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ISO metric black hexagon bolts, screws and nuts — Specification

ICS 21.060.10; 21.060.20

Committees responsible for this British Standard

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- British Constructional Steelwork Association Ltd.
- Confederation of British Forgers
- Electricity Association
- Society of Motor Manufacturers and Traders Limited
- UK Steel Association

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Contents

	Page
Committees responsible	Inside front cover
Foreword	iii
1 Scope	1
2 Normative references	1
3 Finish	2
4 General dimensions	2
5 Length of bolts and screws	2
6 Ends of bolts and screws	3
7 Screw threads	3
8 Length of thread	4
9 Nuts — Squareness of thread to face	6
10 Chamfering and facing	6
11 Diameter of shank of bolt	8
12 Drilled bolts and split pin holes	8
13 Strength grade designation system for steel bolts and screws	10
14 Material and manufacture of steel bolts and screws	10
15 Mechanical properties of bolts and screws	10
16 Strength grade designation system for steel nuts	10
17 Material and manufacture of steel nuts	11
18 Mechanical properties of steel nuts (excluding thin nuts)	11
19 Marking and identification	11
20 Inspection and testing	11
21 Complete designation for the purpose of an enquiry or order	12
Annex A (normative) Testing of mechanical properties of steel nuts (see clause 18)	20
Annex B (normative) Sizes greater than 68 mm diameter	22
Annex C (informative) Manufacturers' recommended range of sizes	23
Figure 1 — Rounded end	3
Figure 2 — Rolled thread end	3
Figure 3 — Hexagon head bolt	4
Figure 4 — Hexagon head screw	6
Figure 5 — Head chamfering	7
Figure 6 — Alternative types of normal thickness nut	7
Figure 7 — Thin nut	8
Figure A.1 — Proof load test for nut	20
Table 1 — Product categories	2
Table 2 — Tolerance on nominal length	2
Table 3 — Thread tolerance classes	3
Table 4 — Thread lengths	4
Table 5 — Thread runout (bolts) and underhead distance (screws)	5
Table 6 — Split pin holes	9
Table 7 — Strength grade designations for steel bolts and screws	10
Table 8 — Strength grade designations for steel nuts	10
Table 9 — Recommended bolt and nut combinations	11
Table 10 — Dimensions of ISO metric black hexagon head bolts and screws	13

	Page
Table 11 — Dimensions of ISO metric hexagon head bolts and screws faced under head or faced under head and turned on shank	14
Table 12 — Dimensions of ISO metric hexagon nuts and hexagon thin nuts	15
Table 13 — Standard nominal lengths and preferred sizes of ISO metric black hexagon bolts and screws	16
Table 14 — Mechanical properties of steel nuts	18
Table 15 — Chemical composition of steel nuts	18
Table 16 — Proof loads for steel nuts (coarse pitch series)	19
Table B.1 — Sizes greater than 68 mm diameter	22
Table C.1 — Hexagon head bolts	23
Table C.2 — Hexagon head screws	24

Foreword

This new edition of BS 4190 has been prepared by Sub-Committee FME/9/6, General purpose fasteners and accessories, on behalf of Technical Committee FME/9, Bolts, nuts and accessories. It supersedes BS 4190:1967, which is withdrawn. This new edition embodies the text of amendment No. 1 (AMD 1778), amendment No. 2 (AMD 2690) and amendment No. 3 (AMD 8226).

The need for bolts, screws and nuts covered by this British Standard has been reviewed and it has been decided, in the interests of safety, to delete BS 4190:1967 Tables 14 and 18 (mechanical properties for bolts and screws) and to produce a new edition. In this edition, BS EN ISO 898-1 has been referred to as it reflects current thinking and practice of the mechanical properties for such products. This edition cross-refers to tables for mechanical properties of bolts, and brings the specification into line with BS EN ISO 898-1.

Annex A and Annex B are normative. Annex C is informative.

It has been assumed in the drafting of this British Standard that the execution of its provisions is entrusted to appropriately qualified and experienced people, for whose guidance it has been prepared.

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 to iv, pages 1 to 24, an inside back cover and a back cover.

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1 Scope

This British Standard gives the general dimensions and tolerances of black hexagon bolts, screws and nuts with ISO metric threads, in diameters from 5 mm to 68 mm inclusive. Mechanical properties are included for steel bolts, screws and ordinary plain nuts, which may be produced by hot or cold forging at the option of the manufacturer. Dimensional requirements are included for bolts, screws and nuts finished black all over and for those which have partially machined finishes.

NOTE 1 The term “black” does not necessarily relate to the appearance of the products, since these may be of bright appearance or black in the finished state. The term implies the comparatively wider tolerances to which these products are usually made.

NOTE 2 Nuts with an effective height of less than $0.6d$ or a width across flats or outside diameter of less than $1.45d$, or both, are excluded from the mechanical requirements specified in this standard.

