

This Standard is obsolescent.
See the BSI Catalogue for details.

BRITISH STANDARD 4190 : 1967

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SPECIFICATION FOR ISO METRIC BLACK HEXAGON BOLTS, SCREWS AND NUTS

**Amendment No. 3
published and effective from 15 November 1994
to British Standard 4190 : 1967**

ISO metric black hexagon bolts
screws and nuts

Obolescence

Insert the following paragraph before clause 1.

'Obsolescent (by Amendment No. 3).

The need for the bolts, screws and nuts covered by this British Standard has been reviewed and it has been decided that, in the interests of rationalization they should be regarded as obsolescent. Their use for new designs is not therefore recommended. The standard will be withdrawn in due course.

Even though this standard has largely been superseded by a series of BS EN standards, of which BS EN 24016 : 1992 and BS EN 24034 : 1992 are typical examples, it has not been withdrawn but declared obsolescent as it is recognized that it should remain available for the servicing of existing designs which are expected to have a long working life.

As the BS EN standards have mechanical properties in accordance with BS EN 20898-1 : 1992 and BS EN 20898-2 : 1992, which reflect more up to date thinking and are different to the mechanical properties specified in BS 4190 : 1967, it is recommended that every effort should be made to utilize the BS EN series of fastener standards for any new designs'.

**SPECIFICATION FOR
ISO METRIC
BLACK HEXAGON BOLTS,
SCREWS AND NUTS**

BS 4190 : 1967

Incorporating amendments issued August 1975 (AMD 1778) and
August 1978 (AMD 2690)

BRITISH STANDARDS INSTITUTION
Incorporated by Royal Charter

THIS BRITISH STANDARD, having been approved by the Mechanical Engineering Industry Standards Committee and endorsed by the Chairman of the Engineering Divisional Council, was published under the authority of the General Council on 30th November, 1967.

The Institution desires to call attention to the fact that this British Standard does not purport to include all the necessary provisions of a contract.

In order to keep abreast of progress in the industries concerned, British Standards are subject to periodical review. Suggestions for improvements will be recorded and in due course brought to the notice of the committees charged with the revision of the standards to which they refer.

This standard makes reference to the following British Standards:

- BS 18. Methods for tensile testing of metals.
- BS 240. Method for Brinell hardness test.
Part 1. Testing of metals.
- BS 427. Method for Vickers hardness test.
Part 1. Testing of metals.
- BS 729. Zinc coatings on iron and steel articles.
- BS 891. Method for Rockwell hardness test.
Part 1. Testing of metals.
- BS 1916. Limits and fits for engineering.
- BS 3382. Electroplated coatings on threaded components.
- BS 3580. Guide to design considerations on the strength of screw threads.
- BS 3643. ISO metric screw threads.
Part 1. Thread data and standard thread series.
Part 2. Limits and tolerances for coarse pitch series threads.
- BS 1574. Split cotter pins.
- As added
August 1978 BS 4500. ISO limits and fits
Part 1. General, tolerances and deviations.

British Standards are revised, when necessary, by the issue either of amendment slips or of revised editions. It is important that users of British Standards should ascertain that they are in possession of the latest amendments or editions.

The following BSI references relate to the work on this standard:
Committee references MEE/60/10 and MEE/60
Draft for comment 66/29854

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*As added
August 1975*

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CO-OPERATING ORGANIZATIONS

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:

Associated Offices' Technical Committee
 Association of Consulting Engineers
 Association of Mining Electrical and Mechanical Engineers
 Board of Trade
 British Chemical Plant Manufacturers' Association
 British Compressed Air Society
 *British Electrical and Allied Manufacturers' Association
 British Gear Manufacturers' Association
 British Internal Combustion Engine Manufacturers' Association
 *British Iron and Steel Federation
 British Mechanical Engineering Federation
 British Pump Manufacturers' Association
 Crown Agents for Oversea Governments and Administrations
 *Electricity Council, the Central Electricity Generating Board and the Area Boards in England and Wales
 *Engineering Equipment Users' Association
 Gas Council
 Institute of Marine Engineers
 *Institution of Civil Engineers
 Institution of Gas Engineers
 Institution of Heating and Ventilating Engineers
 Institution of Mechanical Engineers
 Institution of Mechanical Engineers (Automobile Division)
 *Institution of Production Engineers
 *Locomotive and Allied Manufacturers' Association of Great Britain
 London Transport Board
 Machine Tool Trades Association
 Ministry of Defence
 Ministry of Labour (H.M. Factory Inspectorate)
 Ministry of Power
 *Ministry of Public Building and Works
 *Ministry of Technology—National Engineering Laboratory
 Ministry of Transport
 *National Coal Board
 *National Physical Laboratory (Ministry of Technology)
 Radio Industry Council
 Royal Institute of British Architects

