British Standard

BRITISH STANDARD

BS 4929-1: 1973

Incorporating Amendment No. 1

Specification for

Steel hexagon prevailing-torque type nuts —

Part 1: Metric series

UDC 621.822.31

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 Hydraulic Equipment Manufacturers Ltd.*
Association of Mining Electrical and Mechanical Engineers
British Compressed Air Society
British Electrical and Allied Manufacturers' Association
British Gear Manufacturers' Association
British Internal Combustion Engine Manufacturers' Association
British Mechanical Engineering Confederation
British Pump Manufacturers' Association
British Steel industry*
Crown Agents for Overseas Governments and Administrations
Department of Employment
Department of the Environment*
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Engineering Equipment Users' Association*
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Institution of Heating and Ventilating Engineers
Institution of Mechanical Engineers
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London Transport Executive
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Ministry of Defence, Army Department
National Coal Board
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Railway Industry Association of Great Britain
Royal Institute of British Architects
Telecommunications Engineering Manufacturing Association
Water Tube Boilermakers Association

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:

Black Bolt and Nut association of Great Britain
British Bolt, Nut, Screw and Rivet Federation
British Constructional Steelwork Association
British Railways Board
Constructional Steel Research and Development Organisation
Fasteners and Turned Parts Institute
Institute of Iron and Steel Wire Manufacturers
Ministry of Defence, Navy Department
Post Office
Power Generation Association
Precision Bolt and Nut Institute
Rolled Thread Screw Association
Scientific Instrument Manufacturers Association of Great Britain
Society of Motor Manufacturers and Traders Ltd.
Washer Manufacturers Association of Great Britain
Individual Manufacturers

This British Standard, having been approved by the Mechanical Engineering Industry Standards Committee, was published under the authority of the Executive Board on 15 June 1973

The following BSI references relate to the work on this standard:
Committee reference MEE/60, MEE/60/12
Draft for comment 69/4810

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Amendments issued since publication

Amd. No.	Date of issue	Comments
2105	October 1976	Indicated by a sideline in the margin

Contents

Foreword

This Part of this British Standard has been prepared under the authority of the Mechanical Engineering Industry Standards Committee as a result of requests received from industry for the provision of a new standard covering steel hexagon prevailing-torque type nuts.

This type of product has been standardized in the USA over a period of many years and the USA has submitted a draft ISO proposal, covering both metric and inch series products, which has been adopted by ISO/TC2, "*Bolts, nuts and accessories*", as the basis for ISO draft Recommendations. Where possible, the provisions of the following ISO Recommendations and ISO Standard have also been incorporated in the text of this standard:

ISO Recommendation R 272,	"*Hexagon bolts and nuts. Metric series. Widths across flats, heights of heads, thicknesses of nuts*".
ISO Recommendation R 733,	"*Hexagon bolts and nuts. Metric series. Tolerances on widths across flats. Widths across corners*".
ISO Recommendation R 898/I,	"*Mechanical properties of fasteners. Part I. Bolts, screws and studs*".
ISO Recommendation R 898/II,	"*Mechanical properties of fasteners. Part II. Nuts with specified proof load values*".
ISO Recommendation R 898/III,	"*Mechanical properties of fasteners. Part III. Marking of bolts, screws, studs and nuts*".
ISO Standard ISO 2320,	"*Prevailing-torque type steel hexagon locknuts. Mechanical and performance properties*".
ISO Standard ISO 2358,	"*Prevailing-torque type steel hexagon locknuts. Dimensions. Metric units*".

This standard purposely relates to metric series products only, since it was felt that confusion might arise if inch series products having similar performance, functional and material requirements (but differing with regard to dimensional and identification characteristics), were included in a composite document. Thus, not withstanding the amount of duplication involved, it was considered advisable to prepare similar but separate documents for the metric and inch series products. The dimensional and identification requirements in this document are based on current ISO metric practice.

NOTE Two property classes, 8 and 12 from ISO/R 898/II have been included in this standard.

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 8, an inside back cover 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.

1 Scope

1.1 This part of this British Standard specifies the general dimensions and tolerances of prevailing-torque type nuts with ISO metric threads in diameters from 3 mm to 36 mm inclusive.

