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Australian Standard 1112–1980

ISO METRIC HEXAGON NUTS, INCLUDING THIN NUTS, SLOTTED NUTS AND CASTLE NUTS

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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:

Australian Institute of Steel Construction

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

Petroleum Refinery Engineers Advisory Committee

Railways of Australia Committee

Telecom Australia

University of Sydney

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AUSTRALIAN STANDARD

ISO METRIC HEXAGON NUTS, INCLUDING THIN NUTS, SLOTTED NUTS AND CASTLE NUTS

AS 1112–1980

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PREFACE

This standard was prepared by the Association's Committee on Fasteners to supersede the 1972 edition. When first published, the standard was intended to cover the anticipated needs of Australian industry under the metric system for metric hexagon nuts. In the interests of international trade and international standardization, the standard at that time was fully aligned with international recommendations published by the International Organization for Standardization (ISO).

Since 1972 there have been several important changes introduced in the international standards, the needs of Australian industry have become more crystallized, and a complete revision was necessary to take all factors into account. The changes in the ISO standards have been introduced after a great deal of technical study and research within ISO/TC 2, and were to a large degree initiated by the U.S.A. who when the metric system was first seriously proposed for adoption in that country, developed a new metric fastener system (The Optimum Metric Fastener System). This system was forwarded to ISO as a U.S.A. proposal for a revision of the relevant ISO standards. In the original submission, a very significant number of changes were proposed for both metric fasteners and metric screw threads. The ensuing technical discussions within ISO/TC 2 which took place over several years were aimed at reducing the technical changes to existing ISO standards to a minimum consistent with achieving improved performance without significantly increasing product costs.

The most significant changes in ISO standards and this standard from the user's point of view are with regard to the across-flat hexagon sizes, and attention is drawn to Appendix F where this is fully detailed. A further important change has been an increase in nut thickness to improve performance. This has been based on extensive research carried out by ISO/TC 2 by Canada.

In AS 1112 — 1972, three property classes only were specified which it was felt would cover the needs of Australian industry at least during the transition to the metric (SI) system. More recently it has become apparent that a further strength grade was becoming popular particularly in the automotive industry, and consequently a property class 9 has been added.

It was noted by the committee that the proof load values for hot-dip galvanized nuts given in this standard had been developed by ISO/TC 2/WG 9 the Secretariat of which is held by Australia. The values have been determined mathematically, and at this stage have not been verified in actual production. Because there has not yet been adequate opportunity thus in Australia or other countries to verify whether these values are fully attainable in practice, the committee decided to include this material as an appendix (Appendix J) until more production experience is accumulated. Consideration will be given to the inclusion of this information in the body of the standard when sufficient experience has accumulated.

The proof load values for property class 8 nuts from M4 to M16 have been slightly increased in ISO 898/2 to meet the new assembly design criteria referred to in Appendix A, and apply to the new across-flats and nut height dimensions. However, these new values have not yet been proved by production experience, either in Australia or other countries, and until such time as this experience is available, the committee agreed to retain the original values given in AS 1112 — 1972, recognizing that because of the increase in nut height the integrity of the bolt/nut assembly was still going to be significantly improved over the previous situation. The committee proposes to review this aspect as soon as experience is available from the use of the new across-flats and nut height sizes. Additionally, the committee noted that there is separate provision in this standard for property class 9 nuts for assembly with property class 9.8 bolts, these being exactly aligned with ISO 898/2.

The nut heights for thin nuts given in this standard are based on a ratio of 0.6D to permit manufacture by cold forming, and thus may differ from those specified in international standards having a ratio of 0.5D. This aspect has been the subject of repeated Australian comment to ISO/TC 2, and it is hoped that eventually it will be recognized in the international standards.

This standard has been based on and is in alignment with the following ISO standards with the above exception (ISO 898/2):

ISO 272	Fasteners — Hexagon Products — Widths Across Flats
ISO 733	Hexagon Bolts and Nuts — Metric Series — Tolerances on Widths Across Flats, Widths Across Corners
ISO 898/2	Mechanical Properties of Fasteners Part 2 — Nuts with Specified Proof Load Values
ISO 1000	SI Units and Recommendations for the Use of Their Multiples and of Certain Other Units
ISO 4759/1	Tolerances for Fasteners — Part I: Bolts, Screws and Nuts with Thread Diameters between 1.6 (inclusive) and 150 mm (inclusive) and Product Grades A, B and C.

The standard is also in alignment (with the exceptions noted above) with the equivalent ISO product standards in the following manner:

ISO 4032	Hexagon Nuts, Style 1 — Product Grades A and B (for hexagon nuts in sizes M1.6 to M36 inclusive)
ISO 4033	Hexagon Nuts, Style 2 — Product Grades A and B. (in sizes M5 to M16 inclusive)
ISO 4034	Hexagon Nuts — Product Grade C (in sizes over M36 to M64 inclusive)
ISO 4035	Hexagon Thin Nuts — Product Grades A and B (in sizes M1.6 to M36 inclusive)

ISO standards for slotted and castle nuts, namely ISO/R 288, Parts I and II, are currently being revised by ISO/TC 2 and this standard is based on and is in alignment with the latest draft proposals for these products.

