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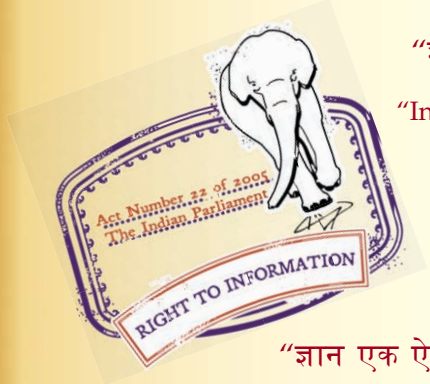
IS 12427 (2001): Fasteners - Threaded Steel Fasteners - Hexagon Head Transmission Tower Bolts [PGD 31: Bolts, Nuts and Fasteners Accessories]



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(पहला पुनरीक्षण)

Indian Standard

FASTENERS—THREADED STEEL FASTENERS — HEXAGON HEAD TRANSMISSION TOWER BOLTS— SPECIFICATION

(First Revision)

ICS 21.060.10

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110 002

December 2001

Price Group 2

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Bolts, Nuts and Fasteners Accessories Sectional Committee and approved by the Basic and Production Engineering Division Council.

This standard was originally published in 1988; subsequently need is felt to revise it to incorporate the changes taken place at various levels.

In this revision, following major changes have been made:

a) The range of sizes has been enlarged to cover sizes upto M24;

b) The range of nominal lengths has been extended upto M24;

c) The use of property classes 5.8 and 8.8 are also permitted subject to the agreement between the manufacturers and the users; and

d) The length—size combinations have been suitably extended.

The other type of transmission tower bolt known as step bolt is covered in IS 10238 : 2001 'Fasteners — Threaded steel fasteners — Step bolts for steel structures — Specification (*first revision*)'. The hexagon head bolts intended for fabrication of general steel structures are covered in IS 6639 : 1972 'Hexagon bolts for steel structures'.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

FASTENERS — THREADED STEEL FASTENERS — HEXAGON HEAD TRANSMISSION TOWER BOLTS — SPECIFICATION

(First Revision)

1 SCOPE

1.1 This standard covers the requirements for hot-dip galvanized hexagon head transmission tower bolts in the size range M12 to M24 for use in the construction of transmission towers, sub-stations and similar steel structures.

1.2 The bolts covered in this standard are not suitable for applications requiring improved low temperatures characteristics.

2 REFERENCES

The following Indian Standards contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of standards indicated below:

IS No.	*Title*
1367 (Part 2) : 1979	Technical supply conditions for threaded steel fasteners : Part 2 Product grades and tolerances (*second revision*)
1367 (Part 3) : 1991 ISO 898-1 : 1988	Fasteners—Threaded steel — Technical supply conditions : Part 3 Mechanical properties and test methods for bolts, screws and studs with full loadability (*third revision*)
1367 (Part 9/Sec 1) : 1993 ISO 6157-1 : 1988	Technical supply conditions for threaded steel fasteners : Part 9 Surface discontinuities, Section 1 Bolts, screws and studs for general applications (*third revision*)
1367 (Part 13) : 1983	Technical supply conditions for threaded steel fasteners : Part 13 Hot–dip galvanized coatings on threaded fasteners (*second revision*)
1367 (Part 17) : 1996 ISO 3269 : 1988	Industrial fasteners — Threaded steel fasteners—Technical supply conditions:Part 17 Inspection, sampling and acceptance procedure (*third revision*)
1367 (Part 18) : 1996	Industrial fasteners — Threaded steel fasteners—Technical supply conditions: Part 18 Packaging (*third revision*)
1368 : 1980 ISO 4753 : 1983	Dimensions for ends of parts with external ISO metric threads (*third revision*)
2016 : 1967	Plain washers (*first revision*)
2334 : 2001 ISO 1502 : 1996	ISO general purpose metric screw thread — Gauges and gauging (*second revision*)
4218 (Part 1) : 2001 ISO 68-1 : 1998	ISO general purpose metric screw threads: Basic profiles (*second revision*)
(Part 2) : 2001 ISO 261 : 1998	General plan (*second revision*)
(Part 3) : 1999 ISO 724 : 1993	Basic dimensions (*second revision*)
(Part 4) : 2001 ISO 262 : 1998	Selected sizes for screws, bolts and nuts (*second revision*)
4759 : 1996	Hot-dip zinc coatings on structural steel and other allied products (*third revision*)
14394 : 1996	Industrial fasteners — Hexagon nuts of product grade C — Hot-dip galvanized — Specification (size range M12 to M36)

3 DIMENSIONS

3.1 The dimensions of the bolts shall be as given in Table 1 when read with Fig. 1. All dimensions apply before hot-dip galvanizing.

