

Australian Standard[®]

Wrought alloy steels—Stainless and heat-resisting steel plate, sheet and strip

[Defence Title allocated by Codification and Standardisation Authority:
METAL PLATE, SHEET, STRIP (STAINLESS AND HEAT
RESISTING STEEL IN COILS AND CUT LENGTHS
NATO Supply classification 9515]

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Bureau of Steel Manufacturers of Australia
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**Wrought alloy steels—Stainless
and heat-resisting steel plate,
sheet and strip**

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PREFACE

This Standard was prepared under the direction of the Multitechnics Standards Policy Board by the Standards Australia Committee on Iron and Steel to supersede AS 1449—1980. In this edition several alloys have been added to meet the requirements of industry.

The alloy compositions and mechanical properties specified in this Standard are equivalent to their counterparts in ASTM A240:90, *Standard specification for heat-resisting chromium and chromium-nickel stainless steel plate, sheet, and strip for pressure vessels*. The unified numbering system (UNS) alloy designations have been included for information purposes and to bring the Standard into alignment with the requirements of AS 1210—1989, *SAA Unfired Pressure Vessels Code*.

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

Australian Standard**Wrought alloy steels—Stainless and
heat-resisting steel plate, sheet and strip**

1 SCOPE This Standard specifies requirements for stainless and heat-resisting steels for general engineering purposes which, with the exception of grade 301, are supplied in the softened condition as plates or as cold-rolled and annealed sheet and strip, in coils or cut lengths.

NOTES:

- 1 Advice and recommendations on information to be supplied by the purchaser at the time of inquiry and order are contained in the purchasing guidelines set out in Appendix A.
- 2 Alternative means for determining compliance with this Standard are given in Appendix B.

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

AS

1050	Methods for the analysis of iron and steel
1199	Sampling procedures and tables for inspection by attributes
1213	Iron and steel—Methods of sampling
1391	Methods for tensile testing of metals
1399	Guide to AS 1199—Sampling procedures and tables for inspection by attributes
1627	Metal finishing—Preparation and pretreatment of surfaces
1627.5	Part 5: Pickling steel surfaces
1815	Metallic materials—Rockwell hardness test
1816	Metallic materials—Brinell hardness test
1817	Metallic materials—Vickers hardness test
2038	Methods for detecting the susceptibility of austenitic stainless steels to intergranular corrosion
2338	Preferred dimensions of wrought metal products
2505	Methods for bend and related testing of metals
2505.1	Part 1: Sheet, strip and plate
2706	Numerical values—Rounding and interpretation of limiting values
3900	Quality management and quality assurance standards
3900.1	Part 1: Guidelines for selection and use
3904	Quality management and quality system elements
3904.1	Part 1: Guidelines
K1	Methods for the sampling and analysis of iron and steel

SAA

HB18 Guidelines for third-party certification and accreditation

HB18.44 Guide 44—General rules for ISO or IEC international third-party certification schemes for products

ASTM

A380 Practice for cleaning and descaling stainless steel parts, equipment and systems

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

3.1 Camber—the deviation of an edge from a straight line forming a chord to it (see Figure 1).

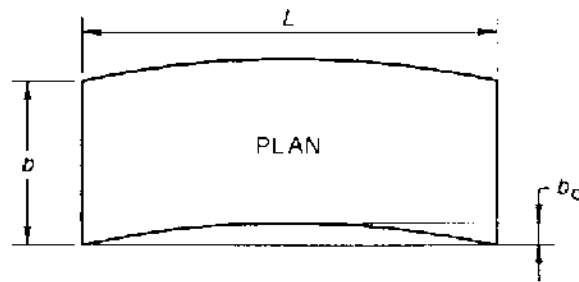


FIGURE 1 ILLUSTRATION OF CAMBER

NOTE:
$$C = \frac{b_c}{L} \times 100, \%$$

where

C = camber, in percent

b = width of sheet

b_c = linear measurement of camber

L = length of sheet

3.2 Parcel—any quantity of finished plate, sheet or strip presented for examination and test at any one time.

3.3 Plate—a flat-rolled product 5 mm and over in thickness and 600 mm min. in width.

3.4 Sheet—a flat-rolled product less than 5 mm thick and greater than 600 mm wide, supplied as coils or cut lengths.

3.5 Strip—a cold-rolled product less than 5 mm thick and up to and including 600 mm wide, produced by slitting sheet supplied as coils or cut lengths.

3.6 Test batch—finished steel of the same thickness produced at the same time from the same ladle and treated in the same manner.

3.7 Test piece—a prepared piece for testing, made from a test specimen.

3.8 Test sample—a portion of material or product, or a group of items selected from a test batch or group, by a sampling procedure.

3.9 Test specimen—a portion or a single item taken from the test sample for the purpose of applying a particular test.

4 DESIGNATION OF GRADE

4.1 General The steel designation shall comprise the number of this Australian Standard, i.e. AS 1449, followed by a slash and additional characters in accordance with the following:

- (a) A three-digit number to indicate the grade, in accordance with Clause 4.2.

