

**TECHNICAL SPECIFICATION FOR SHACKLE HARDWARE FITTINGS**  
**SUITABLE FOR TENSION STRING TO BE USED FOR 11KV LINE**

The hardware fittings suitable for tension string to be used for 11KV consisting of following components.

- 1) one pair of mild steel cross arm straps having size 152 mm lengthx35 mm widthx6mm thickness conforming to IS 2486(Part II) -1989 and REC specification No.3/1971(Rev-1993).
- 2) One hexagonal headed bolt with length 145 mm & 16 mm dia, with 1 No. nut,, one No. flat washer of 16mm dia. and 3 mm thickness and 1 No. split pin of 4 mm dia. conforming to IS 1363(Part-1)1992.
- 3) One No. forged steel ball eye 16mm suitable for attaching the socket end of the strain insulator to the cross arm strap. Forgings shall be made of steel as per IS 2004-1991. The ball eye shall also be conforming to REC specification No.3/1971(Rev.1993) with this. One no. MS pin (rivet) of 55mm lengthx16mm dia along with one No. spring washer of 3 mm thickness and 1 no. split pin of 4 mm dia. are to be supplied.
- 4) One No. aluminum alloy socket made out of permanent mould cast, high strength aluminum alloy for attaching to the strain insulator on one end and for accommodating the helically formed dead-end fittings at the other end in its smooth internal contour. The socket shall be attached to the strain insulator with the help of 'w' clip as per IS 2486 (Part II) 1989.
- 5) 1 no. U bolt with dimension 62mmx12mm with 2 nos. 12 mm nuts, 2 nos. flat washer of 2 mm thickness and, 2 Nos. spring washers of 2.5mm thickness and one no. keeper piece of aluminum alloy suitable to U bolt.

The detailed dimension of above components shall be as per drawing nos. as under:

Common drawings: 01 DOG HW & 02 Rabbit HW

6) The minimum breaking strength of alloy socket shall be as under:

- |                           |   |          |
|---------------------------|---|----------|
| i) Up to Rabbit conductor | : | 2500 Kgf |
| ii) For Dog Conductor     | : | 4000 Kgf |

The aluminum socket shall be embossed/casted with trade name for identification of manufacturer and -word "**Name of DISCOM**",

7) All ferrous parts shall be hot dip galvanized as per IS-2633/1986. However spring washer shall be electro-galvanized.

8) Chemical composition of aluminum alloy and its analysis for socket ended strain clamp shall be as per I.S. 617/92, I.S 319, I.S.6745 & I.S.2062/06 Gr. A for respective metal parts specified hereunder.

1	Copper	:	0.1% Max.
2	Magnesium	:	0.1% Max
3	Silicon	:	11 to 13%
4	Iron	:	0.6% Max
5	Manganese	:	0.5% Max
6	Nickel	:	0.1% Max
7	Zinc	:	0.1% Max
8	Lead	:	0.1% Max
9	Tin	:	0.05% Maximum
10	Titanium	:	0.2% Maximum
11	Aluminum	:	Remainder

#### 9) TYPE TEST:

Firm has to submit notarized reports of following type tests carried out on samples as per IS 2486(Part-I) 1993. Type tests certificates shall not be more than **7** years old from the date of submission of tender.

- Verification of dimensions with relevant **DISCOM** drawings.
- Mechanical failing load test
- Galvanizing test
- Confirmation or Mass of Zinc coating minimum 610 Grams/m<sup>2</sup> for MS strap
- Mechanical Slip Strength Test

#### 10) ROUTINE TEST:

The following routine tests shall be carried out on each insulator fitting by the manufacturer.

- Visual examination.
- Mechanical Routine Test for Slip Strength, Suspension Clamps, Tension Clamps, Compression, Breaking Load & String Fittings as per I.S 2486 P-1

The supplier shall maintain the record of such tests carried out on each fitting and shall submit the records to Inspector, whenever required by him.

### 11)ACCEPTANCE TESTS:

Following tests will be carried out on the offered lot by the supplier in the presence of Inspector of **DISCOM**. All tests will be carried out at the works of the suppliers at the cost of supplier. In case testing facilities are not available then it shall be at the discretion of **DISCOM** to agree to the request for testing at other place, however for this, a prior permission has to be obtained for the same. & then the tests shall be carried out at any Govt. approved laboratory in presence of inspector.

