(Reaffirmed 1995)

Indian Standard

SPECIFICATION FOR HEXAGON BOLTS FOR STEEL STRUCTURES

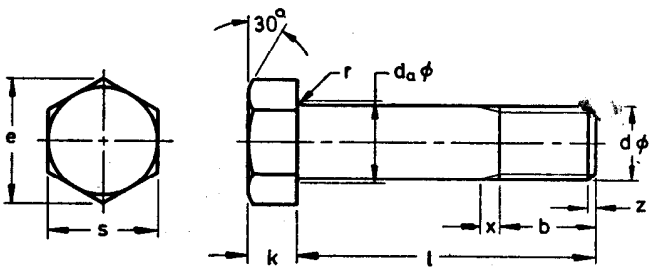
Bolts, Nuts and Fasteners Accessories Sectional Committee, EDC 27 [Ref : Doc : EDC 27 (1813)]

1. Scope — Requirements for hexagon bolts in the size range 12 to 39 mm for steel structures.

2. Dimensions and Tolerances — The dimensions of bolts shall be as given in Table 1 and preferred length, diameter combination and clamping lengths for bolts as given in Table 2. The tolerances shall be as given in Fig. 1.

TABLE 1 DIMENSIONS FOR HEXAGON BOLTS FOR STEEL STRUCTURES

All dimensions in millimetres.



x according to IS : 1369-1961 ' Dimensions for screw threads run-outs and undercuts '.

z according to IS : 1368-1967 ' Dimensions for ends of bolts and screws (*first revision*) '.

Size		M12	M16	M20	(M22)	M24	(M27)	M30	(M33)	M36	(M39)
d	*Nom*	12	16	20	22	24	27	30	33	36	39
	Max	13·10	17·10	21·30	23·30	25·30	28·30	31·30	34·60	37·60	40·60
	Min	11·57	15·57	19·48	21·48	23·48	26·48	29·48	32·38	35·38	38·38
s ≤ 19 h14 > 19 h15	*Nom*	19	24	30	32	36	41	46	50	55	60
	Max	19·00	24·00	30·00	32·00	36·00	41·00	46·00	50·00	55·00	60·00
	Min	18·48	23·16	29·16	31·00	35·00	40·00	45·00	49·00	53·80	58·80
e	*Min*	20·88	26·17	32·95	35·03	39·55	45·20	50·85	55·37	60·79	66·44
k js16	*Nom*	8	10	13	14	15	17	19	21	23	25
	Max	8·45	10·45	13·55	14·55	15·55	17·55	19·65	21·65	23·65	25·65
	Min	7·55	9·55	12·45	13·45	14·45	16·45	18·35	20·35	22·35	24·35
r	*Max*	1	1	1	1	1	1	1	1	1	1
d_a	*Max*	15·2	19·2	24·4	26·4	28·4	32·4	35·4	38·4	42·4	45·5
b		20	23	26	28	30	33	35	38	40	43

Note — Sizes shown in brackets are of second preference.

Adopted 4 September 1972

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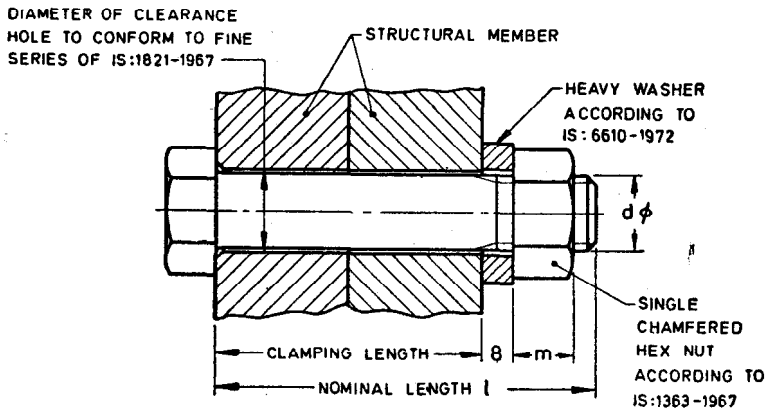
TABLE 2 PREFERRED LENGTH-DIAMETER COMBINATIONS AND CLAMPING LENGTHS FOR HEXAGON BOLTS FOR STEEL STRUCTURES

(*Clause* 2)

All dimensions in millimetres.



