

SRI LANKA STANDARD 481:1980
UDC. 621.882

**SPECIFICATION FOR
HEXAGON BOLTS SCREWS AND NUTS
(COMMERCIAL GRADE)**

BUREAU OF CEYLON STANDARDS

SPECIFICATION FOR HEXAGON BOLTS,
SCREWS AND NUTS (COMMERCIAL GRADE)

SLS 481:1980

Gr. 5

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This Standard does not purport to include all the necessary provisions of a contract.

SRI LANKA STANDARD
SPECIFICATION FOR HEXAGON BOLTS,
SCREWS AND NUTS (COMMERCIAL GRADE)

FOREWORD

This Sri Lanka Standard specification has been prepared by the Drafting Committee on Bolts, Screws and Nuts. It was approved by the Mechanical Engineering Divisional Committee of the Bureau of Ceylon Standards and was authorised for adoption and publication by the Council of the Bureau on 1980-07-28.

The general requirements, physical and mechanical properties, dimensions and tolerances specified in this specification are based on SLS 379*. This specification is one of a series of Sri Lanka Standards on threaded fasteners with ISO metric threads.

All values given in this specification are in SI units.

For the purpose of deciding whether a particular requirement of this specification is complied with, the final value, observed or calculated expressing the results of a test shall be rounded off in accordance with CS 102**. The number of significant places retained in the rounded off value should be the same as that of the specified value in this specification.

**SLS 379 General requirements and technical supply conditions for bolts, screws and nuts.*

***CS 102 Presentation of numerical values.*

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Publications of the British Standard Institution and the Indian Standards Institution were consulted in the preparation of this standard, and the assistance gained therefrom is gratefully acknowledged.

1 SCOPE

This specification covers the requirements for hexagon bolts, screws and nuts of commercial grade in the diameter range 5 mm to 39 mm for bolts and nuts and 5 mm to 24 mm for screws.

2 GRADE

Bolts, screws and nuts covered in this specification shall conform to commercial grade (C) specified in **SLS 379***.

3 MECHANICAL PROPERTIES

The mechanical properties of bolts and screws covered in this specification shall conform to the property classes 4.6, 4.8, 5.6 and 5.8 and those of nuts shall conform to property classes 4 and 5 as given in **Appendix A**.

4 DESIGNATION

Designation of bolts, screws and nuts shall contain the following:

a) General product description, that is *bolts, screws or nuts* etc;

**SLS 379 General requirements and technical supply conditions for bolts, screws and nuts.*

- b) The letter *M* indicating that the product is ISO metric;
- c) The nominal size (thread diameter) of the product in millimetres;
- d) The nominal length in millimetres;
- e) The strength grade symbol as given in **SLS 379*** (applies only to steel components); and
- f) The number of this Sri Lanka Standard, that is **SLS 481**, subjects to conditions stipulated in the Bureau of Ceylon Standards Act.

