

Australian/New Zealand Standard®

**Bolts, screws and nuts with British
Standard Whitworth threads
(rationalized series)**

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee ME/29, Fasteners. It was approved on behalf of the Council of Standards Australia on 1 December 1997 and on behalf of the Council of Standards New Zealand on 11 November 1997. It was published on 5 February 1998.

The following interests are represented on Committee ME/29:

Australian Chamber of Commerce and Industry
Bureau of Steel Manufacturers of Australia
Electricity Supply Association of Australia
Federal Chamber of Automotive Industries, Australia
Institute of Metals and Materials Australasia
Metal Building Products Manufacturers Association, Australia
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Bolts, screws and nuts with British Standard Whitworth threads (rationalized series)

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STANDARDS AUSTRALIA
1 The Crescent,
Homebush NSW 2140 Australia

STANDARDS NEW ZEALAND
Level 10, Radio New Zealand House,
155 The Terrace,
Wellington 6001 New Zealand

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee ME/29, Fasteners, to supersede AS 2451—1981.

The objective of this Standard is to provide manufacturers and purchasers with requirements for hexagon bolts, screws with British Standard Whitworth (BSW) threads in diameters $\frac{1}{4}$ in to 2 in inclusive and nuts with BSW threads in diameters $\frac{1}{4}$ in to 6 in inclusive. The objective of this revision is to update the content in respect of references and current editorial policy, and to issue the Standard as a Joint Australian/New Zealand Standard.

In addition to editorial changes and updating the list of reference documents the following minor technical changes have been incorporated in this revision:

- (a) Size range of bolts reduced to $\frac{1}{4}$ in to 2 in.
- (b) Tolerance on straightness of shank introduced.
- (c) Chemical composition limits for steel specified.
- (d) Methods of test replaced with references to AS/NZS 4291, *Mechanical properties of fasteners*, Part 1: *Bolts, screws and studs*, and Part 2: *Nuts with specified proof load values—Coarse thread*.
- (e) Hexagon across corners dimension changes from maximum limits to minimum limits.

The term ‘informative’ has been used in this Standard to define the application of the appendix to which it applies. An ‘informative’ appendix is only for information and guidance.

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STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard**Bolts, screws and nuts with British Standard Whitworth threads
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SECTION 1 SCOPE AND GENERAL

1.1 SCOPE This Standard specifies the requirements for hexagon bolts and screws with British Standard Whitworth (BSW) thread in diameters from $\frac{1}{4}$ in to 2 in inclusive and nuts with BSW thread in diameters from $\frac{1}{4}$ in to 6 in inclusive.

The Standard is intended primarily to cover steel bolts, screws and nuts used within the temperature range of -50°C to $+300^{\circ}\text{C}$, and does not make provision for products requiring special properties such as weldability or corrosion-resistance.

The dimensional requirements 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.
- 3 If the purchaser requires other pitch series, i.e. BSF or other thread classes, these should be the subject of agreement between the purchaser and the manufacturer.

1.2 REFERENCED DOCUMENTS The following documents are referred to in this Standard:

AS

- | | |
|--------|---|
| 1654 | ISO system of limits and fits |
| 1654.2 | Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts |
| 3501 | Parallel screw threads of Whitworth form (BSW and BSF) and associated gauges and gauging practice |
| B193 | Hot-dip galvanized coating on fasteners (BSW and UNC threads) |

AS/NZS

- | | |
|--------|---|
| 4291 | Mechanical properties of fasteners |
| 4291.1 | Part 1: Bolts, screws and studs |
| 4291.2 | Part 2: Nuts with specified proof load values—Coarse thread |

SAA/SANZ

- | | |
|---------|---|
| HB18 | Guidelines for third-party certification and accreditation |
| HB18.22 | Guide 22—Information on manufacturer's declaration of conformity with standards or other technical specifications |

1.3 DEFINITIONS For the purpose of this Standard the definitions below apply.

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

1.3.2 Thread length (of a hexagon bolt)—the difference between the nominal length of the bolt and the distance between the bearing surface of the head and the nearer face of a nut with no internal chamfer when screwed onto the bolt as far as practicable by hand.

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

1.3.4 Symmetry tolerance (of a bolt or screw)—the allowable deviation of the across-flats dimension with respect to the shank of a bolt or the major diameter of a screw.

1.3.5 Thread runout (of bolts and screws with rolled threads)—the distance from the top of the extrusion cone to the nearest face of a nut with no internal chamfer which has been screwed on to the bolt as far as practicable by hand.

1.3.6 Thread runout (of 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.

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

1.4 MARKING The marking of bolts, screws, nuts shall comply with the following requirements:

- (a) *Bolts and screws* The manufacturer's identification (trade) marking shall be either embossed or indented on the top of the heads of hexagon bolts and screws, at the option of the manufacturer.
- (b) *Nuts* The manufacturer's identification (trade) marking shall be indented on either the bearing or the non-bearing face of hexagon nuts.

NOTES:

- 1 Manufacturers making a statement of compliance with this Australian/New Zealand Standard on a product, packaging, or promotional material related to that product are advised to ensure that such compliance is capable of being verified.
- 2 Guidance on the manufacturer's declaration of conformity with this Standard is given in SAA HB18.22/SANZ HB18.22.

