

Specification for

B.A. Screws bolts and nuts

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The Mechanical Engineering Industry Standards Committee, under whose supervision this British Standard was prepared, consists of representatives from the following Government departments and scientific and industrial organizations:—

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British Compressed Air Society	Institution of Mechanical Engineers (Automobile Division)
British Electrical and Allied Manufacturers’ Association*	Institution of Production Engineers*
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The Government departments and scientific organizations marked with an asterisk in the above list, together with the following, were directly represented on the committee entrusted with the preparation of this British Standard:—

Aircraft Bolt and Nut Manufacturers Association	Metal Thread Screw Manufacturers’ Association (Rolled Screw Section)
Bright Bolt and Nut Manufacturers Association	Metal Thread Screw Manufacturers’ Association (Turned Screw Section)
Bright Steel Bar Association	National Physical Laboratory
British Constructional Steelwork Association	Oil Companies Materials Committee
British Cycle and Motor Cycle Manufacturers’ and Traders’ Union Ltd	Radio Industry Council
British Steel Wire Industries Association	Society of British Aircraft Constructors
Cold Headed Heat-treated Bolt Association	Society of Motor Manufacturers and Traders Ltd.
Council of British Manufacturers of Petroleum Equipment	Telecommunications, Engineering and Manufacturing Association
General Post Office	Washer Manufacturers’ Association
Institution of Naval Architects	

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Contents

	Page
Co-operating organizations	Inside front cover
Foreword	ii
Section 1. Screws, bolts and nuts	
1 Scope	1
2 Method of manufacture	1
3 Material	1
4 Dimensions	1
5 Length of screws and bolts	1
6 Ends of screws and bolts	1
7 Screw threads	2
8 Length of thread on screws and bolts	2
9 Chamfering and washer-facing	3
Section 2. Plain washers	
<i>Deleted</i>	
Appendix A Special types of screws not normally stocked	14
Appendix B Approximate proportions	16
Appendix C Metric slot widths	16
Figure 1 — Alternative types of ends permissible on screws and bolts	2
Figure 2 — Cheese head screw	4
Figure 3 — Round head screw	5
Figure 4 — Countersunk head screw	6
Figure 5 — Raised-countersunk head screw	7
Figure 6 — Hexagonal headed screw	8
Figure 7 — Hexagonal headed bolt	8
Figure 8 — Washer faced head	8
Figure 9 — Hexagonal ordinary nut	9
Figure 10 — Hexagonal thin (or lock) nut	9
Figure 11 — Hexagonal ordinary nut	9
Figure 14 — Raised cheese (fillister) head screw	14
Figure 15 — Connection head screw	15
Table 1 — Cheese head screws	4
Table 2 — Round head screws	5
Table 3 — Countersunk head screws	6
Table 4 — Raised-countersunk (instrument) head screws	7
Table 5 — Hexagonal headed screws and bolts	8
Table 6 — Hexagonal ordinary (or full) and thin (or lock) nuts	9
Table 7 — Lengths of steel and brass cheese and countersunk head B.A. screws (screwed to head)	10
Table 8 — Lengths of steel and brass round head B.A. screws (screwed to head)	11
Table 9 — Lengths of steel and brass raised-countersunk (instrument) head B.A. screws (screwed to head)	12
Table 10 — Lengths of steel hexagonal head B.A. screws (screwed to head) and bolts (2 B.A. only)	13
Table 13 — Raised cheese (fillister) head screws	14
Table 14 — Connection head screws	15
Table 15 — Slot widths	17

NOTE The requirements for washers in this standard have been superseded by the publication of BS 3410, "Metal washers for general engineering purposes", to which reference should now be made.

Foreword

This standard requires reference to the following:—

BS 93:1951, *British Association (B.A.) screw threads, with tolerances for sizes 0 B.A. to 16 B.A.*

BS 4183:1967, *Machine screws and machine screw nuts — metric series.*

This British Standard was first issued in 1920. The provisions of that edition related solely to the dimensions of the heads of the various types of screws and the dimensions of ordinary hexagon nuts.

When the first revision of the standard was published in 1944 its scope was extended to include requirements for the complete dimensions of screws, bolts and nuts; in addition, dimensions for lock nuts and for two sizes of washers were given. The edition was issued as a War Emergency British Standard and took into account recommendations, contained in instructions issued by the Ministry of Supply, which indicated those types, sizes and lengths of small screws and bolts regarded as standard production.

General dimensions for all the common types and sizes of B.A. screws bolts and nuts were included in the standard, but the dimensions for types not recognized as standard were given in an Appendix. The tables in the body of the specification designated selected sizes as “standard” and all other sizes as “specials”. A table of “Standard lengths of steel and brass B.A. bolts and screws for wartime production” was given in an Appendix.

