

Technical Specification for Supply of G.I. Bolts & Nuts (Half Tread).

1. SCOPE:

The Specification covers the design, manufacture, testing before dispatch, marking, packing & supply of GI. Bolts & Nuts for Operation & Maintenance works.

Before dispatch of material, inspection, testing & checking will be witnessed by the representative of purchaser.

2. STANDARDS:

The relevant Indian Standard specification (Latest amendment), to which the material shall conform are as follows:

Sl.No.	Particulars	For G.I. Bolts & Nuts		
1.	Grade	Grade "C" as specified in IS-1367 (Part-2) /2002		
2.	Dimension	Nominal dia- 16 mm.		
		Length of bolt	Details of Thread	IS Applicable.
		50, 65, 75, 125, 150 mm	Half	IS-1363 (Part-II) :2002.
		Length of Nut-15 mm IS-1363 (Part-III):2002.		
3.	Raw Material	Low or medium carbon steel		
4.	Tolerance	As per IS:1367 (Part-II)		
5.	Chemical composition	For Bolt IS: 1367 Part-III/2002 For Nut IS:1367 Part-VI/1994		
6.	Testing	For Bolt IS: 1367 Part-III/2002 For Nut IS:1367 Part-VI/1994		
7.	Sampling	IS:1367 Part-17/2005 for Bolts & Nuts		
8.	Zinc Coating	IS:1367 Part-XIII/1983 & IS: 2633-1986		
9.	Material Classification	4.6		

3. BOLTS AND NUTS REQUIREMENT

All bolts and nuts shall conform to IS: 1363 and its parts or IS:6639-1972 and it there latest amendments as applicable. All bolts and nuts shall be galvanized and shall have hexagonal heads and nuts. The heads shall be forged out of the solid, truly concentric, and square with the shank, which must be perfectly straight.

The length of bolts shall be such that the threaded portion will not extend into the place of contact of the members. The bolt should not be fully threaded. It shall be ensured that the threaded portion of each bolt protrudes not less than 3 mm and not more than 8 mm when fully tightened. All bolts shall be threaded to take the full depth of the nut and threaded enough to permit firm gripping of the members, but not further.

Threads of bolts and nuts shall have a neat fit and shall be such that they can be turned with finger through-out the length of the threads of bolts and they shall be capable of developing full strength of the bolts.

Flat and tapered washers shall be provided wherever necessary. Spring washers shall be provided for insertion under all nuts. These washers shall be of steel electro-galvanized, positive lock type.

4. GALVANISING (Hot Dip)

Bolts & Nuts shall be galvanized as per standard practice. In accordance with Bolts & Nuts shall be galvanized as per standard practice. In accordance with IS:1367 Part-XIII/1983 & IS: 2633-1986.

Mass of Zinc coating shall be minimum 375gm/m² & Avg. Minimum Thickness of 54 microns. The zinc coating uniformity testing in accordance with IS: 2633:1986 and its latest amendments.

5. MARKING:

The bolts shall be marked with the following symbols on the top surface of the bolt head either embossed or indented as given below:

- a. The manufactures identification symbol.
- b. Property class.
- c. The material shall be marked as per the requirement of IS: 1367 Part-XVIII for Bolts & Nuts.

6. CHARACTERISTICS/PROPERTIES REQUIRED:

[Mill test certificate for the following shall be furnish]

A. For Bolts & Nuts (Properties Class)

- I. Properties class for bolts required : 4.6 as specified in IS: 1367/ Part-II/2002.
- II. Properties class for nuts required : 5 as specified in IS:1367/ Part-III/2002.

B. Chemical Composition

- I. For Bolts
 - Carbon % max. : 0.55
 - Phosphorous % : 0.05
 - Sulphur % : 0.06
- II. For Nuts
 - Carbon % max. : 0.50
 - Phosphorous % : 0.11
 - Sulphur % : 0.34

C. Mechanical Properties

- I. For Hexagonal Bolts
 - a. Tensile strength : N/mm sq 400(min)
 - b. Stress under proof load : N/mm sq 225(min)
 - c. Brinell Hardness : HB 114(min)to 238 max
 - d. Rockwell hardness : HRB-Max. 67 (min) to 89 max.
 - e. Vickers harness : HV 120 (min) to 250 max.
 - f. Elongation after fracture : 3 min. 22%
 - g. Strength under wedge loading : N/mm sq. 400 (min)
 - h. Head soundness : No fracture(No cracks > 2mm)
- II. For Hexagonal Nuts
 - Proof stress : N/mm sq. 500 (min)
 - Vicker Hardness : HV-min. 272 to 353 max.

