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# Australian Standard® 1559—1986

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## FASTENERS—BOLTS, NUTS AND WASHERS FOR TOWER CONSTRUCTION



**STANDARDS ASSOCIATION OF AUSTRALIA**  
*Incorporated by Royal Charter*



AUSTRALIAN STANDARD

# FASTENERS—BOLTS, NUTS AND WASHERS FOR TOWER CONSTRUCTION

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Australian Institute of Steel Construction Ltd  
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Confederation of Australian Industry  
Department of Defence  
Electricity Supply Association of Australia  
Fasteners Institute of Australia  
Railways of Australia Committee  
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*This standard was issued in draft form for comment as DR 84291.* ✓

## PREFACE

This edition of this standard was prepared by the Association's Committee on Fasteners, to replace AS 1559—1983, Tower Bolts with Associated Nuts and Washers (Metric Series), which was withdrawn in September 1984.

This edition was necessitated by oversights during the preparation of the previous edition, resulting in contradictions in some dimensional tables. Accordingly, this edition introduces—

- (a) the definition of clamping length ( $l_c$ );
- (b) Tables 2.2 and 2.3 showing grip length ( $l_g$ );
- (c) nut heights in accordance with AS 1112—1980, ISO Metric Hexagon Nuts, Including Thin Nuts, Slotted Nuts and Castle Nuts;
- (d) Tables B1 and B2 showing clamping length ( $l_c$ ); and
- (e) Appendix C, Derivation of Length Tolerances.

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## STANDARDS ASSOCIATION OF AUSTRALIA

## Australian Standard

for

## FASTENERS—BOLTS, NUTS AND WASHERS FOR TOWER CONSTRUCTION

## SECTION 1. SCOPE AND GENERAL

**1.1 SCOPE.** This standard specifies requirements for single-nut and double-nut type steel bolts with ISO metric coarse pitch series threads from M12 to M30 inclusive, and lengths from 35 mm to 160 mm inclusive, suitable for use in electricity transmission towers and similar structures.

NOTE: These bolts are known as 'tower bolts' and are defined accordingly in Clause 1.4.

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 and mechanical properties of this standard are maintained.
3. Appendix D 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 thread is designated 'non-preferred' because of the relatively small usage of this size for tower bolts. It is suggested that if bolts of this size 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 F.

**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, with a specific relationship of the threaded length to the overall length and with a defined thread runout, to ensure the absence, when assembled, of a full thread in the shear plane and a minimum protrusion of one-and-a-half thread pitches beyond the nut face. These bolts are 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 which a second nut is used 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 ( $l_b$ )**—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 (used for reference only).

**1.4.8 Grip length ( $l_g$ )**—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.

**1.4.9 Clamping length ( $l_c$ )**—the total thickness of materials to be clamped, including coating thickness if any (see Fig. B1 of Appendix B).

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

**1.4.11 Thread runout**—

(a) *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)).

(b) *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)).