- a) Verification of dimensions within the limit of specified tolerance as per relevant **DISCOM** drawings.
- b) Mechanical failing load test as per IS 2486 Part I or latest version thereof.
- c) Mechanical slip strength on clamp as per IS 2486-1993 Part I or latest version thereof.
- d) Galvanizing test as per IS 2633/1986 or latest version thereof.

Sample criteria shall be in accordance with IS 2486 Part I or latest revision thereof.

### 11.1 SAMPLING

#### 11.1.1 Lot

All insulator fittings of same type and design manufactured under similar conditions of production offered for acceptance. A lot may consist of the whole or part of the quantity offered.

11.1.2 The number of fittings to be selected at random from the lot shall be in accordance with column 1 and column 2 of Table 1. If required (see-11.2) additional insulator fitting as given in column 3 of Table 1 shall also be selected at random. In order to ensure the randomness of selection, random number tables shall be used in line with IS 4905:1968).

### 11.2 CRITERIA FOR CONFORMITY

Each of the insulator fittings selected in the first stage in accordance with column 1 and column 2 of Table 1 shall be subjected to all

acceptance tests. A fitting shall be declared defective if it fails in any of these tests. The lot shall be considered as conforming to the requirements of acceptance tests if the number of defectives in the sample is less than or equal to corresponding acceptance number (see column 4).

**Table 1 Sample size and Criteria for Conformity**

(I.S 2486 P-1 Annexure-B, Clauses B-1, B-1.2 and B.2)

Lot size	Sample size		a	r1	R2
	1 <sup>st</sup> Stage	2 <sup>nd</sup> Stage			
(1)	(2)	(3)	(4)	(5)	(6)
101 to 500	5	5	0	2	2
501 to 1000	8	8	0	2	2
1001 to 3000	13	13	0	2	2
3001 to 10000	20	20	0	3	4
10001 to 35000	32	32	1	4	5
35001 and above	50	50	2	5	7

The lot shall be rejected if the number of defectives is equal to or greater than first rejection, r1 (see column 5). If the number of defectives are in between 'a' and r1 a second sample of same size (see column 3) shall be selected from the lot at random and subjected to the tests. If the number of defectives in the two samples combined is less than R2 (see column 6), the lot shall be considered as conforming to the requirements of acceptance tests, otherwise the lot shall be rejected.

Samples for inspection shall be randomly selected from the offered lot & the same shall be inspected & tested in presence of **DISCOM** Inspector. However if any sample fails, then further action shall be taken as per Section B-1 of Annexure-B of IS 2486 Part I 1993.

## 12) PACKING:

The hardware fittings shall be packed in double gunny bags in 25 sets. Gunny bags should withstand the weight of the hardware fittings and should not become loose or torn out during transportation. Further on each gunny bag, supplier shall make arrangement for providing suitable seal wire to enable the DISCOM Inspector to fix identification seal for the inspected lot. Unless the materials are inspected and accepted by the Inspector and/ or waiver of the testing or delivery instructions are received in writing material, shall not be dispatched by the supplier.

## **GUARANTEED TECHNICAL PARTICULARS (GTP)**

Technical information and guaranteed technical Particulars for 11KV disc Hardware's suitable for ACSR & AAA Conductors.

