

		<b>BHARAT HEAVY ELECTRICALS LIMITED</b> <b>TRANSMISSION PROJECTS ENGINEERING MANAGEMENT</b> <b>NEW DELHI</b>					
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	04	18.11.10				Unit wt of hardware added	
	02	13.4.06.	BVG	PLK	RMS	Eqpt mounting hardwares added.	
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## **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 Hardware.

### **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.

## 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 $\phi$ X 35 LG	0.117
2	M16	16 $\phi$ X 40 LG	0.125
3	M16	16 $\phi$ X 45 LG	0.133
4	M16	16 $\phi$ X 50 LG	0.141
5	M16	16 $\phi$ X 55 LG	0.149
6	M16	16 $\phi$ X 60 LG	0.157
7	M16	16 $\phi$ X 65 LG	0.164
8	M16	16 $\phi$ X 70 LG	0.172
9	M16	16 $\phi$ X 75 LG	0.180
10	M16	16 $\phi$ X 80 LG	0.188
11	M16	16 $\phi$ X 85 LG	0.196
12	M16	16 $\phi$ X 90 LG	0.204
13	M16	16 $\phi$ X 95 LG	0.212
14	M16	16 $\phi$ X 100 LG	0.220
15	M12	12 $\phi$ X 35 LG	0.0620
16	M12	12 $\phi$ X 40 LG	0.0664
17	M12	12 $\phi$ X 45 LG	0.0708
18	M12	12 $\phi$ X 50 LG	0.0753
19	M12	12 $\phi$ X 55 LG	0.0797
20	M12	12 $\phi$ X 60 LG	0.0842

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**B.) SPRING WASHER**

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

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.