AS 1664—1979

Australian Standard®

SAA Aluminium Structures Code

The following scientific, industrial and governmental organizations and departments were officially represented on the committee entrusted with the preparation of this standard:

Aluminium Development Council

Department of Labour and Industry, N.S.W.

Department of Public Works, N.S.W.

National Association of Australian State Roads Authorities

Railways of Australia Committee

This standard, prepared by Committee BD/50, Aluminium Structures, was approved on behalf of the Council of the Standards Association of Australia on 9 March 1979, and was published on 1 June 1979.

The rules are intended to include the technical provisions necessary for design and fabrication of aluminium alloy load-carrying members, but do not purport to comprise all the necessary provisions of a contract.

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RULES FOR THE USE OF ALUMINIUM IN STRUCTURES

known as the SAA ALUMINIUM STRUCTURES CODE

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PREFACE

This standard, which is a revision of AS 1664—1975 was prepared by the Association's Committee on Aluminium Structures. It is based on the 'Aluminium Construction Manual—Section 1: Specifications for Aluminium Structures' (2nd Ed. 1971) published by the Aluminium Association, New York and British Standard CP 118—1969, The Structural Use of Aluminium. The committee gratefully acknowledges the assistance received from these sources.

In the revision the principal changes have related to data on the range of aluminium alloys which has been generally extended. The standard does not now provide for alloy Alclad 3004 in H16 temper.

The standard applies to the design and fabrication of aluminium structures and is presented in a similar format to AS 1250, SAA Steel Structures Code; however it is emphasized that steel designs should not be directly copied as many types of welded connections used in steel fabrication are entirely unsuitable for aluminium structures. For welded aluminium structures particular attention shall be given to the design of welded connections and the possibility of failure of members by local buckling.

The committee has recommended that the international designation system for wrought aluminium and aluminium alloys used by the Aluminium Development Council (ADC) be adopted for all Australian standards. This designation system is used throughout this standard and a detailed explanation of the system can be found in the ADC publication 'Aluminium Standards and Data—Third Edition'.

The design sections of the standard (Section 5, Maximum Permissible Stresses, and Section 6, Combined Stresses) consist of a compilation of methods to determine the maximum permissible stresses for different types and combinations of stress. The maximum permissible stresses for alloys commonly used in structures are given in Tables A1 to A21 in Appendix A.

Aluminium alloys attain their strengths by heat treatment or strain hardening, and welding causes local overageing or annealing in heat-treatable and non-heat-treatable alloys respectively, producing a zone of lower strength along both sides of the weld bead. To account for this decrease in strength, permissible stresses for welded members are determined as outlined in Rule 5.3.3.

Attention is drawn to the following Australian, American 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
AS 1111	ISO Metric Hexagon Commercial Bolts and Screws
AS 1112	ISO Metric Hexagon Nuts, Including Thin Nuts, Slotted Nuts and Castle Nuts
AS 1170	SAA Loading Code Part 1—Dead and Live Loads Part 2—Wind Forces
AS 1237	Flat Metal Washers for General Engineering Purposes (Metric Series)
AS 1250	SAA Steel Structures Code
AS 1275	Metric Screw Threads for Fasteners (Based on ISO Recommendations)
AS 1418	SAA Crane Code
AS 1449	Stainless and Heat-resisting Steel Plate, Sheet and Strip (Coils and Cut Lengths)
AS 1480	SAA Concrete Structures Code
AS 1511	SAA High-strength Structural Bolting Code
AS 1538	SAA Cold-formed Steel Structures Code
AS 1562	Code of Practice for the Design and Installation of Self-supporting Metal Roofing Without Transverse Laps
AS 1588	Filler Rods for Welding
AS 1627	Code of Practice for Preparation and Pretreatment of Metal Surfaces Prior to Protective Coating Part 1—Degreasing of Metal Surfaces Using Solvent or Alkaline Solutions
AS 1665	SAA Aluminium Welding Code
AS 1734	Wrought Aluminium and Aluminium Alloy Flat Sheet, Coiled Sheet and Plate for General Engineering Purposes
AS 1735	SAA Lift Code
AS 1866	Wrought Aluminium and Aluminium Alloy Extruded Rod, Bar, Solid Tubes and Hollow Shapes for General Engineering Purposes
AS 1867	Wrought Aluminium and Aluminium Alloy Drawn Tubes for General Engineering Purposes
AS K108	Metal Priming Paint, Anti-corrosive
ASTM D 962	Specification for Aluminium Pigments, Powder and Paste, for Paints
U.S.A.	Federal Government Specification TT-V-81F: Varnish, Mixing for Aluminium Paints
BS 641	Dimensions of Small Rivets for General Purposes
BS 1974	Large Aluminium Alloy Rivets: 1/2 in to 1 in Nominal Diameters
BS 2708	Unified Black Square and Hexagon Bolts, Screws and Nuts (UNC and UNF Threads)—Normal Series
BS CP118	The Structural Use of Aluminium
Aluminium Technology*	Book 2—Forming Aluminium Book 3—Machining Aluminium Book 4—Joining Aluminium