1.2 Mechanical properties and performance requirements are given only in respect of steel nuts, with or without non-metallic inserts such as nylon, which are not to be used for special applications such as those requiring weldability, corrosion resistance or the ability to withstand temperatures above 300 °C (120 °C for nuts with non-metallic inserts) or below – 50 °C.

1.3 Two nut heights are specified, designated "normal" and "high" respectively. The particular design used by the nut manufacturer will determine which of these height categories is applicable.

1.4 Unless otherwise specified by the purchaser either normal or high nuts, with or without non-metallic inserts, may be supplied.

NOTE The titles of the British Standards referred to in this standard are listed on the inside back cover.

2 Definition

For the purposes of this British Standard the following definition applies:

prevailing-torque type nut

a nut which is frictionally resistant to rotation due to a self-contained prevailing-torque feature and not because of a compressive load developed at assembly against the bearing surface of the nut. The term prevailing-torque is not intended to imply an indefinite permanence of fixity

3 Property class designation system

3.1 This standard includes property classes specified in this standard for metric series steel hexagon prevailing-torque type nuts which shall be designated by the numbers "8" and "12" as shown below. The designation number of the property class is equal to one tenth of the specified proof load stress in kilogrammes-force per square millimetre (SI units given for reference). This proof load stress corresponds to the minimum tensile strength of a bolt or screw with which the nut should be assembled so as to ensure the loading capacity of the bolted connection up to the minimum tensile strength of the bolt.

NOTE The designation system adopted is identical with that used for steel nuts in BS 3692 and ISO/R 898/II.

Property class	**Proof load stress** (S_p) **N/mm²** [a]
8	785
12	1 177

NOTE If in exceptional circumstances it is necessary to combine one of these quality classes of nuts with a bolt of lower class, the performance characteristics may be significantly altered.

[a] 1 N/mm^2 = 1 MN/m^2 = 1/MPa

4 Material and manufacture of steel nuts

4.1 Material. Nuts shall be made of carbon or alloy steel of a grade adequate for the nut to meet the mechanical and performance requirements of this standard. The prevailing-torque element of insert design nuts may be of a material other than steel.

4.2 Heat treatment. Class 8 nuts may be heat treated as necessary. Class 12 nuts shall be heat treated to meet the mechanical and performance requirements of this standard.

4.3 Finish. Nuts shall be finished plain (bare metal) or with a protective coating (electro-deposited plating or chemical conversion coating) as specified on the order. Plating shall be in accordance with BS 3382 or BS 1706.

In order to comply with the stated performance requirements of this standard nuts shall, where necessary, be provided with a supplementary lubricant which shall be clean and dry to the touch.

5 Dimensional requirements

5.1 Basic dimensions. Nuts shall be in accordance with the dimensions given in Table 2. The portion of the nut containing the prevailing-torque feature may have a special contour within the maximum permitted width across flats and thickness. The minimum width across flats shall not apply at a depressed portion of the nut at the prevailing-torque feature.

5.2 Thread form, series and tolerances. The threads of the nuts shall be to the ISO metric coarse pitch series in accordance with BS 3643-2.

The tolerance class shall be "6H". The portion of the nut containing the prevailing-torque element need not be in accordance with this requirement.

5.3 Thread start. The nuts shall assemble a minimum of one full turn by hand on a basic GO thread plug gauge. The plug gauge shall be chamfered at 45° to at least the full depth of the thread.

5.4 Defects. The nuts shall be free from burrs, loose scale, sharp edges, and all other defects that might adversely affect their service.

6 Mechanical requirements

6.1 Proof load. The nuts shall withstand the proof stresses specified for the applicable class in Table 3 and Table 4 when tested as specified in **8.1**.

6.2 Hardness. The nuts shall have a hardness not in excess of the hardness specified for the applicable class in Table 1 when tested as specified in **8.2**.

Table 1 — Mechanical properties of steel nuts

Property class	8	12
Proof load stress[a] (S_p), min.	N/mm^2 785	N/mm^2 1 177
Vickers hardness HV, max.	310	370
Rockwell hardness[b] HRC, max.	32.2	38.8
Brinell hardness[b] HB, max.	294.5	351.5

[a] The proof load is calculated by multiplying the proof load stress by the tensile stress area of the bolt.
[b] The conversion from Vickers hardness into Rockwell hardness and Brinell hardness has been taken from BS 860.