3.2 The length-size combinations as well as grip ranges shall be as given in Table 2.

3.3 The bolt threads shall be in accordance with IS 4218 (Parts 1 to 4) and prior to hot-dip galvanizing shall conform with Go and Not Go threaded ring gauges in accordance with IS 2334. The tolerance on threads shall be 8 g.

4 GRADES

Unless otherwise specified, the bolts shall be of product grade C as specified in IS 1367 (Part 2).

5 MATING NUTS AND WASHERS

5.1 Nuts

The hexagon nuts used with these bolts shall conform to the requirements given in IS 14394.

5.2 Washers

5.2.1 The plain washers used with these bolts shall be of Type A, punched washer type and shall conform to the requirements of IS 2016 except the thickness of washers which shall be 5 ± 1 mm.

5.2.2 The washers supplied along with these bolts shall be hot-dip galvanized in accordances with **7.2.**

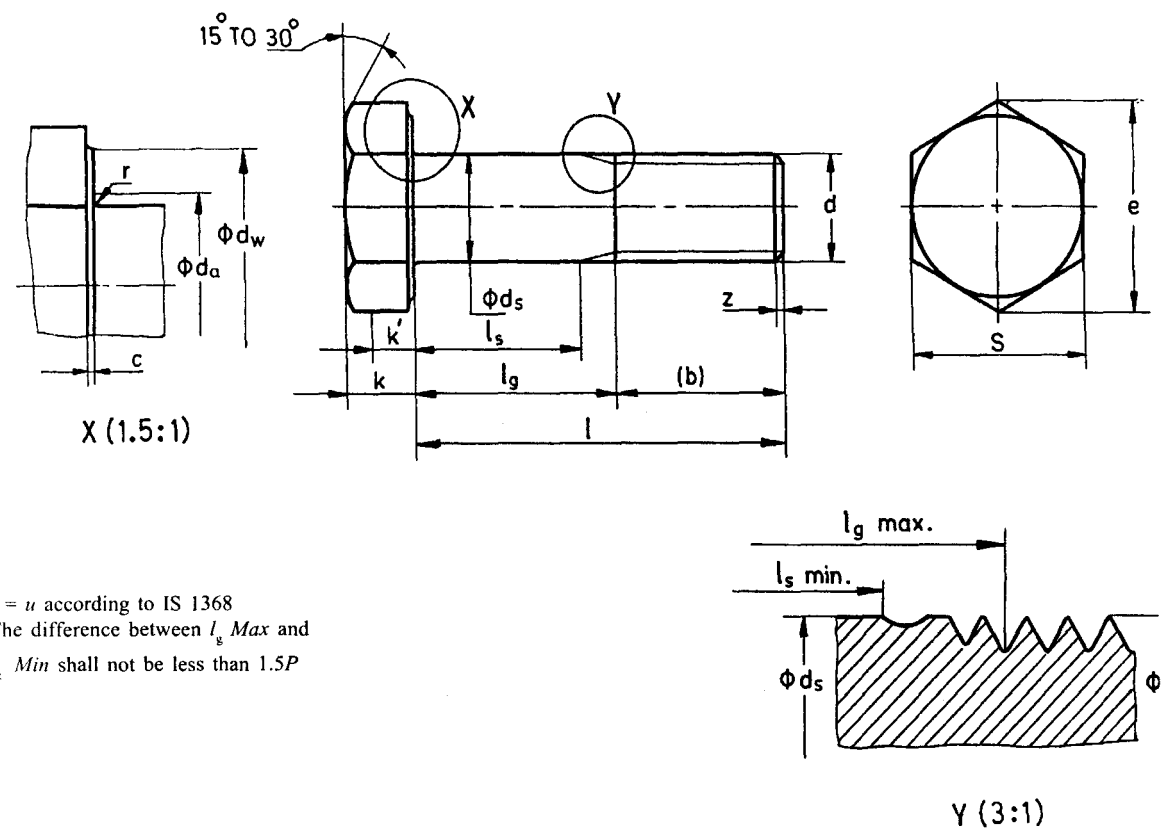
Table 1 Dimensions of Hexagon Head Transmission Tower Bolts

(*Clause* 3.1)

All dimensions in millimetres.