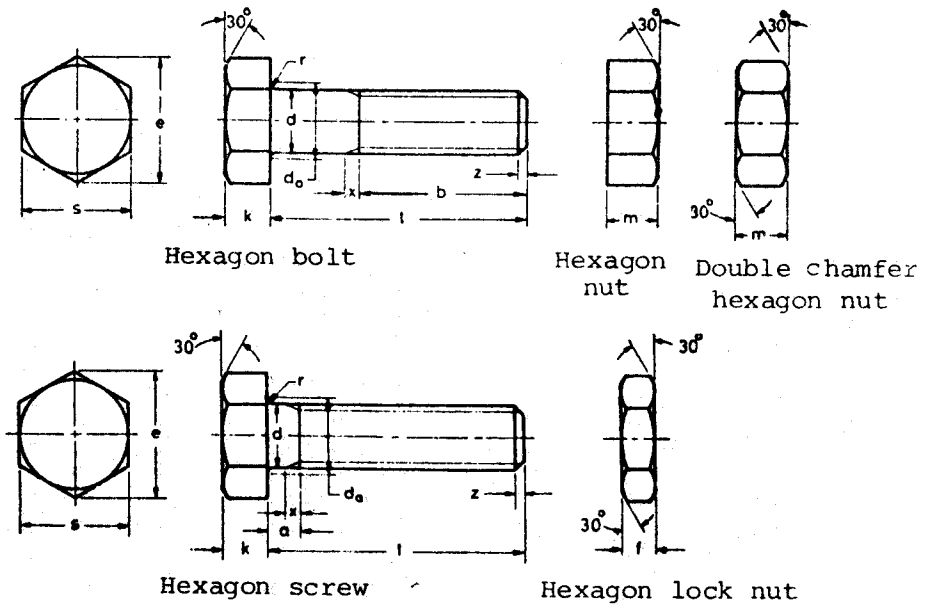


FIGURE 1 - Dimensions of bolts, screws, nuts and lock nuts

**SLS 379 General requirements and technical supply conditions for bolts, screws and nuts.*

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Example:

1) Bolts 10 mm diameter, 50 mm in length, manufactured from steel of strength grade 4.8 shall be designated as:

Bolt M10 x 50/4.8 SLS 481

2) Nuts 24 mm diameter, manufactured from steel of strength grade 4, shall be designated as:

Nut M24/4, SLS 481

5 GENERAL DIMENSIONS

The dimensions of bolts, screws and nuts shall be as given in Table 1 and Table 2.

6 SURFACE DEFECTS AND FINISH

Surface defects and finish shall conform to the requirements given in SLS 379*.

7 SCREW THREADS

7.1 The bolts, screws and nuts shall have coarse pitch screw threads conforming to SLS 268**.

7.2 Tolerances on screw threads shall conform to the tolerance classes 8 g for Bolts and Screws and 7H for nuts as detailed in SLS 268**.

*SLS 379 *General requirements and technical supply conditions for bolts, screws and nuts.*

**SLS 268 *ISO Metric screw threads.*

TABLE 1 - Dimensions for bolts and screws (commercial grade)
(Clause 5)
All dimensions in millimetres

Nominal size	Diameter of unthreaded shank (d)		Width across flats (s)		Width across corners (e) min.	Height of head (k)		Transition diameter (da) max.	Radius under head (r) min.
	max.	min.	nom	max.		nom	max.		
M5	5.48	4.75	8	8.00	8.63	3.5	3.875	6.2	0.2
M6	6.48	5.70	10	10.00	10.89	4.0	4.38	7.2	0.25
(M7)	7.58	6.64	11	11.00	11.94	5.0	5.38	8.2	0.25
M8	8.90	7.64	13	13.00	14.20	5.5	5.88	10.2	0.4
M10	10.90	9.64	17	17.00	18.72	7.0	7.45	12.0	0.4
M12	13.10	11.57	19	19.00	20.88	8.0	8.45	15.2	0.6
(M14)	15.10	13.57	22	22.00	23.91	9.0	9.45	17.2	0.6
M16	17.10	15.57	24	24.00	26.17	10	10.45	19.2	0.6
(M18)	19.10	17.57	27	27.00	29.56	12	12.55	21.2	0.6
M20	21.30	19.48	30	30.00	32.95	13	13.55	24.4	0.8
(M22)	23.30	21.48	32	32.00	35.03	14	14.55	26.4	0.8
M24	25.30	23.48	36	36.00	39.55	15	15.55	28.4	0.8
(M27)	28.30	26.48	41	41.00	45.20	17	17.55	32.4	1.0
M30	31.30	29.48	46	46.00	50.85	19	19.65	35.4	1.0
(M33)	34.60	32.38	50	50.00	55.37	21	21.65	38.4	1.0
M36	37.60	35.38	55	55.00	60.79	23	23.65	42.4	1.0
(M39)	40.60	38.38	60	60.00	66.44	25	25.65	45.4	1.0

Sizes shown in brackets are non-preferred

TABLE 2 - Dimensions for nuts and lock nuts (commercial grade)
(Clause 5)

