AS 2465—1981
UDC [621.882.211 + 621.882.31]: 621.882.082.3
Supersedes AS B147—1967

Australian Standard 2465–1981

UNIFIED HEXAGON BOLTS, SCREWS AND NUTS (UNC AND UNF THREADS)

[Title allocated by Defence Cataloguing Authority:
BOLT, MACHINE; SCREW, MACHINE; NUT, PLAIN, HEXAGON
(UNC and UNF threads) .. NSC 5306, 5310, 5305]

STANDARDS ASSOCIATION OF AUSTRALIA
Incorporated by Royal Charter

THE FOLLOWING SCIENTIFIC, INDUSTRIAL AND GOVERNMENTAL ORGANIZATIONS AND departments were officially represented on the committee entrusted with the preparation of this standard:

Australian Institute of Steel Construction

Bureau of Steel Manufacturers of Australia

Department of Defence

Electricity Supply Association of Australia

Fasteners Institute of Australia

Federal Chamber of Automotive Industries

Institution of Production Engineers

Metal Trades Industry Association of Australia

Petroleum Refinery Engineers Advisory Committee

Railways of Australia Committee

Telecom Australia

University of Sydney

This standard, prepared by committee ME/29, Fasteners, was approved on behalf of the Council of the Standards Association of Australia on 26 March 1981, and was published on 1 August 1981.

This standard was issued in draft form for public review as DR 80086.

AUSTRALIAN STANDARD

UNIFIED HEXAGON BOLTS, SCREWS AND NUTS (UNC AND UNF THREADS)

AS 2465—1981

First published 1981

PUBLISHED BY THE STANDARDS ASSOCIATION OF AUSTRALIA
STANDARDS HOUSE, 80 ARTHUR ST, NORTH SYDNEY, N.S.W.

ISBN 0 7262 2258 2

PREFACE

This standard was prepared by the Association's Committee on Fasteners and takes the place of AS B147 which was withdrawn in 1980.

AS B147 was first issued in 1956 as an endorsement of BS 1768:1955, Unified Precision Hexagon Bolts, Screws and Nuts (UNC and UNF Threads) — Normal Series. This British standard was revised in 1963 and that edition was endorsed as a revised edition of the Australian standard in 1967. AS B147 was subsequently withdrawn along with other inch-unit fastener standards.

At a meeting of the Association's Committee on Fasteners in 1979, all fastener standards were reviewed in the light of current requirements. It was noted that fasteners with Unified screw threads were still being used in large quantities, particularly by the automotive industries, and it was considered that such fasteners would be required for replacement purposes, albeit in diminishing numbers at least during the next decade. Hence there was a need to continue to provide a standard for them. However, it was further noted that the types of Unified fasteners used by Australian industry had changed since the advent of metrication. Due largely to the influence of the automotive companies with North American affiliations, most of the Unified fasteners now in demand are supplied against American standards and consequently unified fasteners in accordance with AS B147 are little used.

To provide for this development it was agreed that in the replacement standard for AS B147 the dimensions, properties, etc, would be changed to those given in the relevant American standards, viz:

ANSI B18.2.1 Square and Hexagon Bolts and Screws

ANSI B18.2.2 Square and Hexagon Nuts

SAE J429 Mechanical and Material Requirements for Externally Threaded Fasteners

SAE J995 Mechanical and Material Requirements for Steel Nuts.

Although this new standard is now in line with the concepts given in the previous paragraph it should be noted that the number of types and varieties specified have been kept to a minimum commensurate with the anticipated demand of industry until such time as the inch-based fastener system is fully replaced by its metric counterpart.

This standard, therefore, covers only a restricted range of diameters and property classes. With respect to dimensional tolerances, these are now somewhat wider than those given previously so as to permit manufacture by either hot or cold forging/forming. Hence it would not be practical for this standard to refer to 'precision' products and in consequence the title of the standard now carries no reference to precision products as was previously the case with AS B147.

In most sectors of industry metric conversion is now at an advanced stage and it is anticipated that this rate of conversion will increase during the next few years. As a consequence, measuring capability in imperial units will decline. To meet this situation an appendix has been provided which gives the approximate metric equivalent of all dimensions, tolerances and mechanical properties given in the standard. The inch designation, however, has been retained because it is currently well entrenched in Australian industry; furthermore, the cost to industry of amending drawings, specifications, and the like to introduce a different designation would be totally uneconomic.