7 Performance requirements

7.1 Prevailing-torque. The prevailing-torque developed by the nuts during their first installation, or any subsequent installation, or removal shall not exceed the maximum first installation torque specified in Table 3 and Table 4 when tested as specified in **8.3**. In addition, the maximum and minimum prevailing-torques developed by nuts during their first and fifth removals shall not be less than the "highest" and "lowest" reading removal torques specified in Table 3 and Table 4 when tested as specified in **8.3**.

7.2 Definition. The prevailing-torque developed by a nut is the torque necessary to rotate the nut on its mating externally threaded component, with the torque being measured while the nut is in motion, and with no axial load in the mating component.

8 Test methods

8.1 Proof load test. The test sample nut shall be assembled on a test bolt (see **8.1.1**) or on a hardened mandrel (see **8.1.2**) with a minimum of three full threads projecting through the nut. For referee test purposes, the hardened mandrel shall be used. The maximum torque occurring during the assembly of the nut on the test bolt or mandrel shall be recorded. A tensile load equal to the specified proof load for the nut, as given in Table 3 and Table 4, shall be applied through the test bolt or mandrel against the nut bearing surface in an axial direction. The nut shall resist this load without thread stripping or rupture. The torque necessary to remove the nut from the test bolt or mandrel shall not exceed the maximum torque occurring during assembly.

8.1.1 *Test bolt.* The bolt used for proof load testing a nut shall have threads in accordance with BS 3643-2, tolerance class "6g". The test bolt shall have a yield strength in excess of the specified proof load of the nut being tested.

8.1.2 *Hardened mandrel.* The hardened mandrel used for proof load testing a nut shall have threads in accordance with BS 3643, tolerance class "5h", except that the tolerance on the major diameter shall be the last quarter of the "6g" range on the minimum material side for ISO metric screw threads. The mandrel shall be heat treated to a hardness of Rockwell C45-50 or Brinell HB 430-486.

8.2 Hardness test. The hardness of a sample nut shall be determined on a suitable surface. The preparation of the test specimen and the method of performing the test shall be in accordance with the following British Standards:

Vickers hardness	BS 427-1
Brinell hardness	BS 240-1
Rockwell hardness	BS 891-1

8.3 Prevailing-torque test. The prevailing-torque test shall be conducted at room temperature using a load measuring device (see **8.3.1**). A test bolt (see **8.3.2**) shall be inserted in the load measuring device, a hardened washer (see **8.3.3**) placed on the bolt and the sample nut then assembled on the bolt. The nut shall be advanced on the bolt until a minimum of two full bolt threads protrude through the nut. At that time, the maximum torque occurring while the nut is being advanced through the next 360° of nut rotation shall be recorded. This torque shall not exceed the first installation prevailing-torque value as specified for the applicable class in Table 3 and Table 4.

Tightening shall be continued until the nut is seated against the hardened washer. The length of the test bolt should be such that seating of the nut shall occur when a length equivalent to four to seven thread pitches of the test bolt protrude through the top of the nut measured from the end of the bolt. The nut shall then be tightened until a tensile load equal to the clamp load, as specified in Table 3 and Table 4, is developed in the bolt. The hardened washer shall be prevented from turning during nut tightening. The nut shall then be backed off by the application of reverse torque until the tensile load in the bolt has been reduced to zero. The maximum and minimum torques occurring while the nut is being backed off throughout the next 360° of rotation shall be recorded. The maximum torque shall not be less than the first removal "highest reading" prevailing-torque value as specified in Table 3 and Table 4. The minimum torque shall not be less than the first removal "lowest reading" prevailing-torque values as specified in Table 3 and Table 4. The nut shall then be backed off until the prevailing-torque element is disengaged from the bolt thread. The nut shall be reassembled and removed four more times. On each assembly, the nut shall be advanced sufficiently to allow a length equivalent to four to seven thread pitches to protrude through the nut. This portion of the test need not be conducted in the load cell; however, regardless of method used, the test washer shall not be removed. At no time during these four additional installations and removals should the torque exceed the maximum first installation prevailing-torque value as specified in Table 3 and Table 4. During the fifth removal, the maximum and minimum torques occurring while the nut is being backed off throughout the first 360° of rotation shall be recorded. The maximum torque shall not be less than the fifth removal "highest reading" prevailing-torque value as specified in Table 3 and Table 4 and the minimum torque shall not be less than the fifth removal "lowest reading" prevailing-torque value as specified in Table 3 and Table 4. Sufficient time shall elapse between torquing cycles to prevent overheating of the test assembly.