Size	M12	M16	M20	(M22)	M24	(M27)	M30	(M33)	M36	(M39)
m	10	13	16	18	19	22	24	26	29	31
Nominal Length *l*	Clamping Length									
30	5-9									
35	10-14	6-10								
40	15-19	11-15	8-12	6-10						
45	20-24	16-20	13-17	11-15	9-13					
50	25-29	21-25	18-22	16-20	14-18					
55	30-34	26-30	23-27	21-25	19-23					
60	35-39	31-35	28-32	26-30	24-28	21-25				
65	40-44	36-40	33-37	31-35	29-33	26-30				
70	45-49	41-45	38-42	36-40	34-38	31-35				
75	50-54	46-50	43-47	41-45	39-43	36-40				
80	55-59	51-55	48-52	46-50	44-48	41-45	39-43			
85	60-64	56-60	53-57	51-55	49-53	46-50	44-48			
90	65-69	61-65	58-62	56-60	54-58	51-55	49-53			
95	70-74	66-70	63-67	61-65	59-63	56-60	54-58			
100	75-79	71-75	68-72	66-67	64-68	61-65	59-63	57-61	54-58	
105	80-84	76-80	73-77	71-75	69-73	66-70	64-68	62-66	59-63	
110	85-89	81-85	78-82	76-80	74-78	71-75	69-73	67-71	64-68	62-66
115	90-94	86-90	83-87	81-85	79-83	76-80	74-78	72-76	69-73	67-71
120	95-99	91- 95	88- 92	86- 90	84-88	81-85	79-83	77-81	74-78	72-76
125		96-100	93- 97	91- 95	89-93	86-90	84-88	82-86	79-83	77-81
130		101-105	98-102	96-100	94-98	91-95	89-93	87-91	84-88	82-86
135		106-110	103-107	101-105	99-103	96-100	94- 98	92- 96	89- 93	87- 91
140		111-115	108-112	106-110	104-108	101-105	99-103	97-101	94- 98	92- 96
145		116-120	113-117	111-115	109-113	106-110	104-108	102-106	99-103	97-101
150		121-125	118-122	116-120	114-118	111-115	109-113	107-111	104-108	102-106
155			123-127	121-125	119-123	116-120	114-118	112-116	109-113	107-111
160			128-132	126-130	124-128	121-125	119-123	117-121	114-118	112-116
165			133-137	131-135	129-133	126-130	124-128	122-126	119-123	117-121
170			138-142	136-140	134-138	131-135	129-133	127-131	124-128	122-126
175			143-147	141-145	139-143	136-140	134-138	132-136	129-133	127-131
180				146-150	144-148	141-145	139-143	137-141	134-138	132-136
185				151-155	149-153	146-150	144-148	142-146	139-143	137-141
190				156-160	154-158	151-155	149-153	147-151	144-148	142-146
195				161-165	159-163	156-160	154-158	152-156	149-153	147-151
200				166-170	164-168	161-165	159-163	157-161	154-158	152-156

Note — Nominal lengths against which clamping lengths are indicated, are preferred.