Note: Material shall be Lead free & RoHs compliant (Restriction of Hazardous substances)

7. WARRANTY:

5 years corrosion warranty with rejection criteria for defects >1% shall be applicable.

8. PRE-DISPATCH INSPECTION / THIRD PARTY INSPECTION:

BESCOM have discretion to conduct a third party inspection along with BESCOM Engineer about the assuring the quality and quantity of the product by conducting field trail to validate improvements.

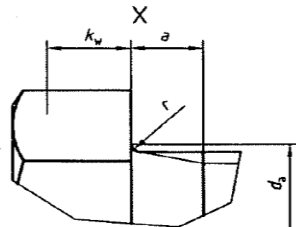
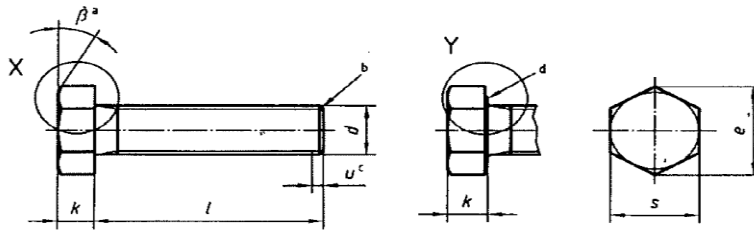
9. PACKING:

The packing of material shall be made in double gunny backs having having rust inhibiting VCI (Vapour corrosion inhabitant) containing 50kg weight of Bolts & Nuts (Net weight). The packing shall bare transportation hazards. The packing shall be in such a way as to protect the material from the atmospheric effect like rains, humidity etc. The packing shall bare the marking as under.

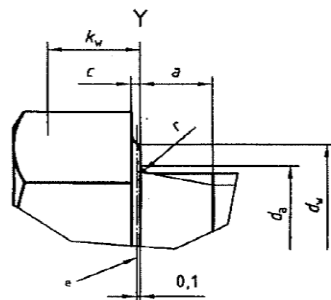
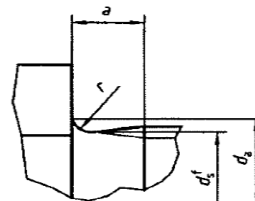
- a. Particulars of materials.
- b. Quantity.
- c. Manufactures identification mark.
- d. Complete dispatch details like name of the consignee P.O No:
& Date and destination etc.
- e. Word “BESCOM for Electrical use” shall be printed on the packing gunny bag

**General Manager(Ele),
QS&S, BESCOM**

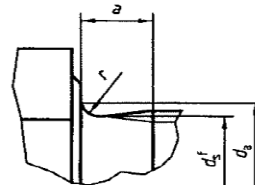
Dimensions in millimetres



Permissible shape



Permissible shape



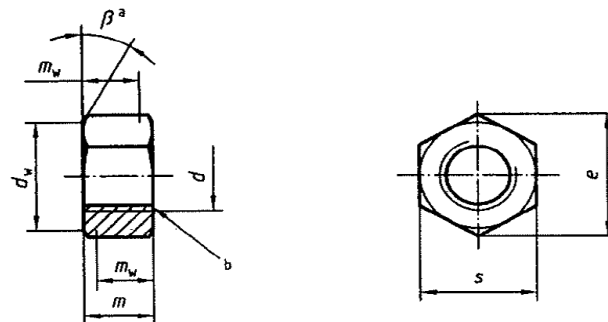
- a $\beta = 15^\circ$ to 30°
b End without special requirements
c Incomplete thread $u \leq 2 P$
d Washer face permissible
e Reference datum for d_w
f $d_s \sim$ pitch diameter

