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HIGH-STRENGTH STEEL BOLTS WITH ASSOCIATED NUTS AND WASHERS FOR STRUCTURAL ENGINEERING

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This Australian standard was prepared by Committee ME/29, Fasteners. It was approved on behalf of the Council of the Standards Association of Australia on 22 September 1982 and published on 10 February 1983.

The following interests were represented on the committee responsible for the preparation of this standard:

Australian Institute of Steel Construction Ltd

Bureau of Steel Manufacturers of Australia

Confederation of Australian Industry

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

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AUSTRALIAN STANDARD

HIGH-STRENGTH STEEL BOLTS
WITH ASSOCIATED NUTS AND WASHERS FOR STRUCTURAL ENGINEERING

AS 1252—1983

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PREFACE

This edition of this standard was prepared by the Association's Committee on Fasteners to supersede AS 1252—1973, General Grade High-strength Steel Bolts with Associated Nuts and Washers for Structural Engineering. At its time of issue in 1973, the first edition was in complete alignment with all relevant ISO documentation which, however, consisted only of a series of basic recommendations covering such things as head sizes, bolt diameters, nominal lengths, mechanical properties, etc.

Since that time ISO/TC 2 has been quite active in preparing standards on these types of products, and a working group, ISO/TC 2/WG 9, was formed with Australia as Secretariat. This working group has recently completed a series of draft International standards, which are currently being balloted for acceptance as International standards.

Because of the different practices used for bolting for steel structures in different countries or regions, it was found necessary to prepare some five International standards to cover all requirements. It was recognized that each individual country would select only such standards as were required for their purposes. Attention is drawn to Appendix A for further information. The complete range of ISO standards is as follows:

ISO/DIS 4775	High Strength Structural Nuts —Product Grade B
ISO/DIS 7411	High Strength Structural Bolts —Thread Lengths According to ISO 888
ISO/DIS 7412	High Strength Structural Bolts —Short Thread Length Type
ISO/DIS 7415	Hardened and Tempered Plain Hole Circular Washers for High Strength Structural Bolts
ISO/DIS 7416	Hardened and Tempered Chamfered Hole Circular Washers for High Strength Structural Bolts

The draft International standards incorporate the new heavy metric hexagon sizes as given in ISO 272—1979. The most significant change is for M20 diameter bolts and nuts, where the hexagon across—flats size has been changed from 32 mm to 34 mm. The draft International standards also feature slightly thinner nuts than those currently given in AS 1252—1973. These nuts have been theoretically designed and as yet have not been proved in practice.

The committee gave serious consideration as to whether these changes should be incorporated in this edition of AS 1252. It is significant to note that finalizing the ISO standards and their subsequent adoption by major industrial countries will take some 3 to 5 years and therefore it would be premature to incorporate these changes at this time. It was agreed by the committee that the current hexagon size for M20 diameter bolts and nuts, and also the current nut heights would be retained in this edition, and the situation would be reviewed following the publication of the ISO standards and their adoption by major industrial countries. However, Appendix H gives for information details of the relevant dimensions for the new 34 mm across-flats size for M20 diameter bolts and nuts as incorporated in the draft International standards.

It was further agreed by the committee that there was sufficient international agreement to warrant a new edition of this standard and take into account the concepts given in the draft International standards. This would be coupled with the committee's policy to rationalize the types and varieties which would ensure the best economic benefit to Australian industry. This standard therefore covers only high-strength structural bolts with normal (ISO 888) thread lengths of property class 8.8, and high-strength structural nuts of property class 8. These are functionally the same as those given in the respective ISO standards shown below. The other differences are minor and are in the thread run-out, marking and designation requirements. In the International standards, in order to align with the ISO property class designation system given in ISO 898, structural bolts and associated nuts are required to be marked 8.8S and 8S respectively, but in the context of an Australian standard it was noted by the committee that the current marking provisions given in AS 1252—1973 were well entrenched in the construction industry and no useful purpose would be served by changing the marking to incorporate the ISO system. Consequently the marking system as given in the 1973 edition of AS 1252 has been changed only marginally in that the symbol M has been replaced by the numeral(s) denoting the property class.* The committee also noted that there was a growing requirement for short thread length bolts, but currently there was insufficient usage to warrant their inclusion in the standard. To assist users who require such bolts, the thread run-out was reduced from $4.5p$ (as given in the ISO standard) to $3p$, which should alleviate the problem to some degree. Furthermore, an appendix has been added giving further information on ISO short thread length bolts.

Other changes from the 1973 edition are as follows:

(a) A slight upgrading of the mechanical properties of bolts.