This standard may require reference to the following Australian standards:

AS 1391 Methods for Tensile Testing of Metals

AS 1654 Limits and Fits for Engineering

AS 1815 Method for Rockwell Hardness Test
Part 1 — Testing of Metals

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 B133 Unified Screw Threads

AS B193 Hot-dip Galvanized Coating on Fasteners (BSW and UNC Threads)

AS K132 Electroplated Coatings on Threaded Components
Part 1 — Cadmium on Steel
Part 2 — Zinc on Steel
Part 7 — Thicker Coatings for Threaded Fasteners

CONTENTS

STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard for UNIFIED HEXAGON BOLTS, SCREWS AND NUTS (UNC AND UNF THREADS)

SECTION 1. SCOPE AND GENERAL

1.1 SCOPE. This standard specifies requirements for hexagon nuts and bolts with full sized shanks and screws with Unified screw threads (UNC and UNF) in diameters from $\frac{1}{4}$ in to 2 in inclusive.

The standard is intended primarily to cover steel bolts, screws and nuts used within the temperature range of −50°C to +300°C, and does not make provision for products requiring special properties such as weldability or corrosion-resistant materials.

The dimensional and marking requirements (except strength grade marking) of this standard may also be applied to hexagon nonferrous and stainless steel bolts, screws and nuts.

NOTES:

1. The range of sizes included in this standard is considered adequate for most of the applications for which this series is likely to be employed.
2. To provide for the time when imperial measuring equipment is no longer available, dimensional and mechanical property requirements in metric units are given in Appendix A.

1.2 DEFINITIONS. For the purpose of this standard the following definitions apply.

1.2.1 Transition diameter (D_a) — the diameter of a circle formed at the transition between the fillet radius and the bearing surface of the head.

1.2.2 Concentricity tolerance (of a bolt) — the allowable deviation of the shank with respect to the screw thread.

1.2.3 Symmetry Tolerance.

1.2.3.1 *Bolts* — the allowable deviation of the across-flats dimension with respect to the shank of the bolt.

1.2.3.2 *Screws* — the allowable deviation of the across-flats dimension with respect to the major diameter of the screw thread.

1.2.3.3 *Nuts* — the allowable deviation of the across-flats dimension with respect to the screw thread of the nut.

1.2.4 Length.

1.2.4.1 *Nominal length* (of a hexagon bolt or screw) (*l*) — the distance from the bearing surface of the head to the extreme end of the shank including any chamfer or radius (see Fig. 2.1).

1.2.4.2 *Thread length* (on hexagon bolts) (*b*) — the difference between the nominal length of the bolt and the length of unthreaded shank.

1.2.5 Thread Runout.

1.2.5.1 *Bolts and screws with rolled threads* — the distance from the top of the extrusion cone to the nearer face of a nut with no internal chamfer which has been screwed on to the bolt as far as practicable by hand.

1.2.5.2 *Bolts and screws with cut threads* — the distance from the last witness of thread to the nearer face of a nut with no internal chamfer which has been screwed on to the bolt as far as practicable by hand.

1.2.6 Carburization and Decarburization.

1.2.6.1 *Base metal hardness* — the hardness closest to the surface (when traversing from core to outside diameter) just before an increase or decrease occurs denoting carburization or decarburization.

1.2.6.2 Carburization — a process of increasing surface carbon to a content above that of the base metal.

1.2.6.3 Decarburization — generally, the loss of carbon at the surface of commercial ferrous materials (steels).

1.2.6.4 *Partial decarburization* — decarburization with loss of carbon sufficient to cause a lighter shade of tempered martensite and significantly lower hardness than that of the adjacent base metal.

1.2.6.5 *Complete decarburization* — decarburization with sufficient carbon loss to show only clearly defined ferrite grains under metallographic examination.

1.2.6.6 *Carbon restoration* — a process of restoring surface carbon loss by heat treating in a furnace atmosphere of properly controlled carbon potential.

1.3 MARKING AND DESIGNATION.

1.3.1 Marking.

1.3.1.1 *Bolts and screws.* Bolts and screws shall be marked with the following information indented or embossed on the top of the head:

(a) The manufacturer's identification (trade) mark.

(b) The appropriate strength-grade symbol as shown in Table 1.1.

1.3.1.2 *Nuts.* Nuts of strength-grade 8 shall be marked with a dot indented or embossed on each chamfer corner as illustrated in Table 1.1 The marking shall be on one face of the nut only.

Marking for nuts of all strength grades shall appear on the package (see Clause 1.3.1.3).

1.3.1.3 *Packaging.* In addition to the preceding requirements, the packages of all Unified bolts,