The War Emergency edition has now been reviewed in the light of present-day conditions and, whilst the principles stated above have been largely adopted in the present revision, certain modifications which more recent experience has shown to be desirable have been incorporated. There has been some rearrangement of the tables of general dimensions, including the transfer of the table of dimensions for “Raised-countersunk (instrument) head screws and bolts” from the Appendix to the body of the standard. The ranges of nominal sizes given in these tables are now designated “Preferred,” “Second choice” and “Not normally stocked”; the table of standard lengths has been reviewed and tables are now included in the standard relating to each type of screw and showing the lengths in which each size is normally stocked and other lengths which may be regarded as standard, although they are not normally stocked.

Finally, since the production of B.A. bolts is very small compared with that of B.A. screws, the title of the standard has been suitably revised.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 17 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Section 1. Screws, bolts and nuts

1 Scope

Section 1 of this British Standard specifies requirements and dimensions for both ferrous and non-ferrous screws, bolts and nuts.

2 Method of manufacture

Screws and bolts may be either turned from bars or forged.

3 Material

The material from which the screws, bolts and nuts are manufactured shall have an ultimate tensile stress of not less than the following:—

Steel	25 tons/sq. in.
Brass	20 tons/sq. in.
Aluminium alloy	20 tons/sq. in.

If the purchaser requires the screws, bolts and nuts to be manufactured from steel or brass of a higher tensile stress, or of another material, he shall specify the ultimate tensile stress of the material.

NOTE The choice of alloy should normally be left to the manufacturer, but among suitable light alloys satisfying the requirement are the following:—

For screws, bolts and nuts turned from wire or from the bar:

BS 1475 or BS 1476 respectively:

BS 1475, "Aluminium and aluminium alloy wire for general purposes."

H.G. 14. T

H.G. 15 (Condition W or WP)

BS 1476, "Aluminium and aluminium alloy rods, bars and sections for general purposes."

H.E. 11. WP

H.E. 14. T

H.E. 15 (Condition W or WP)

For screws and bolts cold headed from wire:

BS 1475, "Aluminium and aluminium alloy wire for general purposes."

N.G. 6. M

H.G. 14. T

H.G. 15 (Condition W or WP)

4 Dimensions

The screws, bolts and nuts shall conform to the dimensions and tolerances given in Table 1, Table 2, Table 3, Table 4, Table 5, Table 6, Table 13 and Table 14, and Clauses 5, 6, 7, 8 and 9.

The screw heads shall be concentric with the shank. The slots shall be clean and free from burrs and, on visual inspection, shall appear to be closely co-incident with the centre line of the head.

NOTE Screws and bolts turned from bars can be supplied with a smaller radius under the head if specially ordered.

5 Length of screws and bolts

a) *Countersunk heads.* The nominal length shall be the distance from the upper surface of the head to the extreme end of the shank, including any chamfer or radius.

b) *Raised-countersunk (instrument) heads.* The nominal length shall be the distance from the upper surface of the head (excluding the raised portion) to the extreme end of the shank, including any chamfer or radius.

c) *Hexagonal, round, cheese, raised-cheese (fillister), and connection heads.* The nominal length shall be the distance from the underside of the head to the extreme end of the shank, including any chamfer or radius.

NOTE The nominal lengths of screws normally stocked are given in Table 7, Table 8, Table 9 and Table 10. Bolts (screwed part way) are not normally stocked but should be ordered to the lengths given in Table 7, Table 8, Table 9 and Table 10.

d) *Tolerance on length.* The permissible tolerance on the nominal length of screws and bolts shall be as follows:—