1.5 DESIGNATION The designation of bolts, screws and nuts with BSW threads shall be composed of the following:

- (a) General product description, e.g. BSW bolts.
- (b) The number of this Australian/New Zealand Standard, i.e. AS/NZS 2451.
- (c) The nominal thread diameter.
- (d) The nominal length for bolts and screws in inches.
- (e) The coating where applicable.
- (f) Any other features.

Examples

- 1 Whitworth hexagon bolts $\frac{1}{2}$ in diameter and 6 in long would be designated as follows:
BSW bolts to AS/NZS 2451— $\frac{1}{2} \times 6$.
- 2 Whitworth hexagon $\frac{1}{2}$ in nuts would be designated as follows:
BSW nuts to AS/NZS 2451— $\frac{1}{2}$

SECTION 2 BOLTS AND SCREWS

2.1 SCOPE OF SECTION This Section gives the requirements for hexagon bolts and screws with BSW threads nominal diameter $\frac{1}{4}$ in to 2 in inclusive.

2.2 METHOD OF MANUFACTURE Hexagon bolts and screws shall be produced by hot forging, cold forging, or machining.

2.3 SHAPE, DIMENSIONS AND FINISH

2.3.1 General The dimensions and tolerances given in this Clause apply to fasteners before the application of any hot-dip galvanized coating.

2.3.2 Tolerance on length of hexagon bolts and screws The tolerance on the nominal lengths of hexagon bolts and screws is given in Table 2.1.

2.3.3 Ends of hexagon bolts and screws The ends of hexagon bolts and screws may, at the option of the manufacturer, be finished with either a 45-degree chamfer to a depth slightly exceeding the depth of thread, or a radius approximately equal to 1.25 times the nominal diameter of the shank. Alternatively, when bolts are made with rolled threads, the lead formed at the end of the bolt by the rolling operation may be regarded as providing the necessary chamfer to the end, no other machining operation being necessary. The end shall be reasonably square with the centre-line of the shank (see Figure 2.1(c)).

TABLE 2.1
TOLERANCE ON NOMINAL LENGTH
OF BOLTS AND SCREWS

Nominal length (<i>l</i>)	Diameter (<i>d</i>) in	Tolerance on length, in
All lengths	Below 1	$+1/8, -0$
	1 and over	$+3/16, -0$

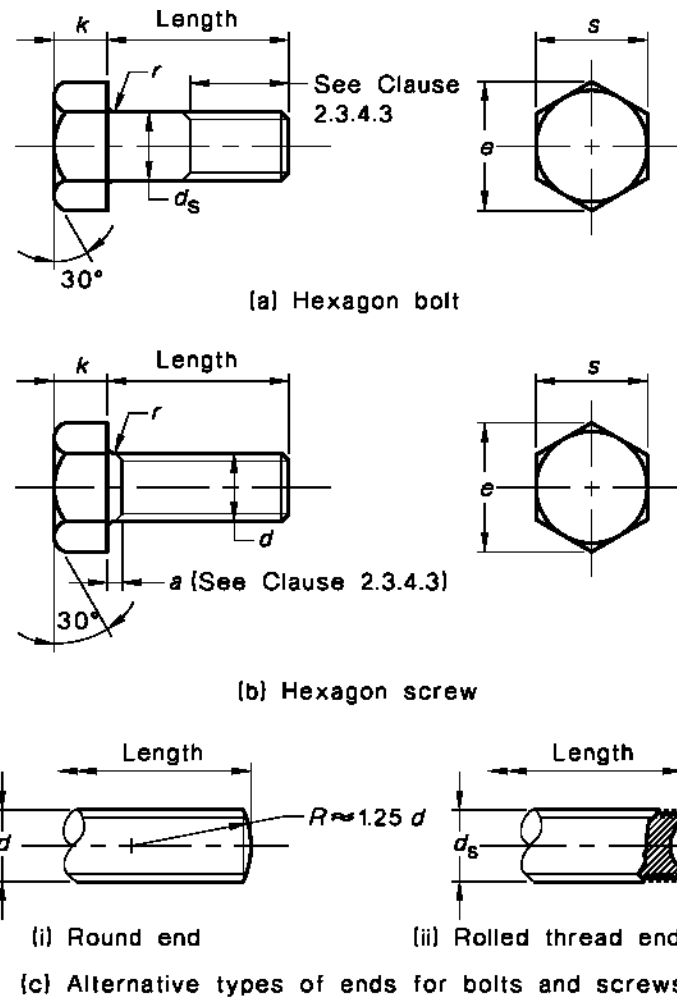
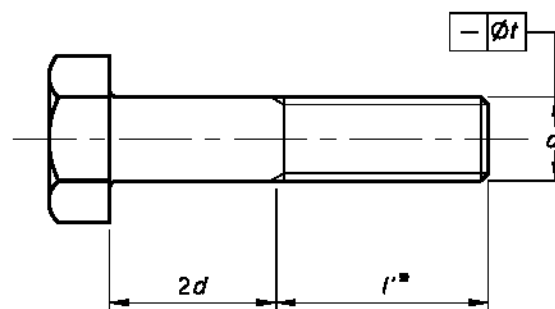


FIGURE 2.1 GENERAL CONFIGURATION OF BOLTS AND SCREWS



$$^{\circ}t = 2(0.0025 \ l' + 0.002)$$

Straightness is applicable only for l'

DIMENSIONS IN INCHES

FIGURE 2.2 TOLERANCE ON STRAIGHTNESS