AS 1448—1981

Australian Standard®

CARBON STEELS AND CARBON-MANGANESE STEELS—FORGINGS (RULING SECTION 300 mm MAXIMUM)

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

Bureau of Steel Manufacturers of Australia
Confederation of Australian Industry
Department of Defence
Department of Industry and Commerce
Institute of Steel Service Centres of Australia
Metal Trades Industry Association of Australia
Railways of Australia Committee
Society of Automotive Engineers— Australasia

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PREFACE

This edition of this standard was prepared under the direction of the Association's Committee on Iron and Steel by its subcommittee on carbon and alloy steels, to supersede AS 1448—1974. It applies, in particular, to hot-forged carbon and carbon-manganese steel forgings for general engineering purposes, and the steels detailed in this standard represent those steels specified in AS 1442, Carbon Steels and Carbon-manganese Steels—Hot-rolled Bars and Semi-finished Products, that are in general use in Australia in the form of forgings.

Forgings complying with this standard may be supplied to specified chemical composition only, or to specified chemical composition and mechanical properties, and enquiries seeking information regarding availability of other grades of carbon and carbon-manganese steel forgings not listed should be directed to the suppliers. In addition, information regarding the mechanical properties which can be obtained from a number of grades specified on a composition basis only in this standard is contained in the following publication:

ASTM A 400 Recommended Practice for Selection of Steel Bar Compositions According to Section

In this edition grades have been rationalized, and an appendix added, which presents purchasing guidelines, including contractual requirements previously in the body of AS 1448, and which directs attention to matters requiring consideration at the time of enquiry and/or order, the intention being to avoid misinterpretation or other problems and to ensure a clear understanding of product requirements by both purchaser and supplier.

Attention is drawn to the fact that semi-killed steels may not be as homogeneous as fully killed steels, and, therefore, may not be as suitable for critical applications, particularly in the higher carbon grades.

Those requiring information on the welding of steel are referred to the steel manufacturer or to the Australian Welding Research Association's Technical Note 1, The Weldability of Steels.

This standard requires reference to the following Australian and British standards:

AS 1050 Methods for the Analysis of Iron and Steel (Metric Units)

AS 1065 Methods for the Ultrasonic Testing of Ferritic Steel Forgings

AS 1171 Methods for Magnetic Particle Testing of Ferromagnetic Products and Components

AS 1213 Methods for the Sampling of Iron, Steel, Permanent Magnet Alloys and Ferro-alloys

AS 1391 Methods for Tensile Testing of Metals

AS 1544 Methods for Impact Tests on Metals
Part 1—Izod
Part 2—Charpy V-notch
Part 3—Charpy U-notch and Keyhole Notch

AS 1733 Methods for the Determination of Grain Size in Metals

AS 1770 Method for the End-quench Test for Hardenability of Steel (Jominy Test)

AS 1816 Method for Brinell Hardness Test
Part 1—Testing of Metals

AS 1817 Method for Vickers Hardness Test
Part 1—Testing of Metals

AS 2062 Methods for Non-destructive Penetrant Testing of Products and Components

AS B161 Charts for Approximate Comparison of Hardness Scales for Steels

AS K1 Methods for the Sampling and Analysis of Iron and Steel

BS 5046 Method for the Estimation of Equivalent Diameters in the Heat Treatment of Steel.

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Australian Standard

for

CARBON STEELS AND CARBON-MANGANESE STEELS — FORGINGS (RULING SECTION 300 mm MAXIMUM)

1 SCOPE. This standard specifies requirements for carbon steel and carbon-manganese steel forgings for general engineering purposes with ruling section up to and including 300 mm. The standard provides for the supply of forgings on the following basis:

(a) Chemical composition only, as specified in Tables 1 to 4.

(b) Chemical composition as specified in Tables 1 to 4, and hardness or other mechanical properties in any heat-treated condition, as negotiated at the time of enquiry and/or order.

(c) Chemical composition and mechanical properties in the normalized or normalized and tempered condition as specified in Table 5.

NOTE: Guidelines to purchasers on requirements that must be specified by the purchaser and those that must be agreed at the time of enquiry and/or order are given in Appendix A.

2 DESIGNATION.

2.1 Steels Supplied to Specified Composition Only (See Tables 1 to 4).

2.1.1 *General.* For steels supplied to specified composition in accordance with Table 1, 2, 3 or 4, the steel designation shall consist of the following:

(a) The number of this Australian standard, i.e. AS 1448.

(b) A prefix letter to indicate the degree of killing or deoxidation in accordance with Clause 2.1.2.

(c) A series designation in accordance with Clause 2.1.3.

(d) Modification symbols in accordance with Clause 2.1.4, where applicable.

2.1.2 *Degree of deoxidation.* The prefix letters indicating the degree of deoxidation shall be as follows:

S = semi-killed (balanced*) steel (restricted carbon range).

K = fully killed steel.

2.1.3 *Series designation.* The following series designation shall be used to identify each group, whereby the first two digits of the number indicate the type of steel and the last two digits indicate the approximate mean of the specified carbon range:

10XX . . Plain carbon steels.

11XX . . Sulphurized free-cutting carbon steels.

12XX . . Phosphorized and sulphurized free-cutting carbon steels.

13XX . . Carbon-manganese.

2.1.4 *Modification symbols.* The modification symbols shall be as follows:

(a) *Deviation in chemical composition.* The prefix letter 'X' shall be used to indicate a major deviation in chemical composition of any grade from the corresponding AISI-SAE grade, e.g. AS 1448/XK1038.

(b) *Aluminium-killed or boron-treated steels.* Where steels conforming to Tables 2 and 4 are aluminium-killed or boron-treated, the designations shall be AS 1448/XXAXX and AS 1448/XXBXX, respectively.

2.2 Steels Supplied to Chemical Composition and Mechanical Properties. For steels supplied to chemical composition and mechanical properties in accordance with Table 5, the steel designation shall consist of the following:

(a) The number of this Australian standard, i.e. AS 1448.

(b) The prefix letters 'S' or 'K' in accordance with Clause 2.1.2 to indicate the degree of killing or deoxidation, e.g. AS 1448/K.

(c) The number 1, 3, 4, 5, 6, 8, 9 or 10 to indicate grade, e.g. AS 1448/K9.

3 STEELMAKING PROCESS. The steel shall be made by the open hearth, basic oxygen, or an electric process.

NOTES:

1. A basic oxygen process means the process of making steel in a basic converter blown with commercially pure oxygen.
2. Additional refining by vacuum-arc-remelt (VAR), electroslag-refining (ESR) or vacuum degassing is permitted.

4 CONDITION OF FORGINGS ON DELIVERY.

4.1 General.

4.1.1 *Forgings supplied to Tables* 1 *to* 4 *on a composition basis only.* Forgings supplied to Table 1, 2, 3 or 4 shall be delivered in the normalized or normalized and tempered condition.

4.1.2 *Forgings supplied to Table* 5. Forgings supplied to Table 5 shall be delivered in the normalized or normalized and tempered condition.

* The term 'balanced steel' is sometimes used in the steel industry as a synonym for semi-killed steel.