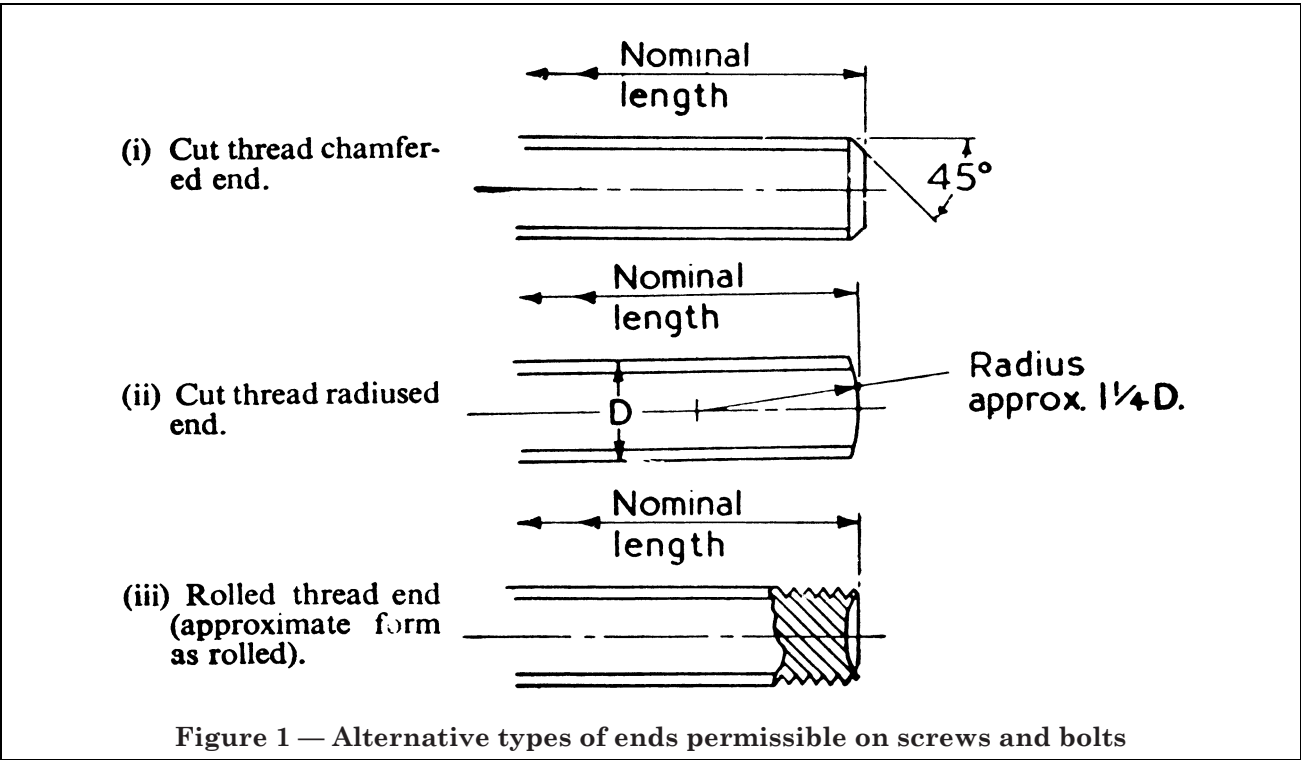
Nominal length	Tolerance
Up to and including $\frac{1}{8}$ in.	+ 0.01 in. – 0.
Above $\frac{1}{8}$ in., up to and including $\frac{1}{2}$ in.	+ 0.02 in. – 0.
Above $\frac{1}{2}$ in.	+ $\frac{1}{32}$ in. – 0.

6 Ends of screws and bolts

a) *Cut threads.* The ends of screws and bolts with cut threads may, at the option of the manufacturer, be finished with either a flat chamfer with a 90° included angle to a depth slightly exceeding the depth of thread, or with a radius approximately equal to 1½ times the nominal diameter of the shank.

b) *Rolled threads.* When screws and bolts are made with rolled threads the lead formed at the end of the screw or bolt by the thread-rolling operation may be regarded as providing the necessary chamfer to the end and no other machining operation is necessary, unless the purchaser, in his enquiry and order, has specified that the ends shall be finished as in Clause 6 a) above.

NOTE For convenience, one type of end only is illustrated in the Figures at the head of Table 1 to Table 5 inclusive, and Table 13 and Table 14. The three alternative types of end permissible are shown in Figure 1 below.



7 Screw threads

- a) *Screws and bolts.* The screw threads may be either cut or rolled, at the option of the manufacturer. Limits and tolerances shall be as specified for normal class bolts in BS 93:1951, “British Association screw threads.” Screws and bolts with close class threads are not normally stocked and should not be ordered, except for special work where refined accuracy of pitch and thread form is particularly required. If the limits and tolerances in respect of the screws and bolts are to be as specified for close class bolts in BS 93:1951, this shall be stated by the purchaser in his enquiry and order.
- b) *Nuts.* The limits and tolerances of the screw threads shall be as specified in BS 93:1951.

8 Length of thread on screws and bolts

- a) *Screws: countersunk and raised-countersunk heads.* These shall be threaded right up to the head.
- b) *Screws: hexagonal, round, cheese, raised-cheese (fillister) and connection heads.* These shall be threaded to leave a limited length of unthreaded shank under the head. The length of unthreaded shank is defined as the distance from the leading face of a nut which has been screwed as far as possible on to the screw by hand to the underside of the head. The nut shall have threads as specified in Clause 7 b) and shall not be countersunk.

The length of unthreaded shank shall not exceed the following:—

Nominal length of screw	Length of unthreaded shank
Up to and including 5 times the diameter.	Not to exceed 1½ times the pitch.
Greater than 5 times the diameter.	Not to exceed 2½ times the pitch.

- c) *Bolts.* The length of thread on bolts shall be the distance from the end of the bolt (including any chamfer or radius) to the leading face of a nut which has been screwed as far as possible on to the bolt by hand. The nut shall have threads as specified in Clause 7 b) and shall not be countersunk.

The length of thread shall be not less than three times the nominal diameter of the bolt.

9 Chamfering and washer-facing

a) *Hexagonal headed screws and bolts*. These shall have a chamfer of approximately 30° on their upper faces. The underside of the head may, at the option of the manufacturer, be finished flat, or in the case of sizes 0 to 6 B.A. inclusive, have a washer-face.

b) *Hexagonal ordinary (or full) nuts*. These shall have a chamfer of approximately 30° on both faces, but sizes 13 B.A. and smaller may, at the option of the manufacturer, be chamfered on one face only.

c) *Hexagonal thin (or lock) nuts*. These shall have a chamfer of approximately 30° on both faces.