Thread (d)	M5	M6	M8	M10	M12	M16
p^a	0,8	1	1,25	1,5	1,75	2
a	max. 2,4 min. 0,8	3 1	4,00 1,25	4,5 1,5	5,30 1,75	6 2
c	max. 0,5	0,5	0,6	0,6	0,6	0,8
d_a	max. 6	7,2	10,2	12,2	14,7	18,7
d_w	min. 6,74	8,74	11,47	14,47	16,47	22
e	min. 8,63	10,89	14,2	17,59	19,85	26,17
k	nom. 3,5 max. 3,875 min. 3,125	4 4,375 3,625	5,3 5,675 4,925	6,4 6,85 5,95	7,5 7,95 7,05	10 10,75 9,25
k_w^b	min. 2,19	2,54	3,45	4,17	4,94	6,48
r	min. 0,2	0,25	0,4	0,4	0,6	0,6
s	nom. = max. 8,00 min. 7,64	10,00 9,64	13,00 12,57	16,00 15,57	18,00 17,57	24,00 23,16
l^c						
nom.	min.	max.				
10	9,25	10,75				
12	11,1	12,9				
16	15,1	16,9				
20	18,95	21,05				
25	23,95	26,05				
30	28,95	31,05				
35	33,75	36,25				
40	38,75	41,25				
45	43,75	46,25				
50	48,75	51,25				
55	53,5	56,5				
60	58,5	61,5				
65	63,5	66,5				
70	68,5	71,5				
80	78,5	81,5				
90	88,25	91,75				
100	98,25	101,75				
110	108,25	111,75				

3 Dimensions

See Figure 1 and Tables 1 and 2.

Symbols and descriptions of dimensions are defined in ISO 225.



- a $\beta = 15^\circ$ to 30°
b Countersink at start of thread permissible

Figure 1

Table 1 — Preferred threads

Dimensions in millimetres

Thread (d)		M5	M6	M8	M10	M12	M16	M20
p^a		0,8	1	1,25	1,5	1,75	2	2,5
d_w	min.	6,7	8,7	11,5	14,5	16,5	22	27,7
e	min.	8,63	10,89	14,2	17,59	19,85	26,17	32,95
m	max.	5,6	6,4	7,9	9,5	12,2	15,9	19,0
	min.	4,4	4,9	6,4	8,0	10,4	14,1	16,9
m_w	min.	3,5	3,7	5,1	6,4	8,3	11,3	13,5
s	nom. = max.	8,00	10,00	13,00	16,00	18,00	24,00	30,00
	min.	7,64	9,64	12,57	15,57	17,57	23,16	29,16

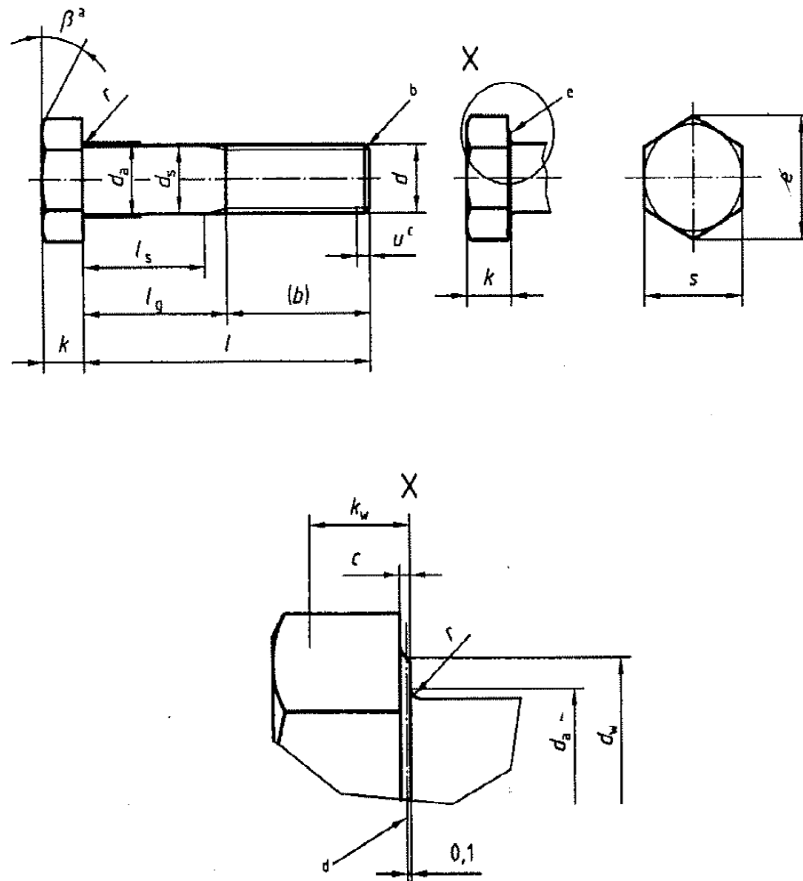
P- is the pitch of the Thread

3 Dimensions

See Figure 1 and Tables 1 and 2.

Symbols and designations of dimensions are defined in ISO 225.

Dimensions in millimetres



- a $\beta = 15^\circ$ to 30°
- b End without special requirements
- c Incomplete thread $u \leq 2 P$
- d Reference datum for d_w
- e Washer face permissible