The Government departments and scientific and industrial 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:

Agricultural Engineers' Association
 Association of Hydraulic Equipment Manufacturers
 Black Bolt and Nut Association of Great Britain
 British Railways Board
 British Constructional Steelwork Association
 British Cycle and Motor Cycle Industries Association Ltd.
 Council of British Manufacturers of Petroleum Equipment
 Electronic Engineering Association
 Fasteners and Turned Parts Institute
 Institute of Iron and Steel Wire Manufacturers
 Institution of Engineers and Shipbuilders in Scotland
 Ministry of Defence, Army Department
 Ministry of Defence, Navy Department
 Post Office
 Precision Bolt and Nut Institute
 Rolled Thread Screw Association
 Scientific Instrument Manufacturers' Association
 Society of Motor Manufacturers and Traders
 United Society of Boilermakers' and Iron and Steel Shipbuilders
 Washer Manufacturers' Association of Great Britain
 Individual manufacturers

BRITISH STANDARD SPECIFICATION FOR ISO METRIC BLACK HEXAGON BOLTS, SCREWS AND NUTS

FOREWORD

This British Standard has been prepared under the authority of the Mechanical Engineering Industry Standards Committee and forms a complementary standard to BS 3692, 'ISO metric precision hexagon bolts, screws and nuts'. Although BS 3692 was initially issued in 1963, this specification is the first British Standard dealing with ISO metric bolts, screws and nuts generally known as 'black'. It should be realized that 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, but implies the comparatively wider tolerances to which these products are usually made.

The basic dimensions for width across flats, height of head and thicknesses of nuts are in accordance with ISO Recommendation R 272, 'Hexagon bolts and nuts', and since the publication of ISO/R 272, ISO Technical Committee ISO/TC 2, 'Bolts, nuts and accessories', has prepared the following draft recommendations upon which this standard has also been based:

*As amended
August 1975*

ISO Recommendation R898/1.	Mechanical properties of fasteners—Part 1: Bolts, screws and studs.
ISO Recommendation R 272.	Hexagon bolts and nuts—Widths across flats, heights of heads, thicknesses of nuts—Metric series, 2nd Edition.
ISO Recommendation R 888.	Nominal lengths for bolts, screws and studs—Thread lengths for general purpose bolts.
ISO Recommendation R 733.	Hexagon bolts and nuts—Metric Series—Tolerances on widths across flats—Widths across corners.
ISO Recommendation R 885.	Bolts and screws—Radii under the head for general purpose bolts and screws—Metric series.

It is to be emphasized that although the draft recommendations listed above have yet to be finally ratified, they have been provisionally agreed and are being progressively incorporated in the national standards of ISO member countries. Agreement has yet to be reached internationally on several items, such as the

tolerances on nominal lengths, thread lengths and concentricity, but wherever possible information on these matters has been provided based on proposals at present before ISO/TC2 for adoption.

NOTE 1. Although the mechanical requirements specified in this standard are in metric technical units (i.e. kgf/mm²), in accordance with present ISO agreements (ISO/R898/1), *As amended August 1975* comparable SI units have been included in anticipation of future international agreement in this respect. 1 kgf = 9.806 65 newtons. For further information about SI units see BS 350, 'Conversion factors and tables', and PD 5686, 'The use of SI units'.

NOTE 2. For the BSI policy statement on screw threads and the metric system, see Appendix D.

SPECIFICATION

1. SCOPE

1.1 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.

1.2 Mechanical properties are given in respect of steel bolts, screws and ordinary plain nuts which may be produced by hot or cold forging, at the option of the manufacturer.

1.3 Dimensional requirements are included for bolts, screws and nuts finished black all over and for those which have partially machined finishes.

NOTE 1. For explanation of the term 'black' see Foreword.

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 Appendix C.

2. FINISH

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

2.2 Types of finish. 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 one side Thin nuts (faced both sides)

2.3 Coated finishes. 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 729 or BS 3382*).

3. GENERAL DIMENSIONS

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

4. LENGTH OF BOLTS AND SCREWS

4.1 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.

The standard nominal lengths are given in Table 13.

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

TABLE 2. TOLERANCE ON NOMINAL LENGTH

Dimensions in millimetres

Length /		Bolts faced under head only or black bolts and screws	Screws faced under head only or bolts faced under head and turned on shank
Over	Up to and including		
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

5. 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

* BS 729, 'Zinc coatings on iron and steel articles'.

BS 3382, 'Electroplated coatings on threaded components'.

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, no other machining operation being necessary, and the end shall be reasonably square with the centre line of the shank (see Figs. 1, 2 and 3).