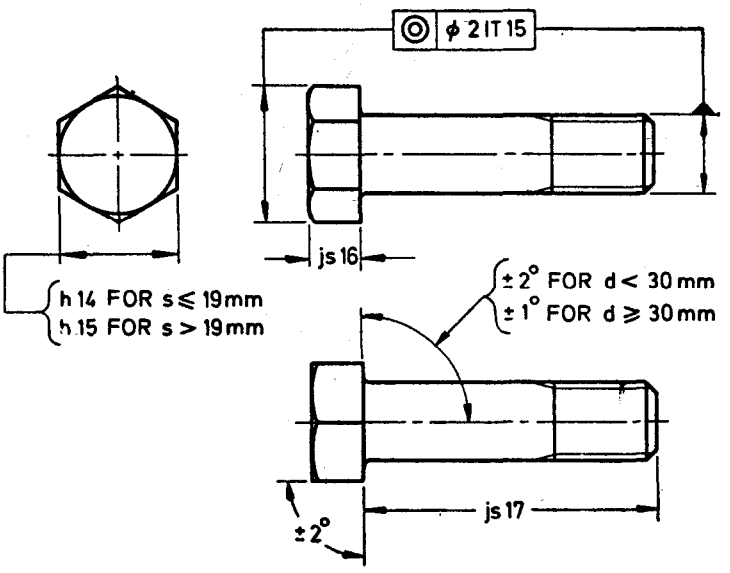


FIG. 1 TOLERANCES FOR HEXAGON BOLTS FOR STEEL STRUCTURES

3. Mechanical Properties — The mechanical properties of the bolts shall conform to the property class 4.6 or 6.6 as specified in IS : 1367-1967 ' Technical supply conditions for threaded fasteners (*first revision*) '.

4. Grade — Black (B) grade according to IS : 1367-1967.

5. Designation — The hexagon bolts shall be designated by the size, length, the number of this standard and the property class.

Example:

A hexagon bolt of size M12, length 30 mm conforming to this standard and of property class 4.6 shall be designated as:

Hex Bolt M12 × 30 IS : 6639 4.6

5.1 Where the bolts are required with hexagon nuts (see **6.3**), they shall be designated as:

A hexagon bolt of size M12, length 30 mm and property class 4.6 with a hexagon nut shall be designated as:

Hex Bolt M12 × 30N IS : 6639 4.6

6. General Requirements

6.1 *Sampling* — The method of sampling and acceptance criteria is to be in accordance with IS : 2614-1969 ' Methods for sampling of fasteners (*first revision*) '.

6.2 The hexagon bolts shall comply with the requirements of IS : 1367-1967 in respect of requirements not specified in this standard.

6.3 The hexagon nuts used with hexagon bolts shall conform to requirements given in IS : 1363-1967 ' Black hexagon bolts, nuts and lock nuts (dia 6 to 39 mm) and black hexagon screws (dia 6 to 24 mm) (*first revision*)' in all respects.

6.4 The bolts shall be supplied in natural finish unless otherwise specified by the purchaser. At the request of the purchaser they may be galvanized as per IS : 5358-1969 ' Hot-dip galvanized coating on fasteners '.

6.5 The approximate weight of hexagon bolts with nuts has been given in Appendix A for the guidance of the purchaser.

APPENDIX A

(*Clause* 6.5)

APPROXIMATE WEIGHT OF HEXAGON BOLTS WITH NUTS (FOR 1 000 PIECES IN kg)