Torque measuring devices shall be accurate within ± 3 % of the maximum of the specified torque range of the device.

Driving speed shall not exceed 30 rev/min and shall be continuous and uniform.

8.3.1 *Load measuring device.* The load measuring device used in the prevailing-torque test shall be an instrument capable of measuring the actual tension induced in the test bolt as the nut is tightened. The device shall be accurate within ± 5 % of the test clamp load being used. The diameter and tolerance of the bolt clearance hole in the backing plate shall be the same as for the test washer.

8.3.2 *Test bolt.* The test bolt used in the prevailing-torque test shall have a zinc phosphate and oil finish.

The bolt shall have threads in accordance with tolerance class "6g" of BS 3643-2. Threads on all bolts 24 mm diameter and smaller shall be produced by rolling. Bolt length shall be such that a minimum length of four to seven pitches, as measured from the end of the bolt, will protrude through the nut when the nut is seated against the test washer. The thread length shall be such that a minimum of two full threads are within the grip after the nut is seated.

The thread surface shall be free of scale, iron oxide, burrs or other contamination that might affect an accurate determination of the prevailing-torque developed by the nut.

The bolt shall have an ultimate tensile strength not less than the specified proof load of the nuts to be tested.

A new bolt shall be used for testing each nut.

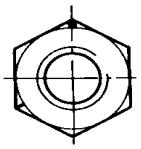
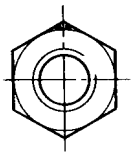
8.3.3 *Test washer.* Test washers shall be unplated and shall be in accordance with the dimensional, metallurgical and mechanical requirements given in Table 5. Alternative configurations are acceptable provided they meet the minimum requirements of Table 5.

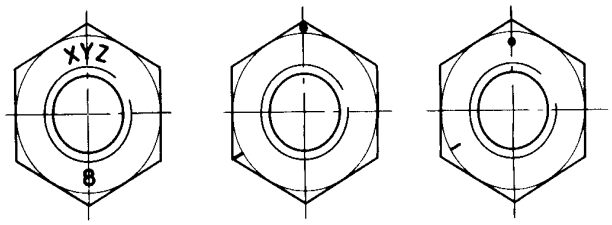
9 Marking and identification

9.1 Nuts 6 mm and above may carry some form of manufacturer's identification (trade) marking and shall be appropriately marked for strength class designation by either of the following alternative methods[1)]:

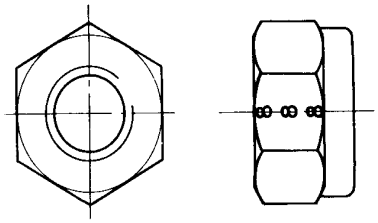
1) The property class symbol 8 or 12 should be indented into one of the faces of the nut. In the case of nuts turned from hexagon bar the symbol may be indented or rolled continuously into the side of one of the hexagon flats.

2) The strength grade shall be indicated by means of a "clock face" system, which shall be marked preferably on the external chamfers of the nuts by indenting or embossing. Embossed marks shall in no case protrude beyond the bearing face of the nut. The "clock face" system may alternatively be indented on one of the faces of the nut.

Property class	8	12
Marking symbol	8	12
Alternative "clock face" marking		



Examples of marking of forged nuts



Example of marking of bar turned nut

10 Inspection

The manufacturer shall take the necessary steps to ensure that the requirements of this standard are fulfilled, but if in addition, the purchaser desires the manufacturer to certify or demonstrate that the nuts are in accordance with this standard, the details and costs of any further inspection shall be the subject of agreement between the purchaser and the manufacturer.

11 Complete designation for the purpose of an enquiry or order

11.1 Information to be provided. When designating prevailing-torque nuts for the purpose of an enquiry or order, the following information shall be given:

1) General product description, i.e. thickness of nut (normal or high), type of insert, and nut material if other than steel.

2) Nominal size or thread diameter, e.g. "M5".

NOTE It is not necessary to quote the pitch for metric products since coarse pitch series ISO metric threads only are specified in this standard.

3) The number of this British Standard, i.e. BS 4929-1.