All dimensions in millimetres

Nominal size	Width across flats (S)		Width across corners (e)	Thickness of nut (m)		Thickness of lock nut (f)	
	nom.	max. min.		nom.	max. min.	nom.	max. min.
M5	8	8.00 7.64	8.63	4.0	4.375 3.625	-	-
M6	10	10.00 9.64	10.89	5.0	5.38 4.62	3	3.30 2.70
(M7)	11	11.00 10.57	11.94	5.5	5.88 5.12	3	3.30 2.70
M8	13	13.00 12.57	14.20	6.5	6.95 6.05	4	4.38 3.62
M10	17	17.00 16.57	18.72	8.0	8.45 7.55	5	5.38 4.62
M12	19	19.00 18.48	20.88	10	10.45 9.55	7	7.45 6.55
(M14)	22	22.00 21.16	23.91	11	11.55 10.45	8	8.45 7.55
M16	24	24.00 23.16	26.17	13	13.55 12.45	8	8.45 7.55
(M18)	27	27.00 26.16	29.56	15	15.55 14.45	9	9.45 8.55
M20	30	30.00 29.16	32.95	16	16.55 15.45	9	9.45 8.55
(M22)	32	32.00 31.00	35.03	18	18.55 17.45	10	10.45 9.55
M24	36	36.00 35.00	39.55	19	19.65 18.35	10	10.45 9.55
(M27)	41	41.00 40.00	45.20	22	22.65 21.35	12	12.55 11.45
M30	46	46.00 45.00	50.85	24	24.65 23.35	12	12.55 11.45
M33	50	50.00 49.00	55.37	26	26.65 25.35	14	14.55 13.45
M36	55	55.00 53.80	60.79	29	29.65 28.35	14	14.55 13.45
(M39)	60	60.00 58.80	66.44	31	31.80 30.20	16	16.55 15.45

Sizes shown in brackets are non-preferred

8 NOMINAL LENGTH

8.1 The nominal length of 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.

8.2 Preferred length and diameter combinations for bolts are given in Table 5 and those for screws, in Table 6.

8.3 The permissible variation on the nominal length shall be as given in SLS 379*.

9 LENGTH OF THREAD

9.1 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.

9.1.1 The standard thread length shall be in accordance with the formula set out in Table 3.

9.1.2 The length of thread runout shall not exceed the values given in Table 4.

**SLS 379 General requirements and technical supply conditions for bolts, screws and nuts.*

TABLE 3 - Thread lengths
(Clause 9.1.1)

Nominal length of bolt l	Length of thread b
Up to and including 125 mm	$2d + 6$ mm
Over 125 mm upto and including 200 mm	$2d + 12$ mm
Over 200 mm	$2d + 25$ mm

9.1.3 In order to provide for structural applications, particularly shear connections where the thread is not allowed in the shear plane, bolts in diameter range M16 to M27 inclusive, upto 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 inquiry and order states that he requires this shorter thread length.

9.1.4 Bolts that are too short for minimum thread lengths shall be threaded as screws and shall be designated as screws. Guidance in this respect is given in Table 6.

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

9.2 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 4.

TABLE 4 - Thread runout (bolts) and
underhead distances (screws)
(Clauses 9.1.2 and 9.2)

All dimensions in millimetres

Nominal size (thread diameter)	Thread runout on bolts	Distance of ring gauge from underside of head (screws)
(d)	(x) max.	(a)
M5	2	3
M6	2.5	4
(M7)	2.5	4.5
M8	3	4.5
M10	3.5	5
M12	4	6
(M14)	5	7
M16	5	7.5
(M18)	6	8
M20	6	9
(M22)	6	9
M24	7	11
(M27)	7	11
M30	8	12
(M33)	8	12
M36	10	15
M39	10	15

Sizes shown in brackets are non-preferred.

10 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 1½ 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 ends shall be reasonably square, with the centre line of the shank (see Figure 2).

11 SAMPLING AND CRITERIA FOR CONFORMITY

The method of sampling and criteria for conformity shall be in accordance with that described in SLS 379*.

