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Australian/New Zealand Standard®

Aluminium structures

Part 2: Allowable stress design

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee BD/50, Aluminium Structures. It was approved on behalf of the Council of Standards Australia on 27 June 1997 and on behalf of the Council of Standards New Zealand on 11 July 1997. It was published on 5 September 1997.

The following interests are represented on Committee BD/50:

Aluminium Development Council
Association of Consulting Engineers, Australia
Australian Building Codes Board
Institution of Professional Engineers New Zealand
University of Sydney

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PREFACE

This Joint Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee BD/50, Aluminium Structures, to supersede, in part, AS 1664—1979, *Rules for the use of aluminium in structures (known as SAA Aluminium Structures Code).*

This Standard is technically equivalent to *The Aluminium Design Manual: Specifications and guidelines for aluminium structures. Part 1A: Specifications for Aluminium structures allowable stress design* issued by the U.S. Aluminium Association Inc.

The objective of this Standard is to provide designers of aluminium alloy load carrying members and elements with allowable stress design criteria for use in design applications.

Statements expressed in mandatory terms in notes to tables and figures are deemed to be requirements of this Standard.

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SECTION 1 GENERAL

1.1 SCOPE This Standard specifies requirements for the design of aluminium alloy load carrying members and elements. The allowable stress design (ASD) criteria are intended as an alternative to the limit state design (LSD) criteria (see AS 1664.1). One design specification (ASD or LSD) applies throughout the design of a single structure.

1.2 MATERIALS The principal materials to which these specifications apply are aluminium alloys that comply with AS 1734, AS 1865, AS 1866, AS 1867 and AS 2848.1. Those structural members frequently used are listed in Table 3.3(A).

1.3 SAFETY FACTORS

1.3.1 Building type structures Basic allowable tensile stresses for buildings, structural supports for highway signs, luminaires, traffic signals and similar structures shall be the lesser of the minimum yield strength divided by a factor of safety of 1.65, or the minimum ultimate tensile strength divided by a factor of safety of 1.95. Other allowable stresses for buildings and similar structures shall be based upon the factors of safety shown in Table 3.4(A).

1.3.2 Bridge type structures Basic allowable tensile stresses for bridge type structures shall be the lesser of the minimum yield strength divided by a factor of safety of 1.85, or the minimum ultimate tensile strength divided by a factor of safety of 2.2. Other allowable stresses for bridge and similar structures shall be based upon the factors of safety shown in Table 3.4(A).

1.3.3 Other type structures Where it is customary or standard practice to use factors of safety other than those given in Clauses 1.3.1 or 1.3.2, the general formulas in Table 3.4(C) shall be permitted to be used with the desired factors of safety substituted for n_u, n_y or n_a.

1.4 REFERENCED DOCUMENTS The following documents are referred to in this Standard:

AS

1170	Minimum design loads on structures (known as the 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
1170.4	Part 4: Earthquake loads
1391	Methods for tensile testing of metals

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1664	Aluminium structures
1664.1	Part 1: Limit state design
1664.2	Supplement 1, Part 2: Allowable stress design—Commentary

AS	
1665	Welding of aluminium structures
1734	Aluminium and aluminium alloys—Flat sheet, coiled sheet and plate (adopted in New Zealand as NZS/AS 1734)
1865	Aluminium and aluminium alloys—Drawn wire, rod, bar and strip (adopted in New Zealand as NZS/AS 1865)
1866	Aluminium and aluminium alloys—Extruded rod, bar, solid and hollow shapes (adopted in New Zealand as NZS/AS 1866)
1867	Aluminium and aluminium alloys—Drawn tubes (adopted in New Zealand as NZS/AS 1867)
2848	Aluminium and aluminium alloys—Compositions and designations
2848.1	Part 1: Wrought products
NZS	
4203	Code of practice for general structural design and design loadings for buildings (1984 edition)
ASTM	
B 557	Test methods of tension testing wrought and cast aluminium- and magnesium-alloy products
D 962	Specification for aluminium powder and paste pigments for paints
E 330	Test method for structural performance of exterior windows, curtain walls, and doors by uniform static air pressure difference

SECTION 2 DESIGN PROCEDURE

2.1 PROPERTIES OF SECTIONS Properties of sections, such as cross-sectional area, moment of inertia, section modulus, radius of gyration and torsion constants, shall be determined in accordance with accepted methods of structural analysis.

2.2 PROCEDURE Computations of forces, moments, stresses and deflections shall be in accordance with accepted methods of elastic structural analysis and engineering design. The formulas and methods for determining allowable stresses in this Standard have been simplified in many cases for ease of computation but are not intended to preclude the use of more rigorous analysis.

2.3 LOADING The loads on the structure shall be in accordance with the applicable parts of AS 1170 (Australia) or the applicable parts of NZS 4203:1984 (New Zealand).

When computing allowable stresses in Australia, the most adverse load combination from the following shall be used:

(a) $G + Q$

(b) $0.75\ (G + Q + W_p)$

(c) $0.75\ (G + Q + F_{eq})$

(d) $0.75\ (G' + W'_p)$

where

G = dead load

Q = live load

W_p = wind load based on basic wind speed V_p

F_{eq} = earthquake load

W'_p = wind load causing stresses of opposite sign to the dead load

G' = that part of the dead load that cannot be removed from the structure

In the case of wind and ice loads, the form of the structure and any of its exposed components (e.g. increased area exposed to wind due to icing) shall be considered.