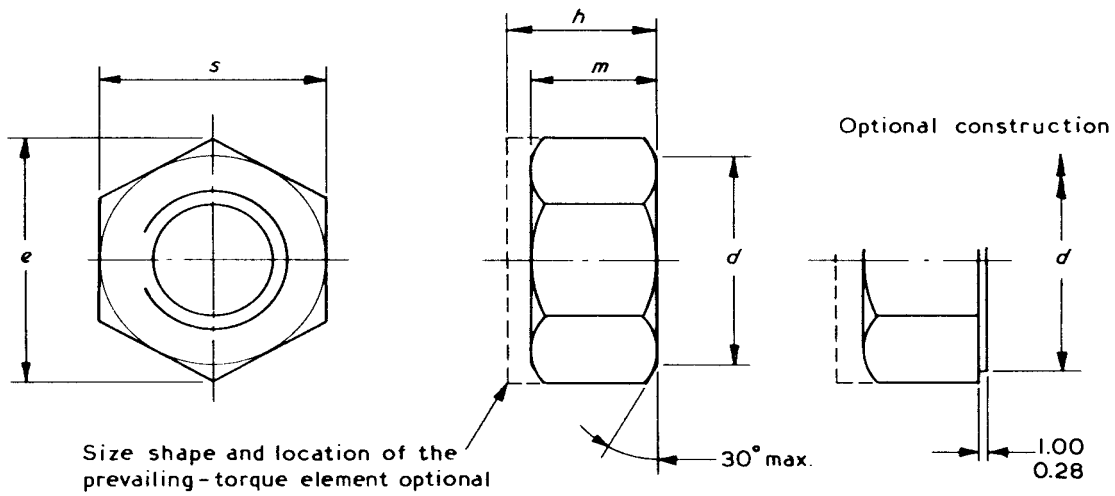
4) The plating (if required), in accordance with BS 3382 or BS 1706.

[1)] Other forms of marking may be used subject to agreement between the manufacturer and the purchaser.

11.2 Example. Nuts of normal thickness, 12 mm diameter, manufactured from steel (property class 8) and cadmium plated with nylon insert, are designated:

Normal nuts M12 to BS 4929-1, property class 8 cadmium plated to BS 3382-1, nylon insert.

Table 2 — Dimensions of metric series prevailing-torque type nuts



Nominal size and thread diameter	Pitch of thread	Width across flats *s*		Width across corners *e*		Thickness *h*		Height of hex. *m*	Diameter of bearing surface *d*		Tolerance on squareness of thread ot face of nut
						high	normal				
d	*u*	max.	min.	max.	min.	max.	max.	min.	max.	min.	max.
M3	0.5	5.50	5.38	6.40	6.08	4.5	3.6	1.8	5.50	5.0	0.09
M4	0.7	7.00	6.85	8.10	7.74	6.0	4.8	2.4	7.0	6.3	0.11
M5	0.8	8.00	7.85	9.20	8.87	7.5	6.0	3.0	0.13	7.2	0.13
M6	1.0	10.00	9.78	11.50	11.05	7.8	6.6	3.6	10.0	9.0	0.17
M8	1.25	13.00	12.73	15.00	14.38	10.4	8.8	4.8	13.0	11.7	0.22
M10	1.5	17.00	16.73	19.60	18.90	13.0	11.0	6.0	17.0	15.3	0.29
M12	1.75	19.00	18.67	21.90	21.10	15.6	13.2	7.2	19.0	17.1	0.32
(M14)	2.0	22.00	21.67	25.40	24.49	18.2	15.4	8.4	22.0	19.8	0.37
M16	2.0	24.00	23.67	27.70	26.75	20.8	17.6	9.6	24.0	21.6	0.41
M20	2.5	30.00	29.67	34.60	33.53	26.0	22.0	12.0	30.0	27.0	0.51
(M22)	2.5	32.00	31.61	36.90	35.72	28.6	24.2	13.2	32.0	28.8	0.54
M24	3.0	36.00	35.38	41.60	39.98	31.2	26.4	14.4	36.0	32.4	0.61
(M27)	3.0	41.00	40.38	47.30	45.63	32.4	27.0	16.2	41.0	36.9	0.70
M30	3.5	46.00	45.38	53.10	51.28	36.0	30.0	18.0	46.0	41.4	0.78
(M33)	3.5	50.00	49.38	57.70	55.80	39.6	33.0	19.8	50.0	45.0	0.85
M36	4.0	55.00	54.26	63.50	61.31	43.2	36.0	21.6	55.0	49.5	0.94

Dimensions are in millimetres.