Thread size d		M12	M16	M20	(M22)	M24
P	Pitch of thread	1.75	2	2.5	2.5	3
b (ref)		20	23	26	28	30
C	*Max*	0.6	0.8	0.8	0.8	0.8
d_a	*Max*	14.7	18.7	24.4	26.4	28.4
d_s	*Max*	12.7	16.7	20.84	22.84	24.84
	Min	11.30	15.30	19.16	21.16	23.16
d_w	*Max*	18	24	30	34	36
	Min	16.47	22.00	27.7	31.35	33.25
e	*Min*	19.85	26.17	32.95	37.29	39.55
k	Nom	7.5	10.0	12.5	14.0	15.0
	Max	7.95	10.75	13.4	14.9	15.9
	Min	7.05	9.25	11.6	13.1	14.1
k'	*Min*	4.95	6.48	8.12	9.17	9.87
r	*Min*	0.6	0.6	0.8	0.8	0.8
s	*Max* = Nom	18	24	30	34	36
	Min	17.57	23.16	29.16	33	35

NOTE—Thread size M22 shown in brackets is non-preferred.



$z = u$ according to IS 1368

The difference between l_g *Max* and l_g *Min* shall not be less than 1.5*P*

FIG. 1 HEXAGON HEAD TRANSMISSION TOWER BOLTS

6 MECHANICAL PROPERTIES

6.1 The bolts shall be of property class 5.6, 5.8 or 8.8 as specified in IS 1367(Part 3) and shall be tested full size.

6.1.1 For tensile, proof load and wedge loading tests, only three threads shall be exposed between the grips. This is obtained by freely running the nuts or fixture to the fullest extent and then unscrewing the specimen three full turns. These tests are to be done after chemically de-galvanizing the bolts.

6.1.2 The bolts having nominal length less than three times the nominal diameter (which is too short for full size tensile testing) shall meet the hardness requirements of the respective property class as per IS 1367 (Part 3).

6.2 Shear Strength

6.2.1 The bolts with shank length l_s more than the nominal diameter shall withstand a minimum shear stress as given below:

Property Class	*Minimum Shear Stress* (MPa)
5.6	310
5.8	322
8.8	515

6.2.2 The bolts shall be single-shear tested through the unthreaded portion of the shank. The holes in the shear plates shall be 1.5 mm larger than the nominal thread diameter of the test bolt and the holes shall be chamfered 0.8 mm to relieve sharp edges. Shear plates shall be prevented from separating by means of using a nut on the test bolt tightened finger tight.

6.2.3 Mount the test specimen in a tensile testing machine capable for applying load at a controlled rate. Use self-aligning grips and take care when mounting the specimen to ensure that the load will be transmitted in a straight line transversely through the test bolt. Apply load and continue until failure of the bolt. Speed of testing as determined with a free running cross head shall be between 7 to 13 mm per minute.

6.2.4 The maximum shear stress applied to the specimen coincident with bolt failure shall be the shear strength of the bolt and shall meet the requirements given at **6.2.1.**

7 FINISH

7.1 The bolts shall be hot-dip galvanized in accordance with the requirements of IS 1367 (Part 13).

7.2 The plain washers supplied under this standard shall be hot-dip galvanized in accordance with the requirements of IS 4759.

7.3 The hot-dip galvanized bolts, nuts and washers shall be passivated by dipping, immediately after galvanizing in a 0.15 percent solution of sodium dichromate with 0.5 percent concentrated sulphuric acid maintained at a temperature of more than 32°C to provide protection against wet storage stain.

8 GENERAL REQUIREMENTS

The permissible surface discontinuities of the bolts shall conform to IS 1367(Part 9/Sec 1).

9 DESIGNATION

The bolts shall be designated by nomenclature, thread size, nominal length, number of this standard and property class. The letter N and W shall be added to the designation to indicate supply with nut and plain washer respectively.

Example:

A transmission tower bolt of thread size M16, nominal length 50 mm with nut and property class 5.6 shall be designated as:

Transmission Tower Bolt M16 × 50 N — 5.6 IS 12427

A transmission tower bolt of thread size M16, nominal length 50 mm, property class 5.6 with nut and plain washer shall be designated as:

Transmission Tower Bolt M16 × 50 NW — 5.6 IS 12427

10 SAMPLING, INSPECTION AND ACCEPTANCE CRITERIA

The sampling, inspection and acceptance criteria shall be in accordance with IS 1367 (Part 17).

