastener.

1.5.3.7 *Live load* — the load assumed to arise from the intended use or purpose of a structure,

* American Iron and Steel Institute.

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