NOTE 3 It is considered that the range of nominal sizes included in this standard is 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 is provided in Annex C.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this British Standard. For dated references, subsequent amendments to or revisions of any of these publications do not apply. For undated references, the latest edition of the publication referred to applies.

BS 1916-1:1953, *Limits and fits for engineering — Part 1: Limits and tolerances*.

BS 3643-1:1981, *ISO metric screw threads — Part 1: Principles and basic data*.

BS 3643-2:1981, *ISO metric screw threads — Part 2: Limits and tolerances for coarse pitch series threads*.

BS 3692:2001, *ISO metric precision hexagon bolts, screws and nuts — Specification*.

BS 7345:1990 (ISO R 888), *Nominal lengths for bolts, screws and studs — Thread lengths for general purpose bolts*.

BS 7371-6:1998, *Coatings on metal fasteners — Part 6: Specification for hot dipped galvanized coatings*.

BS EN ISO 4042:2000, *Fasteners — Electroplated coatings*.

BS EN 10002-1:1990, *Tensile testing of metallic materials — Part 1: Method of test at ambient temperature*.

BS EN 10109-1:1996, *Metallic materials — Hardness test — Part 1: Rockwell test (scales A, B, C, D, E, F, G, H, K) and Rockwell superficial test (scales 15 N, 30 N, 45 N, 15 T, 30 T and 45 T)*.

BS EN 10109-2:1996, *Metallic materials — Hardness test — Part 2: Verification of Rockwell hardness testing machines (scales A, B, C, D, E, F, G, H, K, N, T)*.

BS EN 10109-3:1996, *Metallic materials — Hardness test — Part 3: Calibration of standardized blocks to be used for Rockwell hardness testing machines (scales A, B, C, D, E, F, G, H, K, N, T)*.

BS EN 20286-1:1993, *ISO system of limits and fits — ISO system of limits and fits — Part 1: Specification for uses of tolerances, deviations and fits*.

BS EN 20286-2:1993, *ISO system of limits and fits — ISO system of limits and fits — Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts*.

BS EN 20898-2:1994, *Mechanical properties of fasteners — Nuts with specified proof load values — Coarse thread*.

BS EN ISO 1234:1998, *Split pins*.

BS EN ISO 898-1, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs*.

BS EN ISO 6506-1:1999, *Metallic materials — Brinell hardness test — Part 1: Test method*.

BS EN ISO 6506-2:1999, *Metallic materials — Brinell hardness test — Part 2: Verification of Brinell hardness testing machines*.

BS EN ISO 6506-3:1999, *Metallic materials — Brinell hardness test — Part 3: Calibration of reference blocks*.

BS EN ISO 6507-1:1998, *Metallic materials — Vickers hardness test — Part 1: Test method*.

BS EN ISO 6507-2:1998, *Metallic materials — Vickers hardness test — Part 2: Verification of testing machines*.

BS EN ISO 6507-3:1998, *Metallic materials — Vickers hardness test — Part 3: Calibration of reference blocks*.

3 Finish

The bolts, screws and nuts shall be cleanly finished, sound and free from defects.

NOTE 1 Table 1 gives the alternative categories of product finishes dealt with in this standard.

Table 1 — Product categories

Non-machined products (finished black all over)	Partially machined products
Black bolts	Bolts faced under head only Bolts faced under head and turned on shank
Black screws	Screws faced under head only
Black nuts	Nuts faced under head only Thin nuts (faced both sides)

NOTE 2 If the purchaser requires the bolts, screws or nuts to be coated, he should state the type of coating required in his enquiry and order. Where possible, reference should be made to the appropriate British Standard (e.g. BS 7371-6:1998 or BS EN ISO 4042:2000).

4 General dimensions

The general dimensions and tolerances of bolts, screws and nuts shall be in accordance with Table 2, Table 3, Table 4, Table 5, Table 6, Table 10, Table 11, Table 12 and Table 13 and clauses 5 to 10 inclusive.

5 Length of bolts and screws

5.1 The nominal length of the bolts and screws shall be the distance from the underside of the head to the extreme end of the shank, including any chamfer or radius.

NOTE The standard nominal lengths are given in Table 13.

5.2 The permissible tolerance on the nominal length shall be as given in Table 2.

Table 2 — Tolerance on nominal length

Length		Dimensions in millimetres	
Over	Up to and including	Bolts faced under head only or black bolts and screws	Screws faced under head only or bolts faced under head and turned on shank
10	18	±0.90	±0.55
18	30	±1.05	±0.65
30	50	±1.25	±0.80
50	80	±1.50	±0.95
80	120	±1.75	±1.10
120	180	±2.0	±1.25
180	250	±2.30	±1.45
250	315	±2.60	±1.60
315	400	±2.85	±1.80
400	500	±3.15	±2.00

6 Ends of bolts and screws

The ends of bolts and screws may, at the option of the manufacturer, be finished with either a 45° chamfer to a depth slightly exceeding the depth of the thread or with a radius approximately equal to $1\frac{1}{4}$ times the nominal diameter of the shank. When bolts are made with rolled threads, the lead formed at the end of the bolt or screw by the thread rolling operation may be regarded as providing the necessary chamfer to the end with no other machining operation being necessary, and the end shall be reasonably square with the centre line of the shank. (See Figure 1 and Figure 2.)

