

Australian/New Zealand Standard[®]

**Aluminium and aluminium alloys—
Drawn tubes**

AS/NZS 1867:1997

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee MT/3, Aluminium and Aluminium Alloys. It was approved on behalf of the Council of Standards Australia on 9 May 1997 and on behalf of the Council of Standards New Zealand on 29 April 1997. It was published on 5 August 1997.

The following interests are represented on Committee MT/3:

Australasian Railway Association
Australian Aluminium Council
Australian Chamber of Commerce and Industry
New Zealand Manufacturers Federation
Residential Window Association—Australia
Society of Automotive Engineers—Australasia

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AS/NZS 1867:1997

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Aluminium and aluminium alloys— Drawn tubes

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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee MT/3, Aluminium and Aluminium Alloys, to supersede AS 1867—1986.

The objective of this revision is to upgrade the requirements for wrought aluminium and aluminium alloy drawn tubes for general engineering purposes.

During the preparation of this Standard cognizance was taken of the publication, *Aluminium Standards, Data and design—Wrought products*, published in 1994 by the Aluminium Development Council of Australia. Cognizance was also taken of the following International Standards which partly cover drawn tubes:

ISO

6363 Wrought aluminium and aluminium alloy cold-drawn rods/bars and tubes

6363-1 Part 1 (1988): Technical conditions for inspection and delivery

6363-2 Part 2 (1993): Mechanical properties

These International Standards were not considered to be appropriate replacements for AS 1867 for the following reasons:

- (a) They include requirements for rods and bars in addition to tubes.
- (b) They refer to ISO R209 for chemical composition, to ISO 6363.6 and ISO 6363.7 for dimensional requirements and tolerances, and to a number of other International Standards for definitions and test requirements.
- (c) The preference of Australian/New Zealand industry is to contain the requirements for drawn aluminium and aluminium alloy tubes in the one Standard.

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

The term 'informative' has been used in this Standard to define the application of the appendix to which it applies. An 'informative' appendix is only for information and guidance.

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STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard**Aluminium and aluminium alloys—Drawn tubes**

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE This Standard specifies requirements for wrought aluminium and aluminium alloy drawn tube for general engineering purposes.

NOTES:

- 1 Advice and recommendations on information to be supplied by the purchaser at the time of enquiry or order are contained in the purchasing guidelines set out in Appendix A.
- 2 Typical fabrication characteristics and application data for wrought aluminium and aluminium alloys are given in Appendix B.

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

AS

- 1391 Methods for tensile testing of metals
- 2612 Aluminium and aluminium alloys—Sampling and preparation of solid samples for optical emission spectrometry
- 2706 Numerical values—Rounding and interpretation of limiting values
- 2848 Aluminium and aluminium alloys —Compositions and designations
- 2848.1 Part 1: Wrought products

BS

- 1728 Methods for the analysis of aluminium and aluminium alloys (all parts)

ASTM

- E 34 Test methods for chemical analysis of aluminium and aluminium-base alloys (all parts)
- E 227 Test method for optical emission spectrometric analysis of aluminium and aluminium alloys by the point-to-plane technique.

1.3 DEFINITIONS For the purpose of this Standard, the definitions below apply.

1.3.1 Batch—all product of the same section, size, alloy, temper and finish in a shipment. For heat-treated product, a batch consists of all product of the same section, size, alloy, temper and finish and from the same furnace load.

1.3.2 Drawn tube—a hollow section, finished by cold drawing, long in relation to its cross-section, and which is symmetrical and round, square, rectangular, hexagonal, octagonal or elliptical, in shape and containing, when applicable, sharp or rounded corners, and having uniform wall thickness except as affected by corner radii.

1.4 DESIGNATION

1.4.1 General The aluminium and aluminium alloy designation shall comprise the number of this Standard, i.e. AS/NZS 1867 followed by a diagonal slash and additional characters in accordance with Clauses 1.4.2 and 1.4.3.

1.4.2 Alloy designation The aluminium alloy designation shall comprise a four-digit number to identify the chemical composition. A suffix letter 'A' indicates a nationally derived variation in chemical composition from the registered standard chemical composition.

1.4.3 Temper designation The temper designation shall be in accordance with AS 2848.1 and is applicable to all forms of wrought aluminium and aluminium alloy tubes. It shall follow the alloy designation, the two being separated by a hyphen.

Examples of complete designation: AS/NZS 1867/1200-O, AS/NZS 1867/6060-H18, AS/NZS 1867/6061-T42.

1.5 ROUNDING OF TEST RESULT VALUES The observed or calculated values shall be rounded to the same number of figures as in the specified values, and then compared with the specified values. For example, for specified maximum or minimum values of 2.5, 2.50 and 2.500, the observed or calculated value would be rounded to the nearest 0.1, 0.01 and 0.001 respectively. (See also AS 2706.)

1.6 MARKING Each coil or shipping unit shall be legibly and durably marked or tagged with the batch number or other identification number, product size, alloy and temper, and the manufacturer's name or trademark.

NOTE: Manufacturers making a statement of compliance with this Australian/New Zealand Standard on a product, or on packaging or promotional material related to that product, are advised to ensure that such compliance is capable of being verified.