Size Length *l* (mm)	M12	M16	M20	(M22)	M24	(M27)	M30	(M33)	M36	(M39)
30	57·5									
35	62·0	117								
40	66·4	125	222	281						
45	70·8	133	234	296	369					
50	75·3	141	247	311	387					
55	79·7	149	259	326	405					
60	84·2	157	272	341	423	585				
65	88·6	164	284	356	440	607				
70	93·0	172	296	370	458	630				
75	97·5	180	309	385	476	652				
80	102	188	321	400	494	675	899			
85	107	196	334	415	511	697	917			
90	111	204	346	430	529	720	945			
95	116	212	358	445	547	742	972			
100	120	220	371	460	565	765	1 000	1 250	1 560	
105	124	228	383	475	582	787	1 030	1 280	1 600	
110	129	236	395	490	600	810	1 060	1 310	1 640	2 010
115	134	244	407	504	618	832	1 090	1 350	1 680	2 055
120	138	252	420	519	636	855	1 110	1 380	1 720	2 100
125		260	432	534	653	877	1 140	1 410	1 760	2 145
130		267	445	549	671	900	1 170	1 450	1 800	2 190
135		275	457	564	689	922	1 200	1 480	1 840	2 240
140		283	469	579	707	945	1 220	1 510	1 880	2 290
145		291	482	594	724	967	1 250	1 550	1 920	2 335
150		299	494	608	742	990	1 280	1 580	1 960	2 380
155			506	623	760	1 010	1 310	1 610	2 000	2 425
160			519	638	778	1 030	1 340	1 650	2 040	2 470
165			531	653	795	1 050	1 360	1 680	2 080	2 515
170			543	660	813	1 080	1 390	1 710	2 120	2 560
175			556	683	831	1 100	1 420	1 750	2 160	2 610
180				698	849	1 120	1 450	1 780	2 200	2 660
185				713	866	1 140	1 470	1 820	2 240	2 710
190				728	884	1 170	1 500	1 850	2 280	2 760
195				743	902	1 190	1 530	1 880	2 320	2 800
200				758	920	1 210	1 560	1 920	2 360	2 850

EXPLANATORY NOTE

In the preparation of this standard, assistance has been derived from Draft ISO proposal for hexagon bolts [ISO/TC 2 (Sectt 290) 456].

IS : 6639 - 1972 SPECIFICATION FOR HEXAGON BOLTS FOR STEEL STRUCTURES

AMENDMENT NO. 1 APRIL 1978

Addendum

(Page 3, clause 3) - Add the following new clause after 3:

'3.1 The bolts shall withstand a minimum shear stress of 260 MPa.

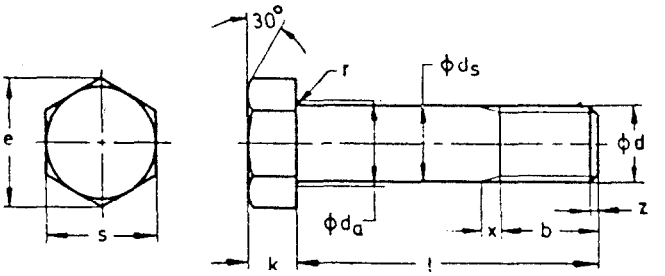
NOTE - The shear stress specified is explicitly intended for bolt testing purposes and is not related to actual design stresses.'

AMENDMENT NO. 2 OCTOBER 1981

Alterations

(Page 1, Table 1):

a) *Figure* — Substitute the following for the existing figure:



b) *First column, heading* — Substitute ' **Size d** ' *for* ' **Size** '.

c) *Entries for Size ' d '* — Substitute the following for the existing entries:

	Nom	12	16	20	22	24	27	30	33	36	39
$d_s \pm$ 1T15	*Max*	12·70	16·70	20·84	22·84	24·84	27·84	30·34	34·00	37·00	40·00
	Min	11·30	15·30	19·16	21·16	23·16	26·16	29·16	32·00	35·00	38·00

(Page 2, Table 2):

a) *Legend in Figure* — Substitute ' DIAMETER OF CLEARANCE HOLE TO CONFORM TO MEDIUM SERIES OF IS : 1821-1967 ' *for* ' DIAMETER OF CLEARANCE HOLE TO CONFORM TO FINE SERIES OF IS : 1821 1967 '.

b) *First column, heading* — Substitute ' **Size d** ' *for* ' **Size** '.

(EDC 27)

Reprography Unit, BIS, New Delhi, India

AMENDMENT NO. 3 DECEMBER 1989
TO
IS : 6639 - 1972 SPECIFICATION FOR HEXAGON BOLTS FOR STEEL STRUCTURES

(*Page* 3, *clause* **3**) — Substitute the following for the existing clause:

"**3. Mechanical Properties** — The mechanical properties of the bolts shall conform to the property class 4.6 or 5.6 as specified in IS 1367 (Part 3) : 1979 'Technical supply conditions for threaded steel fasteners : Part 3 Mechanical properties and test methods for bolts, screws and studs with full loadability (*second revision*)'."