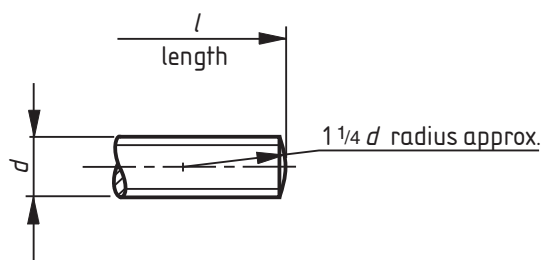


Figure 1 — Rounded end

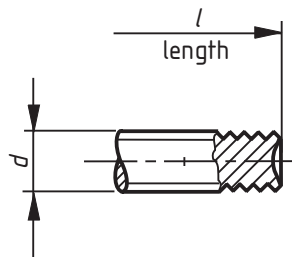


Figure 2 — Rolled thread end

7 Screw threads

7.1 General

The form of thread, diameters and associated pitches of standard ISO metric bolts, screws and nuts shall be in accordance with BS 3643-1.

NOTE Only coarse pitch series threads are specified in this standard.

7.2 Tolerances

The tolerances on the screw threads shall be in accordance with BS 3643-2, as detailed in Table 3.

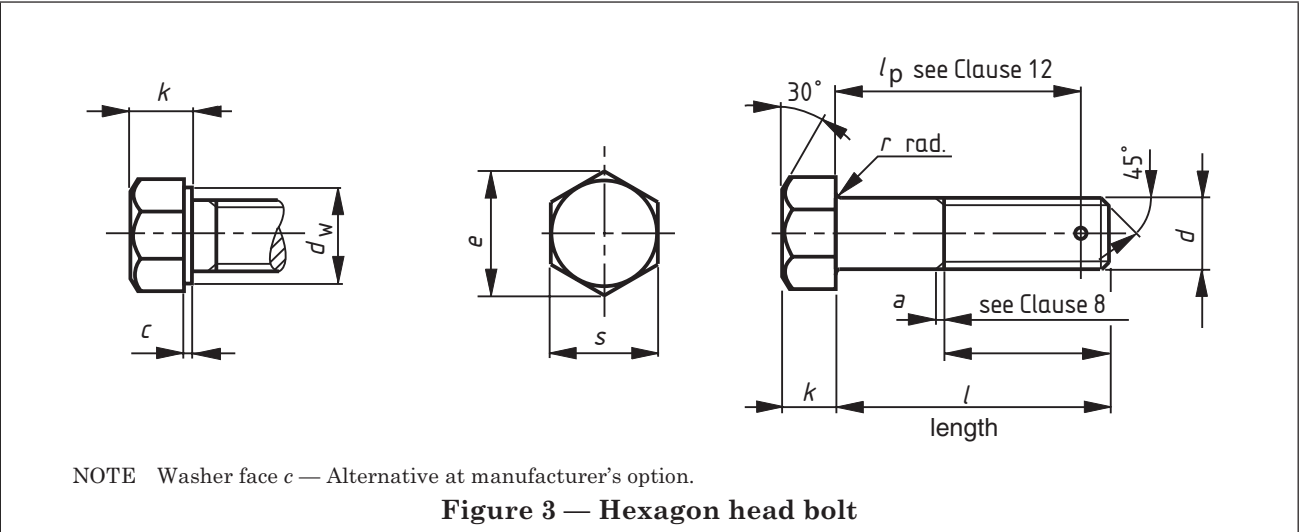
Table 3 — Thread tolerance classes

Product	Tolerance class
Black bolts Black screws Bolts faced under head only	8g
Screws faced under head only Bolts faced under head and turned on shank	6g
Nuts (black or faced)	7H

8 Length of thread

8.1 Bolts

8.1.1 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 screw ring gauge that has been screwed as far as possible on to the bolt by hand. (See Figure 3.)



8.1.2 The standard thread lengths shall be based on the formulae set out in Table 4 in accordance with BS 7375.

Table 4 — Thread lengths

Nominal length of bolt <i>l</i>	Length of thread <i>b</i>
Up to and including 125 mm	$2d + 6$ mm
Over 125 mm up to and including 200 mm	$2d + 12$ mm
Over 200 mm	$2d + 25$ mm

8.1.3 The length of thread runout shall not exceed the values given in Table 5 except where 8.1.4 applies.