For the purpose of this sampling scheme defects are classified as major and minor as follows:

- a) Major defects - Thread major diameter
Thread pitch defects
Width across flats
Perpendicularity of head to shank
- b) Minor defects - Thread length
Bolt length
Shank diameter
Height of head
Neck diameter
End diameter
End of screw

*SLS 379 *General requirements and technical supply conditions for bolts, screws and nuts.*

12 OTHER REQUIREMENTS

Bolts, screws and nuts shall comply with the requirements laid down in SLS 379* in respect of the requirements not laid down in this specification

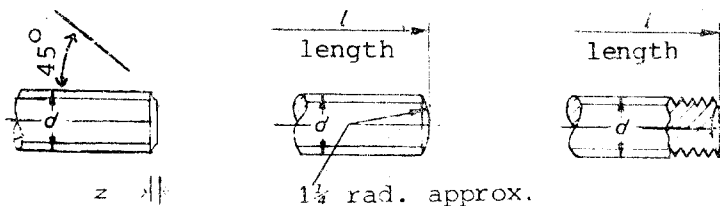


FIGURE 2 - Ends of bolts and screws

*SLS 379 General requirements and technical supply conditions for bolts, screws and nuts.

TABLE 5 - Preferred length and diameter combinations for commercial grade hexagon bolts

(All dimensions in millimetres)

LENGTH L	M5	M6	(M7)	M8	M10	M12	(M14)	M16	(M18)	M20	(M22)	M24	(M27)	M30	(M33)	M36	(M39)
22																	
25																	
(28)																	
30																	
(32)																	
35																	
(38)																	
40																	
45																	
50																	
55																	
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190																	
200																	
220																	
240																	
260																	
280																	
300																	
320																	
340																	
360																	
380																	
400																	

TABLE 6 - Preferred length and diameter combinations for commercial grade hexagon screws

(All dimensions in millimetres)

LENGTH /	M5	M6	(M7)	M8	M10	M12	(M14)	M16	(M18)	M20	(M22)	M24
10												
(11)												
12												
14												
16												
(18)												
20												
(22)												
25												
(28)												
30												
(32)												
35												
(38)												
40												
45												
50												
55												
60												
65												
70												
75												
80												

NOTES

- 1 Preferred lengths are between the bold lines.
- 2 Sizes shown in brackets are of second preference.

APPENDIX A

(Clause 3)

Property classes for bolts and screws

(See Clause 6 of SLS 379:1976* for further details)

Mechanical Property		Property Class			
		4.6	4.8	5.6	5.8
Tensile Strength R _m MPa	nominal	400	400	500	500
	minimum	400	400	500	520
Brinell Hardness HB	minimum	114	124	147	152
	maximum	242	242	242	242
Rockwell Hardness HRB	minimum	67	71	79	82
	maximum	100	100	100	100
Yield Stress Re MPa	nominal	240	340	300	420
	minimum	240	340	300	420
Stress under proof load Sp	Sp/Re	0.94	0.91	0.94	0.91
	MPa	225	310	280	380
Elongation after fracture A ₅	per cent minimum	25	14	20	10

*SLS 379:1976 General requirements and technical supply conditions for bolts, screws and nuts.

Property classes for nuts
(See Clause 6 of SLS 379* for further details)

Mechanical Property	Property Class	
	4	5
Proofload Stress** MPa	400	500
Brinell Hardness HB maximum	302	302
Rockwell Hardness HRC, maximum	30	30

*SLS 379:1976 General requirements and technical supply conditions for bolts, screws and nuts.

**The proof load is calculated by multiplying the proof load stress by the nominal stress area (A_s) of the corresponding bolt thread.

where,

$$A_s = \frac{\pi}{4} (d_2 + d_3)^2$$

d_2 = basic pitch diameter

d_3 = basic minor diameter

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The Sri Lanka Standards Institution is the owner of the registered certification mark shown below. Beneath the mark, the number of the Sri Lanka Standard relevant to the product is indicated. This mark may be used only by those who have obtained permits under the SLS certification marks scheme. The presence of this mark on or in relation to a product conveys the assurance that they have been produced to comply with the requirements of the relevant Sri Lanka Standard under a well designed system of quality control inspection and testing operated by the manufacturer and supervised by the SLSI which includes surveillance inspection of the factory, testing of both factory and market samples.

Further particulars of the terms and conditions of the permit may be obtained from the Sri Lanka Standards Institution, 17, Victoria Place, Elvitigala Mawatha, Colombo 08.



SRI LANKA STANDARDS INSTITUTION

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The principal objects of the Institution as set out in the Act are to prepare standards and promote their adoption, to provide facilities for examination and testing of products, to operate a Certification Marks Scheme, to certify the quality of products meant for local consumption or exports and to promote standardization and quality control by educational, consultancy and research activity.

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