* Published by Aluminium Development Council.

CONTENTS

STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard Rules for THE USE OF ALUMINIUM IN STRUCTURES

SECTION 1. GENERAL

1.1 SCOPE. These Rules (hereinafter referred to as 'this Code') apply to the design and fabrication of aluminium alloy load-carrying members.

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

1.3 NEW MATERIALS OR METHODS. This Code shall not be interpreted to prevent the use of materials, methods of design or construction not specifically referred to herein. If it is desired to seek the opinion of the SAA Committee on Aluminium Structures as to whether materials other than those specified, or methods of design or construction not covered herein, are deemed to comply with the intention of this Code, details of such materials or methods, including relevant test results, shall be submitted to the Committee.

NOTE: It will be necessary to seek approval from the appropriate 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 Code is applied shall be the responsibility of an engineer experienced in the design of such structures.

For the purpose of this Code 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 Code is applied shall be adequately supervised to ensure that all the requirements of the design are satisfied in the completed structure, the supervision being the responsibility of either—

(a) the design engineer, or

(b) an engineer experienced in such supervision.

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

NOTE: Although the execution of design and supervision may be delegated to other acceptable persons who need not necessarily be qualified, Rule 1.4 requires that design and supervision must be the responsibility of qualified and experienced persons.

Similarly, the Rule 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.

1.5 DEFINITIONS.

1.5.1 General. For the purpose of this Code, the definitions in Rules 1.5.2 and 1.5.3 shall apply.

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

1.5.2 Administrative Definitions.

Approved - according to the context, approved either by the Engineer or the appropriate Authority.

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.

Contractor - the person, persons or organization agreeing under a contract to execute the work.

Engineer - a person qualified for Corporate Membership of the Institution of Engineers, Australia (see Rule 1.4).

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

1.5.3 Technical Definitions.

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

Dead load - the actual mass of all permanent construction and all permanently installed plant, equipment, and services required for functional purposes.

Earthquake forces - all forces on a structure caused by earthquakes.

Gauge - the transverse spacing between parallel adjacent lines of fasteners.

Live load - the load assumed to arise from the intended use or purpose of a structure, including distributed, concentrated, impact and inertial forces, but excluding wind, snow and earthquake forces.

Pitch - the centre distance between individual fasteners in a line of fasteners.

Strut - a compression member including a column or stanchion.

Wind forces - all forces on a structure caused by wind pressure.

1.6 NOTATION. The notation used in any of the Rules of this Code shall have the following meanings with respect to the structure, or member or condition to which the Rule is applied, unless otherwise defined elsewhere in this Code. Unless otherwise stated, a dimension shall mean a specified dimension.

(a) *Maximum permissible stresses.*

F_{ac} = the maximum permissible compressive stress in an axially loaded strut not subjected to bending

F_{at} = the maximum permissible tensile stress in an axially loaded tension member not subjected to bending

F_{bc} = the maximum permissible compressive stress due to bending in a member not subjected to axial force

F_{bt} = the maximum permissible tensile stress due to bending in a member not subjected to axial force