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Australian Standard 1559—1983

TOWER BOLTS
WITH ASSOCIATED NUTS AND WASHERS (METRIC SERIES)

STANDARDS ASSOCIATION OF AUSTRALIA
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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
Society of Automotive Engineers—Australasia
Telecom Australia
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University of Sydney

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AUSTRALIAN STANDARD

TOWER BOLTS
WITH ASSOCIATED NUTS AND WASHERS (METRIC SERIES)

AS 1559—1983

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PREFACE

This edition of this standard was prepared by the Association's Committee on Fasteners to supersede AS 1559—1975. When first published, AS 1559 was in alignment with ISO documentation for basic dimensions such as hexagon sizes, nominal lengths, etc, but certain other dimensions and all mechanical properties were determined at that time by the committee to take into account current practices used in the electrical transmission and tower erection industries.

Products such as those described in this edition of the standard were introduced as a part of the work program of ISO/TC 2/WG 9, the International Organization for Standardization's Working Group on Structural Bolting, but after careful consideration by this group it was found that there was insufficient international agreement upon which to base a standard, having regard to the different practices in the various countries. This edition, therefore, incorporates only a revision of the dimensional requirements for the bolts themselves to align them with the new international sizes particularly for the hexagon across-flats and head-heights. The dimensions of bolts given in this standard, insofar as the hexagon sizes and nominal lengths are concerned, are now aligned with the new sizes given in AS 1111, ISO Metric Hexagon Commercial Bolts and Screws. However, the maximum shank diameter, length of unthreaded shank and grip lengths given in the 1975 edition have been retained because they are based on design concepts required in the electrical transmission and tower erection industries.

Similarly the mechanical properties given in this edition are unchanged from those given in the 1975 edition and consequently are different from those given in either AS 1110, ISO Metric Hexagon Precision Bolts and Screws, or AS 1111, the latter being based on the ISO system of mechanical properties.

The most significant change in this edition concerns the hexagon across-flats sizes for M12 diameter bolts. These have been changed from 19 mm to 18 mm to align with the international (ISO) series of metric fasteners and also those given in AS 1110, AS 1111 and AS 1112, ISO Metric Hexagon Nuts, Including Thin Nuts, Slotted Nuts and Castle Nuts. Bolts and nuts to the 1975 edition will gradually be phased out, but during the transition period either type may be supplied as being functionally equivalent. However, bolts with an across-flats size of 19 mm should not be supplied with nuts having an across-flats size of 18 mm and *vice versa*.

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STANDARDS ASSOCIATION OF AUSTRALIA

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for
TOWER BOLTS WITH ASSOCIATED NUTS AND WASHERS (METRIC SERIES)

SECTION 1. SCOPE AND GENERAL

1.1 SCOPE. This standard specifies requirements for single-nut and double-nut type steel tower bolts with ISO metric coarse pitch series threads, in diameters from M12 to M30 inclusive, and lengths from 30 mm to 160 mm inclusive, suitable for use in electricity transmission towers and similar structures.

It also specifies requirements for the type of tower bolt known as the 'step bolt' and steel nuts and washers for use with tower bolts.

Carbon steel bolts, nuts and washers are supplied hot-dip galvanized (see Note 1). The standard also permits manufacture from weather-resistant steels, provided that the bolts, nuts and washers have the same mechanical properties as those manufactured from carbon steel.

NOTES:

1. Other corrosion protective coatings may be used by agreement between the purchaser and the manufacturer.
2. Bolts, nuts and washers may also be manufactured from other materials by agreement between the purchaser and the manufacturer provided that the dimensional requirements of this standard are maintained.
3. Appendix C sets out information which should be supplied by the purchaser for the purpose of any enquiry or order for bolts, nuts and washers to this standard.
4. The M12 diameter is designated 'non-preferred' for the purpose of this standard because of the relatively small useage of this diameter for tower bolts. It is suggested that if bolts of this diameter are required for tower construction purposes, consideration should be given to using bolts of property class 8.8 to AS 1110. Information on M12 tower bolts is given in Appendix E.

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

Section 2—Tower Bolts
Section 3—Step Bolts
Section 4—Nuts
Section 5—Washers
Section 6—Marking

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

AS 1110	ISO Metric Hexagon Precision Bolts and Screws
AS 1112	ISO Metric Hexagon Nuts, Including Thin Nuts, Slotted Nuts and Castle Nuts
AS 1205	Structural Steels—Weather-resistant Weldable Grades
AS 1214	Hot-dip Galvanized Coatings on Threaded Fasteners (ISO Metric Coarse Thread Series)
AS 1275	Metric Screw Threads for Fasteners (Based on ISO recommendations)
AS 1544	Methods for Impact Tests on Metals Part 2—Charpy V-notch
AS 1650	Galvanized Coatings
AS 1721	General Purpose Metric Screw Threads

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

1.4.1 Tower bolt, single-nut type—a hexagon-headed fastener satisfying the technical provisions of this standard, and being most commonly used in electricity transmission towers and similar structures.

1.4.2 Tower bolt, double-nut type—a special variety of tower bolt with limited application, where a second nut is required for locking purposes.

NOTE: This bolt is sometimes used when tensile loads are applied to fastenings.

1.4.3 Step bolt—a type of tower bolt which is used to gain access to the top of the tower structure.

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

1.4.5 Symmetry tolerance—the allowable deviation of the hexagon flats with respect to the body or screw thread of the bolt (see Fig. 2.1).

1.4.6 Squareness tolerance—the allowable deviation of the bearing face of the head with respect to the body or screw thread (see Fig. 2.1).

1.4.7 Body length (l_s)—the distance from the bearing surface of the bolt head to the last scratch of thread, or top of the extrusion angle, whichever is closer to the head.

1.4.8 Grip length (l_g) (of a bolt)—the distance between the bearing surface of the head and the nearest face of a nut with no countersink when the nut is screwed on to the bolt as far as practicable by hand.

NOTE: This represents the approximate minimum thickness of materials which can be clamped, excluding the washer thickness.

1.4.9 Length (l) (of a tower bolt)—the distance from the bearing surface of the head to the end of the bolt including any chamfer or radius (see Fig. 2.2).

1.4.10 Thread runout (a) (of a tower bolt).

1.4.10.1 *Tower bolts with rolled threads*—the distance from the top of the extrusion cone to the nearest face of a nut with no countersink when screwed on to the bolt as far as practicable by hand (see Fig. 2.3(a)).

1.4.10.2 *Tower bolts with cut threads*—the distance from the last scratch of thread to the nearest face of a nut with no countersink when screwed on to the bolt as far as practicable by hand (see Fig. 2.3(b)).