1.7 TRACEABILITY If traceability of the product back to the cast number of the billet used in the manufacturing process is required, this requirement shall be stated and agreed to at the time of enquiry or order.

SECTION 2 MANUFACTURING REQUIREMENTS

2.1 SCOPE This Section specifies general quality requirements including chemical composition, mechanical properties and dimensional tolerances for drawn tubes.

2.2 CHEMICAL COMPOSITION

2.2.1 General The method of sampling for chemical analysis shall be in accordance with AS 2612. Chemical composition shall be determined by any procedures which are not less accurate than those given in any of the relevant parts of BS 1728 (all parts), ASTM E 34 (all parts) or ASTM E 227.

2.2.2 Chemical analysis Chemical analysis shall be performed on samples taken at the time the ingots are poured, or on samples taken from the finished or semifinished product, and shall conform to the limits given in Table 2.1, as appropriate.

2.3 SURFACE FINISH The product shall be supplied with a mill finish.

2.4 FREEDOM FROM DEFECTS The product shall be free from defects and contaminants detrimental to its subsequent processing and end use.

NOTE: It is expected that the degree or amount of surface defects present in coils will exceed those in cut lengths because of the impracticability of inspection and the impossibility of rejecting portions of a coil.

If, after acceptance of the product and provided that it has been properly treated after delivery, subsequent processing reveals that it contains defects found to be detrimental, the product shall be deemed not to comply with this Standard.

NOTE: Defects referred to in this Clause cannot be completely quantified. Where the presence, size or frequency of any defect is considered to be of concern, arrangements should be made between the purchaser and the manufacturer. This may be achieved by acceptable type samples or methods of test.

2.5 MECHANICAL PROPERTIES When tested in accordance with Clause 3.4, the tensile strength, 0.2 percent proof stress and elongation shall comply with the requirements of Table 2.2.

NOTE: A bend test or a cupping test may also be carried out if required by the relevant product Standard.

2.6 DIMENSIONAL TOLERANCES The dimensional tolerances for wrought aluminium and aluminium alloy drawn tube shall comply with the requirements of Section 4.

TABLE 2.1
REQUIREMENTS FOR CHEMICAL COMPOSITION

Alloy designation	Chemical composition, %										Others (Note 1) max.	
	Aluminium min.	Silicon max. or range	Iron max. or range	Copper max. or range	Manganese max. or range	Magnesium max. or range	Chromium max. or range	Zinc max.	Titanium max. or range	Other specific elements max. or range	Each	Total
1050	99.50 (Note 2)	0.25	0.40	0.05	0.05	0.05	—	0.05	0.03	V 0.05	0.03	—
1080A	99.80 (Note 2)	0.15	0.15	0.03	0.02	0.02	—	0.06	0.02	Ga 0.03	0.02	—
1100	99.00 (Note 2)	Si + Fe 0.95	—	0.05–0.20	0.05	—	—	0.10	—	(Note 3)	0.05	0.15
1200	99.00 (Note 2)	Si + Fe 1.00	—	0.05	0.05	—	—	0.10	0.05	(Note 3)	0.05	0.15
1350	99.50 (Note 2)	0.10	0.40	0.05	0.01	—	0.01	0.05	Ti + V 0.02	Ga 0.03, B 0.05	0.03	0.10
3003	Rem	0.6	0.7	0.05–0.20	1.0–1.5	—	—	0.10	—		0.05	0.15
6060	Rem	0.30–0.6	0.10–0.30	0.10	0.10	0.35–0.6	0.05	0.15	0.10		0.05	0.15
6061	Rem	0.40–0.8	0.7	0.15–0.40	0.15	0.8–1.2	0.04–0.35	0.25	0.15		0.05	0.15
6063	Rem	0.20–0.6	0.35	0.10	0.10	0.45–0.9	0.10	0.10	0.10		0.05	0.15
6082	Rem	0.70–1.3	0.50	0.10	0.40–1.0	0.6–1.2	0.25	0.20	0.10		0.05	0.15
6106	Rem	0.30–0.6	0.35	0.25	0.05–0.20	0.40–0.8	0.20	0.10	—		0.05	0.10
6262	Rem	0.40–0.8	0.7	0.15–0.40	0.15	0.8–1.2	0.04–0.14	0.25	0.15	(Note 4)	0.05	0.15
6351	Rem	0.7–1.3	0.50	0.10	0.40–0.8	0.40–0.8	—	0.20	0.20		0.05	0.15

NOTES:

- 1 Except for unalloyed aluminium, analysis is regularly made only for the elements for which specific limits are shown. If, however, the presence of other elements is suspected to be, or in the course of routine analysis is indicated to be, in excess of the specified limits, further analysis is required to determine that these other elements are not in excess of the amount specified.
- 2 The aluminium content for unalloyed aluminium not made by a refining process is the difference between 100% and the sum of all other metallic elements present in amounts of 0.010% or more each, expressed to the second decimal.
- 3 Be 0.0008% max. for welding electrodes and filler wire only.
- 4 Bi 0.40–0.7%, Pb 0.40–0.7%.