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Australian Standard 2506—1981

WROUGHT ALLOY STEELS—En SERIES

[Title allocated by Defence Cataloguing Authority: METAL BARS, SHAPES, AND WIRES (Wrought Alloy Steels, En Series)]

STANDARDS ASSOCIATION OF AUSTRALIA
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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 Productivity

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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WROUGHT ALLOY STEELS—
En SERIES

AS 2506—1981

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PREFACE

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and alloy steels, to supersede AS G18—1966, Wrought Alloy Steels of the BS 970 En Series Type, which is accordingly withdrawn.

The standard applies to wrought alloy steels of the former En series specified in BS 970:1955, Wrought Steels (Bars, Billets and Forgings), supplied in the form of hot-rolled, cold-sized and bright bars for machining, bars, billets and blooms for forging and forgings.

This standard represents the second stage in the revision of AS G18. The first stage in 1975, as represented by Amendment No 2 to that standard, involved the conversion of existing sizes and dimensional tolerances to SI units, in order to accommodate the production of metric items. It was envisaged at that time that the second stage would commence when the metric version of BS 970 was finalized, at which time stress levels and steel types would be clearly defined. BS 970 has not been metricated, but the issue of Part 6, SI Metric Values (For Use With BS 970, Parts 1 to 5), has enabled the subcommittee to provide mechanical properties in metric terms, and acknowledgement is made of the assistance obtained therefrom.

In this standard, further rationalization of steel grades has occurred, and seven grades are covered. To facilitate reference, the standard has been divided into four sections. Appendix A presents purchasing guidelines, including contractual requirements previously included in the body of AS G18, and directs attention to matters requiring consideration at the time of enquiry and/or order. The intention is to avoid misinterpretation or other problems and to ensure a clear understanding of product requirements by both purchaser and supplier.

Those requiring information on 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 standards:

AS 1050	Methods for the Analysis of Iron and Steel (Metric Units)
AS 1065	Methods for 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—Impact
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 2084	Methods for Eddy Current Testing of Metal Bar and Tubular Products
AS 2338	Preferred Dimensions of Wrought Metal Products
AS B161	Charts for Approximate Comparison of Hardness Scales for Steels
AS K1	Methods for the Sampling and Analysis of Iron and Steel
ISO 2566/1	Steel—Conversion of Elongation Values Part 1—Carbon and Low Alloy Steels.

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard
for
WROUGHT ALLOY STEELS—En SERIES

SECTION 1. SCOPE AND GENERAL REQUIREMENTS

1.1 SCOPE. This standard specifies requirements for wrought alloy steels of the former BS 970 En series type intended for general engineering purposes. It covers the following grades (the current BS 970 designation is given in parentheses).

En16 (605M36), En25 (826M31), En26 (826M40), En33 (—), En36A (655M13), En39B (835M15), and En41B (905M39).

The steel is supplied in the form of hot-rolled and cold finished (cold-sized or bright) bars for machining, bars, billets and blooms for forging, and forgings.

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.

1.2 DESIGNATION. The steel designation, as given in Section 2, shall consist of the following:

(a) The number of this Australian standard, i.e. AS 2506.

(b) The prefix letters 'En', followed by 16, 25, 26, 33, 36A, 39B, or 41B, as appropriate.

(c) For hardened and tempered steel, a letter R to Z, as appropriate, to indicate the tensile strength range in accordance with the following:

Reference symbol	*Tensile strength* MPa
R	700 — 850
S	770 — 930
T	850 — 1000
U	930 — 1080
V	1000 — 1150
W	1080 — 1240
X	1150 — 1300
Y	1200 — 1400
Z	1540 min.

NOTE: The varying tensile ranges for the different specifications have been designated with the letters R to Z so that the same letters always represent the same range.

Examples of designation: AS 1483/En26V, AS 1483/En26W

1.3 DEFINITIONS. For the purpose of this standard, the following definitions apply:

1.3.1 Bars—finished products of solid section which may be rectangular, square, round or hexagonal cross-section, defined as follows:

(a) *Flat bars (flats)*—bars of rectangular cross-section, with edges of controlled contour and of thickness greater than or equal to 3 mm, width less than 600 mm, and supplied in straight lengths.

(b) *Round bars (rounds)*—bars of circular cross-section supplied in straight lengths or coils.

(c) *Square bars (squares)*—bars of square cross-section supplied in straight lengths or coils.

(d) *Hexagonal bars (hexagons)*—bars of regular hexagonal cross-section supplied in straight lengths or coils.

(e) *Bright bars*—bars which are produced by cold-drawing, machining and polishing, polishing or precision grinding and which have a smooth surface free from scale and harmful imperfections.

(f) *Cold-sized bars*—bars which are sized by cold-drawing or cold-rolling to provide closer dimensional tolerances than hot-rolled bars, but which may contain some surface imperfections.

1.3.2 Billet—a semi-finished, forged, rolled or continuously cast product, intended for further processing into suitable finished products by forging or rolling. The cross-section is usually square or rectangular, with area not greater than 120 mm × 120 mm (or equivalent cross-sectional area) and the width-to-thickness ratio is less than 4:1.

1.3.3 Bloom—a semi-finished, forged, rolled or continuously cast product, intended for rolling or forging. The cross-section is square or rectangular, with area generally greater than 120 mm × 120 mm (or equivalent cross-sectional area) and the width-to-thickness ratio is less than 4:1.

1.4 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), electro-slag-refining (ESR) or vacuum degassing is permitted.

1.5 CONDITION OF STEEL ON DELIVERY.

1.5.1 General. The steel shall be delivered in one of the conditions specified in Section 2, as appropriate to the form of the material.

NOTES:

1. The limiting ruling sections stated in Section 2 are the maximum sizes in which the properties can be guaranteed and that steel is guaranteed only in respect of those mechanical properties and ruling sections specified in the order.
2. With certain steels, special precautions after hot-working are necessary, and in such cases the supplier is to ensure that the condition in which the steel is supplied is satisfactory.

1.5.2 Cold Finished Bars. Cold finished bars shall be supplied either bright or cold-sized.

NOTES:

1. Bright bars may be heat treated either before or after any cold work at the option of the manufacturer.
2. Cold-sized bars are subject to some restrictions as to grade, size, length and heat-treated condition. Information in this regard should be directed to the manufacturer.