(b) A similar upgrading in the nut proof load stress.

(c) The introduction of the unthreaded shank length (l_s) and the bolt grip length (l_g) concept which should assist designers of steel structures.

(d) The relegation of square tapered washers to an appendix because of their diminishing use.

(e) The introduction of M22 bolts, nuts and washers as part of the non-preferred series to recognize a requirement in the construction industry.

(f) The relegation of M12 bolts, nuts and washers to the non-preferred series because of their small use in the construction industry.

Bolts and nuts to the 1973 edition will gradually be phased out, but during the transition period either type may be supplied as being functionally equivalent.

As indicated previously, with the above exceptions, this standard is in alignment with, and is based on ISO/DIS 4775, ISO/DIS 7411 and ISO/DIS 7415.

*Thus AS 1252 property classes 8.8 and 8 for bolts and nuts respectively, align with the requirements for ISO property classes 8.8S and 8S.

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard for HIGH-STRENGTH STEEL BOLTS WITH ASSOCIATED NUTS AND WASHERS FOR STRUCTURAL ENGINEERING

SECTION 1. SCOPE AND GENERAL

1.1 SCOPE. This standard specifies requirements for general grade high-strength steel bolts and nuts of property class 8.8 and 8 with ISO metric coarse pitch series threads, and associated washers in diameters from M16 to M36 inclusive, mainly intended for use in steel structures in accordance with AS 1250 and AS 1511.

The bolts and nuts covered by this standard should not be used outside the temperature limits of − 50°C and + 300°C, and no provision is made for products requiring special properties such as weldability or for corrosion-resistant materials. However, provision is made for bolts, nuts and washers with corrosion-preventive coatings, such as hot-dip galvanized and cadmium or zinc electroplated coatings.

Appendix B gives requirements for 'non-preferred' diameters of M12, M22 and M27.

NOTE: The M12 diameter is designated 'non-preferred' for the purpose of this standard because of the relatively small usage of this diameter for high-strength structural bolts, nuts and washers.

1.2 APPLICATION. Bolts, nuts and washers shall comply with the requirements of the following Sections as appropriate:

Section 2—Bolts
Section 3—Nuts
Section 4—Washers
Section 5—Marking and Packaging

1.3 REFERENCED DOCUMENTS. The following standards are referred to in this standard:

AS 1014	Gauging of Metric Screw Threads
AS 1214	Hot-dip Galvanized Coatings on Threaded Fasteners (ISO Metric Coarse Thread Series)
AS 1250	SAA Steel Structures Code
AS 1275	Metric Screw Threads for Fasteners (Based on ISO Recommendations)
AS 1391	Methods for Tensile Testing of Metals
AS 1511	SAA High-strength Structural Bolting Code
AS 1544	Methods for Impact Tests on Metals Part 3—Charpy U-notch and Key-hole Notch
AS 1650	Galvanized Coatings
AS 1654	Limits and Fits for Engineering
AS 1721	General Purpose Metric Screw Threads
AS 1789	Electroplated Coatings of Zinc on Iron and Steel
AS 1780	Electroplated Coatings of Cadmium on Iron and Steel
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 1897	Electroplated Coatings on Threaded Components (Metric Coarse Series)
ISO 888	Bolts, Screws and Studs—Nominal Lengths, and Thread Lengths for General Purpose Bolts

Attention is drawn to the following related standards:

ISO 272	Fasteners—Hexagon Products—Widths Across Flats
ISO 885	General Purpose Bolts and Screws—Metric Series—Radii Under the Head
ISO 898/1	Mechanical Properties of Fasteners Part 1: Bolts, Screws and Studs
ISO 898/2	Mechanical Properties of Fasteners Part 2: Nuts with Specified Proof Load Values
ISO 4759/1	Tolerances for Fasteners—Part 1: Bolts, Screws and Nuts with Thread Diameters Between 1.6 (inclusive) and 150 mm (inclusive) and Product Grades A, B and C

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

1.4.1 Body—the unthreaded cylindrical portion of a bolt extending from the bearing surface of the bolt head to the screw thread.

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

1.4.3 Concentricity tolerance (of a bolt)—the allowable deviation of the body with respect to the screw thread (see Fig. 2.2).

1.4.4 Symmetry tolerance.

1.4.4.1 *Bolts*—the allowable deviation of the hexagon flats with respect to the body or screw thread (see Fig. 2.2).

1.4.4.2 *Nuts*—the allowable deviation of the hexagon flats with respect to the screw thread (see Fig. 3.2).

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