

	BHARAT HEAVY ELECTRICALS LIMITED TRANSMISSION PROJECTS ENGINEERING MANAGEMENT NEW DELHI						
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PROJECT							
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04	18.11.10	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	Unit wt of hardware added		
02	13.4.06.	BVG	PLK	RMS	Eqpt mounting hardwares added.		
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Bharat Heavy Electricals Ltd.
Doc. No. TB-xxx-618-002a R4
Technical Specification
GI HARDWARES

SECTION - 1

SCOPE, SPECIFIC TECHNICAL REQUIREMENTS & QUANTITIES

1.1 SCOPE

The scope of this specification is to specify all details required by a supplier for supply of galvanized hardware for projects being executed by BHEL on turnkey basis for NTPC, PGCIL, SEBs and other Customers.

1.2 SPECIFIC TECHNICAL REQUIREMENTS

The specific technical requirements shall be as per Standard Technical Specification (Refer Section 2).

1.3 QUANTITIES

The quantities shall be as per attached BOQ.

SECTION - 2

2.0 GENERAL

This section covers the standard technical specification for GI Hardwares.

2.1 BOLTS:

M16 bolts shall be used in all types of structures except equipment mounting/ earthing bolts which shall be as per equipment requirement.

All bolts for member connections in towers, beams & equipment support structures shall conform to IS: 12427 - 2001 and for step bolts shall conform to IS: 10238 – 1982.

The mechanical properties shall conform to property class 5.6 of IS:1367 (part 3) - 1991.

All bolt heads shall have hexagonal shape, the heads being forged out of the solid material truly concentric and square with the shank, which must be perfectly straight.

Fully threaded bolts should not be used.

All bolts shall be threaded with metric standard thread to take the full depth of the nut and permit firm grip of the member.

All bolts shall be hot dip galvanized as per IS: 1367 (Part 13) – 1983.

2.2 NUTS:

All nuts shall conform to IS: 1363 (Part 3) –1992.

The mechanical properties shall conform to property class 5 of IS:1367 (part 6) – 1980.

The nuts shall be capable of being worked with fingers along the entire threaded portion of the bolt with a neat fit capable of developing the full strength of the bolt.

All nuts shall be hot dip galvanized as per IS: 1367 (Part 13) – 1983.

2.3 PLAIN WASHERS:

All plain washers shall be punched washers, A type conforming to IS: 2016-1967.

These shall be hot dip galvanized as per IS: 4759 – 1984.

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2.4 SPRING WASHER:

All spring washers shall be of spring steel, positive lock type and conforming to type B of IS: 3063-1972. The thickness of spring washer shall be as specified under:

<u>Bolt Diameter</u>	<u>Thickness of Spring washers</u>
16 mm	3.5 mm
12 mm	2.5 mm

These shall be electro-galvanized as per IS: 1573 – 1986.

2.5 UNIT WEIGHT OF BOLTS I/C NUT, PLAIN AND SPRING WASHERS:

For purpose of payment, following unit weights as indicated below shall be considered.

A.) STANDARD BOLTS I/C ONE NUT UNIT WEIGHTS

S. NO.	TYPE	SIZE OF BOLTS	TOTAL WT (KG)
1	M16	16 φ X 35 LG	0.117
2	M16	16 φ X 40 LG	0.125
3	M16	16 φ X 45 LG	0.133
4	M16	16 φ X 50 LG	0.141
5	M16	16 φ X 55 LG	0.149
6	M16	16 φ X 60 LG	0.157
7	M16	16 φ X 65 LG	0.164
8	M16	16 φ X 70 LG	0.172
9	M16	16 φ X 75 LG	0.180
10	M16	16 φ X 80 LG	0.188
11	M16	16 φ X 85 LG	0.196
12	M16	16 φ X 90 LG	0.204
13	M16	16 φ X 95 LG	0.212
14	M16	16 φ X 100 LG	0.220
15	M12	12 φ X 35 LG	0.0620
16	M12	12 φ X 40 LG	0.0664
17	M12	12 φ X 45 LG	0.0708
18	M12	12 φ X 50 LG	0.0753
19	M12	12 φ X 55 LG	0.0797
20	M12	12 φ X 60 LG	0.0842

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B.) SPRING WASHER

S. NO.	TYPE	TOTAL WT (KG)
1	3.5mm thk (M16 bolt)	0.00891
2	2.5mm thk (M12 bolt)	0.00382

C.) For supplies of bolts i/c nuts, plain washers and spring washer other than those listed above, payment shall be made based on unit weights worked out considering theoretical dimensions & density of steel as 7850kg/cum.

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Doc. No. TB-XXX-618-002c R1
Technical Specification of GI Hardware for Equipment Fixing and Earthing

**SCOPE, SPECIFIC TECHNICAL REQUIREMENTS & QUANTITIES
FOR ERECTION HARDWARE**

1.0 SCOPE

The scope of this specification is to specify all details required by a supplier for supply of galvanized hardware for projects being executed by BHEL on turnkey basis.

2.0 SPECIFIC TECHNICAL REQUIREMENTS

2.1 BOLTS:

Bolts as per BOQ shall be used in equipment mounting and earthing connection.

All bolts for member connections in towers, beams & equipment support structures shall conform to IS: 12427 - 2001 and for step bolts shall conform to IS: 10238 – 1982.

The mechanical properties shall conform to property class 5.6 of IS:1367 (part 3) - 1991.

All bolt heads shall have hexagonal shape, the heads being forged out of the solid material truly concentric and square with the shank, which must be perfectly straight.

All bolts shall be threaded with metric standard thread to take the full depth of the nut and permit firm grip of the member.

All bolts shall be hot dip galvanized as per IS: 1367 (Part 13) – 1983.

2.2 NUTS:

All nuts shall conform to IS: 1363 (Part 3) –1992.

The mechanical properties shall conform to property class 5 of IS:1367 (part 6) – 1980.

The nuts shall be capable of being worked with fingers along the entire threaded portion of the bolt with a neat fit capable of developing the full strength of the bolt.

All nuts shall be hot dip galvanized as per IS: 1367 (Part 13) – 1983.

2.3 PLAIN WASHERS:

All plain washers shall be punched washers, A type conforming to IS: 2016-1967.

These shall be hot dip galvanized as per IS: 4759 – 1984.

2.4 SPRING WASHER:

All spring washers shall be of spring steel, positive lock type and conforming to type B of IS: 3063-1972. The thickness of spring washer shall be as per IS: 3063 – 1994 (Table 1A & 1B)

These shall be electro-galvanized as per IS: 1573 – 1986 and shall have service grade number – 4 as per IS:1573 – 1986 (Appendix A).

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Technical Specification of GI Hardware for Equipment Fixing and Earthing

**3.0 QUANTITIES: Estimated quantity is 25 MT
(Nuts and Bolts – 23 MT, Plain Washer – 1.5 MT and Spring Washer – 0.5 MT)**

Each nut bolt set will generally have two plain washers and one spring washer

Sl No.	Bolt Size	Length (mm)	Threading	Spring Washer	Plain Washer
01	M12 – M33	40 - 140	Fully Threaded	Service grade number – 4 as per IS: 1573 – 1986 (Appendix A).	As per table 2 of IS: 2016-1967

- Note:-**
1. 10% shall be considered for export job.
 2. Quantities for PowerGrid and Non-PowerGrid Projects shall be 40:60 ratio and it is valid for ~~two years.~~ 18 months.