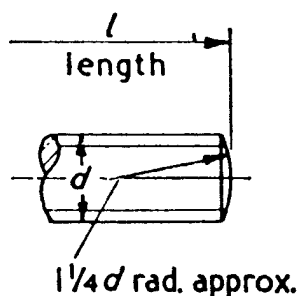


Fig. 1. Rounded end

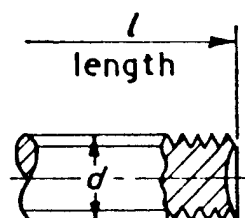


Fig. 2. Rolled thread end

Alternative types of end permissible on bolts and screws

6. SCREW THREADS

6.1 General. The form of thread, diameters and associated pitches of standard ISO metric bolts, screws and nuts shall be in accordance with BS 3643 : Part 1*. Coarse pitch series threads only are specified in this standard.

6.2 Tolerances. The tolerances on the screw threads shall be in accordance with BS 3643 : Part 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

7. LENGTH OF THREAD

7.1 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 screw ring gauge which has been screwed as far as possible on to the bolt by hand.

* BS 3643, 'ISO metric screw threads', Part 1, 'Thread data and standard thread series', Part 2, 'Limits and tolerances for coarse pitch series threads'.

*As amended
August 1975*

7.1.1 The standard thread lengths in accordance with ISO/R888, are based on the formulae set out in Table 4.

7.1.2 The length of thread runout shall not exceed the values given in Table 5.

TABLE 4. THREAD LENGTHS

Nominal length of bolt l	Length of thread b
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

7.1.3 In order to provide for structural applications, particularly shear connections where the thread is not allowed in the shear plane, bolts in the diameter range M16 to M27 inclusive, up to 125 mm nominal length, may alternatively have a shorter thread length equal to $1\frac{1}{2}d$. This option shall not apply unless the purchaser in his enquiry and order, states that he requires this shorter thread length.

7.1.4 Bolts that are too short for minimum thread lengths shall be threaded as screws and shall be designated screws. Guidance in this respect is given in Table 13.

7.2 Tolerances. The tolerances on bolt thread lengths shall be plus two pitches for all diameters.

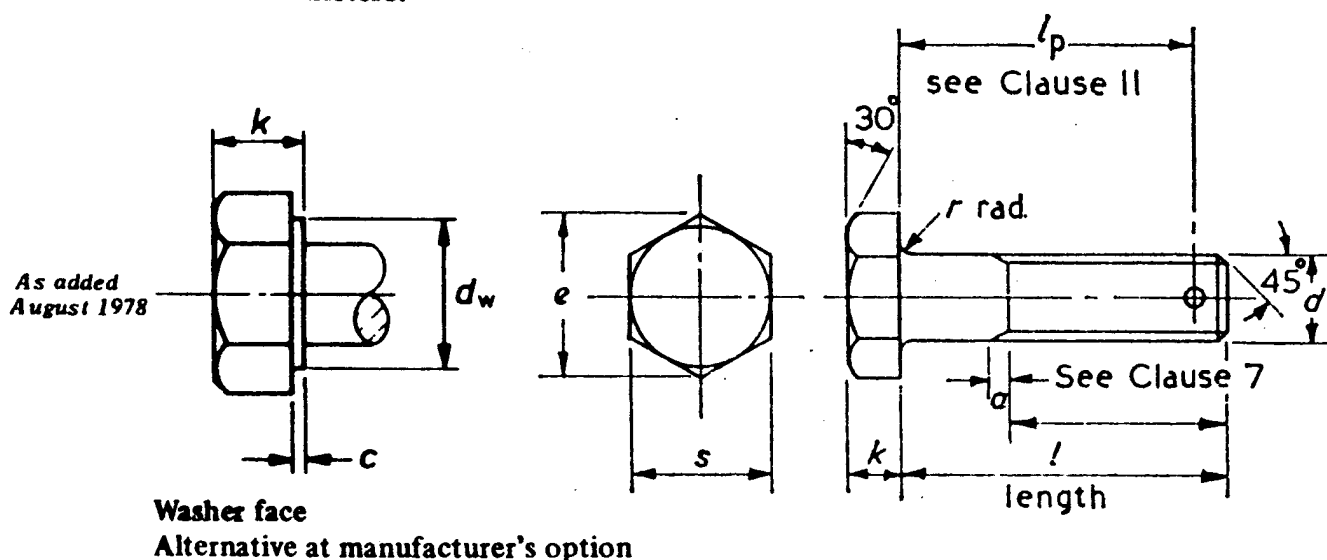


Fig. 3. Hexagon head bolt

7.3 Screws. Screws shall be threaded to permit a screw ring gauge being screwed by hand to within a distance from the underside of the head not exceeding the values given in Table 5.