NOTE: In this edition of the Standard the grades are also designated in accordance with the six-digit unified numbering system (UNS). When there is no three-digit designation for a grade, the UNS designation should be used, e.g. AS 1449/S30815.

- (b) Where necessary, a suffix letter or symbol to indicate modifications to grades in accordance with Clause 4.3.
- (c) Where necessary, one or more characters to indicate surface finish in accordance with Clause 4.5.

4.2 Series designation The following series designations are used to identify each group:

- (a) 2XX: Chromium-nickel-manganese steels.

NOTE: These grades are austenitic, non-magnetic, and are non-hardenable by heat treatment.

- (b) 3XX: Chromium-nickel steels.

NOTE: These grades are austenitic, non-magnetic, and are non-hardenable by heat treatment.

- (c) 4XX: Chromium steels.

NOTE: Some of these grades are ferritic and magnetic, and are non-hardenable by heat treatment; other grades are martensitic (hardenable by heat treatment) and magnetic.

4.3 Modification symbols Modification to grades is indicated by a suffix letter, or letters, as follows:

- (a) L and S: restricted carbon contents.
- (b) Ti: stabilized with titanium.

4.4 Example of grade designation AS 1449/316Ti denotes a chromium-nickel austenitic stainless steel which is stabilized with titanium.

4.5 Surface finish designation The surface finish designation comprises suffix characters as follows:

- | | |
|--|---------------|
| (a) Hot-rolled, softened but not descaled: | O |
| (b) Hot-rolled, softened and descaled: | S & D (No. 1) |
| (c) Cold-rolled and annealed—dull finish: | 2D |
| (d) Cold-rolled and annealed with a finish brighter than 2D: | 2B |
| (e) Cold-rolled and bright annealed: | BA |
| (f) Polished: | 3 |
| (g) General purpose polished: | 4 |

5 CONDITION OF STEEL ON DELIVERY

5.1 General Except for grade AS 1449/301, steel grades shall be supplied in the softened condition. They are normally lightly skin passed after annealing to improve the shape and surface appearance.

Steel grade AS 1449/301 shall be supplied in the softened condition, or in the quarter-hard (1/4H), half-hard (1/2H), three-quarter-hard (3/4H), or full-hard (FH) conditions which are obtained by temper rolling.

5.2 Surface finish The surface finish of each side of the material shall be specified in terms of the designations listed in Clause 4.5.

NOTES:

- 1 Some of these standard finishes may not be available on certain rolled products. Within limitations, material may be produced with a different standard surface finish on each side (see Appendix C).
- 2 It is desirable that all surfaces of austenitic and ferritic-austenitic grades be free from oxide scale produced by hot working or heat treatment operations. Information on descaling methods is given in AS 1627.5 and ASTM A380.

5.3 Edges The material shall have either sheared or slit edges.

6 CHEMICAL COMPOSITION

6.1 General The method of sampling for chemical analysis shall be in accordance with AS 1213. Chemical composition shall be determined by any procedures which are not less accurate than those given in the AS 1050 or the AS K1 series of Standards.

6.2 Cast analysis The reported cast analysis of the steel shall conform to the limits given in Tables 1 to 5 for the appropriate grade.

6.3 Residual elements For steels complying with this Standard, percentages of elements unspecified in Tables 1 to 4 are acceptable up to the following amounts:

- | | |
|-----------------|--------|
| (a) Copper: | 0.35%. |
| (b) Molybdenum: | 0.35%. |
| (c) Nickel: | 0.50%. |

6.4 Product analysis For steels supplied in accordance with the cast analysis requirements of Tables 1 to 5, the results of individual determinations carried out on the product shall be within the product analysis tolerance limits specified in Table 6. Where several determinations of a single element are carried out on products from any one cast, the spread of individual results shall not extend both above and below the range specified in Tables 1 to 5.

7 FREEDOM FROM DEFECTS The steel shall be free from pipe, harmful segregation, surface flaws and other defects detrimental to its use.

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

NOTE: The degree or amount of allowable surface defects present in coils will probably be greater than in sheet because of the impracticability of inspection and the problems resulting from rejecting portions of a coil.

8 MECHANICAL PROPERTIES The mechanical properties of test pieces selected and prepared in accordance with Clause 9.1 and tested in accordance with Clauses 9.2, 9.3 and 9.4, shall comply with the requirements of Tables 7 and 8.

9 MECHANICAL TESTS

9.1 Selection and preparation of test samples A sample of sufficient size to allow the preparation of the necessary test pieces shall be selected and prepared in accordance with the relevant Standards (see AS 1391, AS 1815, AS 1816, AS 1817 and AS 2505.1) to represent each parcel. The test sample shall not, except for the necessary straightening, be mechanically worked or be heat treated before testing.

NOTE: As stainless steels have a relatively high work hardening rate, care is needed during any straightening operation.