NOTE 1 Sizes shown in brackets are non-preferred.

NOTE 2 Design of the method of producing prevailing-torque characteristics and the design of the prevailing-torque feature shall be in accordance with the practice of the manufacturer.

Table 3 — Proof load, clamp load and prevailing-torques (coarse pitch series) property class 8

Nominal size and thread diameter *d*	Pitch of thread *u*	Tensile stress area (A_s)	Clamp load	Proof load	Prevailing-torque				
					First installation max.	First removal		Fifth removal	
						Highest reading min.	Lowest reading min.	Highest reading min.	Lowest reading min
	mm	mm^2	N	N	Nm	Nm	Nm	Nm	Nm
M3	0.5	5.03	—	—	—	—	—	—	—
M4	0.7	8.78	3 726	6 864	0.9	0.18	0.09	0.12	0.06
M5	0.8	14.2	6 080	11 200	1.6	0.29	0.14	0.23	0.10
M6	1.0	20.1	8 630	15 690	3.0	0.45	0.2	0.30	0.15
M8	1.25	36.6	16 280	28 440	6.0	0.85	0.4	0.60	0.3
M10	1.5	58.0	24 900	45 110	10.5	1.5	0.7	1.0	0.5
M12	1.75	84.3	36 000	65 705	15.5	2.3	1.0	1.6	0.8
(M14)	2	115	49 230	90 220	23.5	8.3	1.5	2.3	1.0
M16	2	157	67 180	123 564	31.5	4.5	2.0	3.0	1.5
M20	2.5	245	104 930	192 210	54.0	7.5	3.5	5.3	2.5
(M22)	2.5	303	129 450	237 320	67.5	9.5	4.5	6.5	3.0
M24	3.0	353	151 020	276 550	80.0	11.5	5.5	8.0	4.0
(M27)	3.0	459	196 130	360 000	94.0	13.5	6.5	10.0	5.0
M30	3.5	561	240 260	439 340	108	16.0	8.0	12.0	6.0
(M33)	3.5	694	297 140	542 270	122	18.0	9.0	14.0	7.0
M36	4.0	817	349 120	640 370	136	20.5	10.0	16.0	8.0

NOTE 1 Sizes shown in brackets are non-preferred.

NOTE 2 Clamp loads equal 75 % of proof loads specified for grade 8.8 bolts or screws in BS 3692 (ISO/R 898).

Clamp load = stress under proof load × tensile stress area × $\frac{75}{100}$

for 8.8 bolts or screws = $571 \times A_s \times \frac{75}{100} N$

Table 4 — Proof load, clamp load and prevailing-torques (coarse pitch series) property class 12

Nominal size and thread diameter d	Pitch of thread u	Tensile stress area (A_s)	Proof load	Clamp load	Prevailing-torque				
					First installation max.	First removal		Fifth removal	
						Highest reading min.	Lowest reading min.	Highest reading min.	Lowest reading min.
	mm	mm^2	N	N	Nm	Nm	Nm	Nm	Nm
M3	0.5	5.03	—	—	—	—	—	—	—
M4	0.7	8.78	10 300	6 130	1.2	0.22	0.10	0.15	0.07
M5	0.8	14.2	16 700	9 900	2.1	0.35	0.15	0.30	0.15
M6	1.0	20.1	23 540	14 000	4.0	0.55	0.25	0.40	0.2
M8	1.25	36.6	42 170	25 600	8.0	1.15	0.6	0.80	0.4
M10	1.5	58.0	68 160	40 500	14.0	2.0	1.0	1.4	0.7
M12	1.75	84.3	98 070	59 000	21.0	3.1	1.5	2.1	1.0
(M14)	2.0	115	135 500	80 500	31.0	4.4	2.0	3.0	1.5
M16	2.0	157	184 000	110 000	42.0	6.0	3.0	4.2	2.0
M20	2.5	245	288 000	171 000	72.0	10.5	5.0	7.0	3.5
(M22)	2.5	303	356 000	212 000	90.0	13.0	6.5	9.0	4.5
M24	3.0	353	414 820	247 000	106	15.0	7.5	10.5	5.0
(M27)	3.0	459	539 400	320 680	123	17.0	8.5	12.0	6.0
M30	3.5	561	660 000	392 000	140	19.0	9.5	14.0	7.0
(M33)	3.5	694	816 900	484 500	160	21.5	10.5	15.5	7.5
M36	4.0	817	960 000	570 700	180	24.0	12.0	17.5	8.5