This standard may require reference to the following Australian standards:

AS 1014 Gauging of Metric Screw Threads
AS 1110 ISO Metric Hexagon Precision Bolts and Screws
AS 1111 ISO Metric Hexagon Commercial Bolts and Screws
AS 1214 Hot-dip Galvanized Coatings on Threaded Fasteners (ISO Metric Coarse Thread Series)
AS 1275 Metric Screw Threads for Fasteners
AS 1654 Limits and Fits for Engineering
AS 1721 General Purpose Metric Screw Threads
AS 1815 Method for Rockwell Hardness Test
AS 1816 Method for Brinell Hardness Test
AS 1817 Method for Vickers Hardness Test
AS 1897 Electroplated Coatings on Threaded Components (Metric Coarse Series)

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Australian Standard
for
ISO METRIC HEXAGON NUTS, INCLUDING THIN NUTS, SLOTTED NUTS AND CASTLE NUTS

1 SCOPE. This standard specifies requirements for four types of hexagon nuts with ISO metric coarse pitch threads, i.e. normal nuts, slotted nuts, castle nuts and thin nuts, as given in Table 1.

The standard is intended primarily to cover steel 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 for corrosion-resistant materials.

The dimensional requirements of this standard also apply to non-ferrous and stainless steel nuts.

NOTES:

1. The range of nominal sizes included in this standard is considered adequate for most of the applications for which this series is likely to be employed, but for the convenience of users requiring larger sizes, further information in relation to the nut parameters and derivation of tolerances is provided in Appendix D and Appendix E, respectively.
2. Nuts manufactured of free-cutting steel to property classes 5 and 04 should not be used at a temperature in excess of 250°C.
3. Hexagon nuts given in this standard are generally in agreement with those given in international standards (see Preface).
4. Inclusion of the property classes given in this standard does not necessarily imply that such types are stock items. The purchaser should refer to the manufacturer's listing for stock availability.
5. Proof load values for hot-dip galvanized nuts are given in Appendix J.
6. If nuts with other than coarse pitch series thread are required, these are subject to agreement between the manufacturer and the user, and the thread series should be selected from AS 1721.

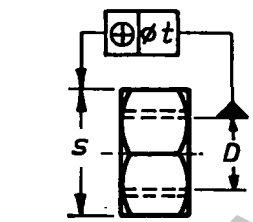
TABLE 1
TYPES OF NUTS

Type of nut	Property classes	Size range	Table No
Normal	5, 8, 10	M1.6 to M64	2
Normal	9	M5 to M16	3
Thin	04, 05	M1.6 to M48	4
Slotted	8, 10	M4 to M64	5
Castle	8, 10	M4 to M64	5

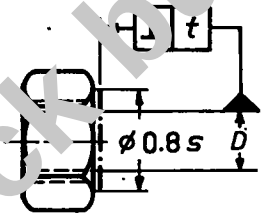
2 DEFINITIONS. For the purpose of this standard, the following definitions apply:

2.1 Symmetry tolerance — of a nut, is the allowable deviation of the across-flats dimension with respect to the screw thread (see Fig. 1(a)).

2.2 Squareness tolerance — of a nut, is the allowable deviation of the bearing face with respect to the screw thread (see Fig. 1(b)).



(a) SYMMETRY TOLERANCE



(b) SQUARENESS TOLERANCE

Fig. 1. SYMMETRY AND SQUARENESS OF HEXAGON NUTS

3 METHOD OF MANUFACTURE. Hexagon nuts may be produced by hot or cold forging with or without subsequent machining. Alternatively, they may be machined from bar stock.

4 SHAPE, DIMENSION AND FINISH.

4.1 General. The shape, dimension and finish of nuts shall be in accordance with Figs 2 and 3, Tables 2 to 5, and the following requirements of this clause.

NOTE: For hot-dip galvanized nuts, the dimensions apply before hot-dip galvanizing (see also Clause 4.2.2).

4.2 Screw Threads.

4.2.1 *General.* The form of thread, and diameters and associated pitches of hexagon nuts, shall be the ISO coarse pitch series, in accordance with AS 1275 (also given in AS 1721).

4.2.2 *Tolerances.* Screw threads shall be made to the 6H tolerances specified in AS 1275 (also given in AS 1721).

Hot dip galvanized nuts shall be tapped oversize in accordance with AS 1214.

If other thread classes are required, these shall be selected from AS 1721.

NOTE: Other thread classes are subject to agreement between the purchaser and the manufacturer.