(*Page* 3, *clause* **4**) — Substitute the following for the existing clause:

"**4. Product Grade** — Shall be of product grade C according to IS 1367 (Part 2) : 1979 'Technical supply conditions for threaded steel fasteners: Part 2 Product grades and tolerances (*second revision*)'."

(*Page* 3, *clause* **6.2**) — Substitute the following for the existing clause:

"**6.2** In respect of the requirements not covered in this standard the hexagon bolts shall comply with the requirements of IS 1367 (Part 1) : 1980 'Technical supply conditions for threaded steel fasteners : Part 1 Introduction and general information (*second revision*)'."

(*Page* 3, *clause* **6.3**) — Substitute the following for the existing clause:

"**6.3** The hexagon nuts used with the hexagon bolts shall conform to IS 1363 (Part 3) : 1984 'Hexagon head bolts, screws and nuts of product grade C : Part 3 Hexagon nuts (size range M 5 to M 36)'."

(*Page* 3, *clause* **6.4**) — Substitute the following for the existing clause:

"**6.4** The bolts shall be supplied in natural finish unless otherwise specified by the purchaser. At the request of purchaser, the bolts may be galvanized as per IS 1367 (Part 13) : 1983 'Technical supply conditions for threaded steel fasteners : Part 13 Hot-dip galvanized coatings on threaded fasteners (*second revision*)'."

(EDC 27)

Reprography Unit, BIS, New Delhi, India

AMENDMENT NO. 4 NOVEMBER 1990
TO
IS 6639:1972 SPECIFICATION FOR HEXAGON BOLTS FOR STEEL STRUCTURES

[Page 3, clause 3 (see also Amendment No. 3)] — Insert the following after 3:

'3.1 For tensile, proof load and wedge loading tests,three threads (3 X P) only shall be exposed between the grips. This is obtained by freely running the nut or fixture to the fullest extent and then unscrewing the specimen three full turns.'

(LMD 14)

Reprography Unit, BIS, New Delhi, India

AMENDMENT NO. 5 NOVEMBER 1999
TO
IS 6639 : 1972 SPECIFICATION FOR HEXAGON BOLTS FOR STEEL STRUCTURES

(*Page* 3, *clause* 3) — Substitute the following for the existing clause:

"**3. Mechanical Properties** — The mechanical properties of the hexagon bolts shall conform to the property class 4.6 or 5.6 as specified in IS 1367 (Part 3) : 1991 'Fasteners — Threaded steel — Technical supply conditions : Part 3 Mechanical properties and test methods for bolts, screws and studs with full loadability (*third revision*)'."

(*Page* 3, *clause* **6.1**) — Substitute the following for the existing clause:

"**6.1** *Sampling, Inspection and Acceptance Criteria* — The method of sampling, inspection and acceptance criteria shall be in accordance with IS 1367 (Part 17) : 1996 'Industrial fasteners — Threaded steel fasteners — Technical supply conditions Part : 17 Inspection, sampling and acceptance procedure'."

(*Page* 3, *clause* **6.3**) — Substitute the following for the existing clause:

"**6.3** The hexagon nuts used with the hexagon bolts shall conform to IS 1363 (Part 3) : 1992 ' Hexagon head bolts, screws and nuts of product grade C : Part 3 Hexagon nuts (size range M5 to M64) (*third revision*)'.

6.3.1 The hot-dip galvanized hexagon nuts used with the hot-dip galvanized hexagon bolts shall conform to IS 14394 : 1996 'Industrial fasteners — Hexagon nuts of product grade C — Hot-dip galvanized — Specification (size range M12 to M36)'."

(LM 14)

Reprography Unit, BIS, New Delhi, India