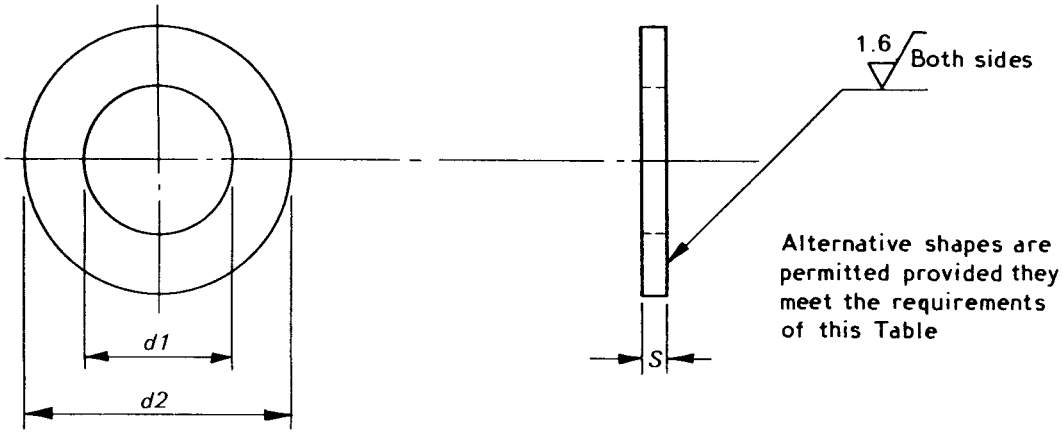
NOTE 1 Sizes shown in brackets are non-preferred.

NOTE 2 Clamp loads equal 75 % of proof loads specified for grade 12.9 bolts or screws in BS 3692 (ISO/R 898).

Clamp load = stress under proof load × tensile stress area × $\frac{75}{100}$

for 12.9 bolts or screws = $932 \times A_s \times \frac{75}{100} N$.

Table 5 — Test washer, metric series



Nominal size of test bolt	Inside diameter d_1		Outside diameter d_2	Thickness s
	max.	min.	min.	min.
M3	3.4	3.2	7.0	0.4
M4	4.5	4.3	9.7	0.7
M5	5.5	5.3	12.1	0.9
M6	6.7	6.4	13.6	1.4
M8	8.7	8.4	20.5	1.4
M10	10.9	10.5	23.5	1.8
M12	13.4	13	27.5	2.3
M14	15.4	15	29.5	2.3
M16	17.4	17	33.2	2.7
M20	19.5	19	36.2	2.7
M18	21.5	21	38.2	2.7
M22	23.5	23	43.2	2.7
M24	25.5	25	49.2	3.7
M27	28.5	28	55	3.7
M30	31.6	31	59	3.7
M33	34.6	34	65	4.4
M36	37.6	37	71	4.4

Dimensions in millimetres:
NOTE 1 Dimensions are the same as Table 2 of BS 4320, except for M3 which is as Table 1.
NOTE 2 Material: Carbon steel quenched and tempered.
Surface hardness Rockwell 85 to 88 HR 15 N.
Core hardness Rockwell 73 to 78 HRA.
NOTE 3 Finish: Plain.
NOTE 4 Washers shall be free from burrs and sharp edges.

Publications referred to

This standard makes reference to the following British Standard:
BS 240, *Method for Brinell hardness test.*
BS 240-1, *Testing of metals.*
BS 427, *Method for Vickers hardness test.*
BS 427-1, *Testing of metals.*
BS 860, *Tables for comparison of hardness scales.*
BS 891, *Method for Rockwell hardness test.*
BS 891-1, *Testing of metals.*
BS 1706, *Electroplated coatings of cadmium and zinc on iron and steel.*
BS 3382, *Electroplated coatings on threaded components.*
BS 3643, *ISO metric screw threads.*
BS 3692, *ISO metric precision hexagon bolts, screws and nuts.*
BS 4320, *Metal washers for general engineering purposes.*

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