11 MARKING

11.1 The marking on transmission tower bolts shall be in accordance with IS 1367 (Part 3).

11.1.1 In addition, transmission tower bolts shall be marked with the manufacturers' identification symbol on the head.

11.1.2 Identification symbol 'T' for transmission tower bolt may also be marked on the head.

11.2 Minimum height of markings shall be 3.0 mm. When embossed, markings shall project not less than 0.3 mm above the surface of the head and total head height (head plus markings) shall not exceed the specified maximum head height plus 0.4 mm.

11.3 BIS Certification Marking

The product may also be marked with the Standard Mark.

11.3.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act,* 1986 and the Rules and Regulations made thereunder.

Table 2 Length — Size Combinations and Grip Ranges

(*Clause* 3.2)

All dimensions in millimetres.

Thread Size *d*	M12			M16			M20			(M22)			M24		
	l_s *Min*	l_g *Max*	Grip range	l_s *Min*	l_g *Max*	Grip range	l_s *Min*	l_g *Max*	Grip range	l_s *Min*	l_g *Max*	Grip range	l_s *Min*	l_g *Max*	Grip range
30	6.5	10	6-10	—	—	—	—	—	—	—	—	—	—	—	—
35	11.5	15	11-15	8	12	8-12	—	—	—	—	—	—	—	—	—
40	16.5	20	16-20	13	17	13-17	9	14	10-14	7	12	8-12	—	—	—
45	21.5	25	21-25	18	22	18-22	14	19	15-19	12	17	13-17	9	15	11-15
50	26.5	30	26-30	23	27	23-27	19	24	20-24	17	22	18-22	14	20	16-20
55	31.5	35	31-35	28	32	28-32	24	29	25-29	22	27	23-27	19	25	21-25
60	36.5	40	36-40	33	37	33-37	29	34	30-34	27	32	28-32	24	30	36-30
65	41.5	45	41-45	38	42	38-42	34	39	35-39	32	37	33-37	29	35	31-35
70	46.5	50	46-50	43	47	43-47	39	44	40-44	37	42	38-42	34	40	36-40
75	51.5	55	51-55	48	52	48-52	44	49	45-49	42	47	43-47	39	45	41-45
80	56.5	60	56-60	53	57	53-57	49	54	50-54	47	52	48-52	44	50	46-50
85	61.5	65	61-65	58	62	58-62	54	59	55-59	52	57	53-57	49	55	51-55
90	66.5	70	66-70	63	67	63-67	59	64	60-64	57	62	58-62	54	60	56-60
95	71.5	75	71-75	68	72	68-72	64	69	65-69	62	67	63-67	59	65	61-65
100	76.5	80	76-80	73	77	73-77	69	74	70-74	67	72	68-72	64	70	66-70
105				78	82	78-82	74	79	75-79	72	77	73-77	69	75	71-75
110				83	87	83-87	79	84	80-84	77	82	78-82	74	80	76-80
115				88	92	88-92	84	89	85-89	82	87	83-87	79	85	81-85
120				93	97	93-97	89	94	90-94	87	92	88-92	84	90	86-90
125				98	102	98-102	94	99	95-99	92	97	93-97	89	95	91-95
130				103	107	103-107	99	104	100-104	97	102	98-102	94	100	96-100
135				108	112	108-112	104	109	105-109	102	107	103-107	99	105	101-105
140				113	117	113-117	109	114	110-114	107	112	108-112	104	110	106-110
145				118	122	118-122	114	119	115-119	112	117	113-117	109	115	111-115
150				123	127	123-127	119	124	120-124	117	122	118-122	114	120	116-120
155				128	132	128-132	124	129	125-129	122	127	123-127	119	125	121-125
160				133	137	133-137	129	134	130-134	127	132	128-132	124	130	126-130

NOTES

1 l_g *Max* = *l* nom − *b* (ref).

2 l_s *Min* = l_g *Max* − 2*P*.

3 Grip is the total thickness of material to be connected excluding washers.

4 Thread size M22 shown in brackets is non-preferred.

The details of conditions under which the licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

12 PACKAGING

The packaging of transmission tower bolts shall be done in accordance with IS 1367 (Part 18).

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 1986 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

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This Indian Standard has been developed from Doc : No. BP 33 (0097).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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Printed at Prabhat Offset Press, New Delhi-2