### **PART – 'A'**

**BIDDER HAS TO CONFIRM FOLLOWING IMPORTANT REQUIREMENT:**

Sr. No.	Particulars	As per Tender requirement	Confirmation																																												
1	Name of Manufacturer																																														
2	Visual Requirement	Should be smooth and free from any defect	Yes																																												
3	Dimension & Drawing	11KV Disc Hardware for ACSR and AAAC shall be manufactured and supplied as per IS-2486 (P-1)/1993 and Drawing attached with this tender	Yes																																												
4	Breaking Strength of Strain clamp/ Hardware	Aluminum Alloy Socket ended Strain clamp shall be having minimum breaking strength 2500 Kgf for Rabbit conductor and 4000 Kgf for Dog Conductor.	Yes																																												
5	Mechanical slip strength on clamp as per IS: 2486-1993 Part I with latest version	Mechanical Slip strength of clamp shall be in accordance with breaking load of conductor, as below: (1) ACSR rabbit - 18.25 KN (2) ACSR dog - 29.26 KN	Yes																																												
6	"W" Clip	'W' clip shall be phosphor bronze as per IS 2486 part II 1986, at least 7.9mm width and 1.5mm thickness	Yes																																												
7	Chemical Composition of Aluminum Alloy Socket ended strain clamp As per clause 8	<table style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 5%;">1</td><td style="width: 45%;">Copper</td><td style="width: 10%;">:</td><td style="width: 40%;">0.1% Max.</td></tr> <tr><td>2</td><td>Magnesium</td><td>:</td><td>0.1% Max</td></tr> <tr><td>3</td><td>Silicon</td><td>:</td><td>11 to 13%</td></tr> <tr><td>4</td><td>Iron</td><td>:</td><td>0.6% Max</td></tr> <tr><td>5</td><td>Manganese</td><td>:</td><td>0.5% Max</td></tr> <tr><td>6</td><td>Nickel</td><td>:</td><td>0.1% Max</td></tr> <tr><td>7</td><td>Zinc</td><td>:</td><td>0.1% Max</td></tr> <tr><td>8</td><td>Lead</td><td>:</td><td>0.1% Max</td></tr> <tr><td>9</td><td>Tin</td><td>:</td><td>0.05% Max</td></tr> <tr><td>10</td><td>Titanium</td><td>:</td><td>0.2% Max</td></tr> <tr><td>11</td><td>Aluminum</td><td>:</td><td>Remainder</td></tr> </table>	1	Copper	:	0.1% Max.	2	Magnesium	:	0.1% Max	3	Silicon	:	11 to 13%	4	Iron	:	0.6% Max	5	Manganese	:	0.5% Max	6	Nickel	:	0.1% Max	7	Zinc	:	0.1% Max	8	Lead	:	0.1% Max	9	Tin	:	0.05% Max	10	Titanium	:	0.2% Max	11	Aluminum	:	Remainder	Yes
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11	Aluminum	:	Remainder																																												
8	Galvanizing	All ferrous parts shall be Hot Dip Galvanized as per IS-2633/86, except item at sr. no.11 of relevant drawings, which shall be Electro-galvanized.	Yes																																												

9	Tolerance in Dimensions	Tolerance in dimensions as mentioned relevant Drawing.	Yes
10	Uniformity of Zinc Coating	4 nos. of 1-minute dips guaranteed for uniformity test.	Yes
11	Mass of Zinc coating	The mass of Zinc coating shall be 610 Grams/Mt2 (Minimum) for M.S. Straps.	Yes
12	Packing	Packing shall be in Double Gunny bags carrying 25 sets/bag.	Yes
13	Material for G.I. Cross arm strap	Cross arm strap - M.S. Flat Hot dip Galvanized	Yes
		Split Pin-Brass	Yes
		Spring washer-Electro Galvanized	Yes
		Hexagonal Bolt-Nut-Hot deep Galvanized	Yes
14	Ball clevis & socket Eye	Ball Clevis -Forged steel & Hot dip Galvanized	Yes
		Socket Eye -Forged steel & Hot dip Galvanized	Yes
		Split Pin- Brass	Yes
15	Aluminum Tensile Clamp	Aluminum Tensile clamp - Heat treated dye cast Aluminum Alloy	Yes
		Rivet, U Bolt & flat washer- Electro Galvanized	Yes
16	Ultimate Strength	45KN	Yes

**PART – ‘B’**

## ENCLOSURES:

Bidder has to enclose following documents and has to confirm for the same.

Sr. No	Particulars.	Confirmation
1	Type Test Certificate of Govt./ <b>NABL</b> approved Laboratory for the tests mentioned in clause no. <b>9</b> of Technical Specification. Name of Laboratory. : Test report. No. : Date :	Yes
2	Chemical Composition Test Certificates for Aluminum Alloy from Govt./ <b>NABL</b> approved laboratory. Name of Laboratory. : Test report. No. : Date :	Yes
3	Submission of <b>attached tender</b> drawing duly <b>signed with stamped</b> by the bidder	Yes
4	List of Plant & Machinery.	Yes
5	List of testing facility available.	Yes
6	List of order pending/executed	
	a) With GUVNL/DISCOMs.	Yes
	b) With other agencies other than GUVNL/DISCOMs.	Yes
7	<b>3 (Three)</b> Sets of samples to be sent with tender for each conductor Rabbit/Dog.	Yes/No
	For Rabbit Conductor	Yes/No
	For Dog Conductor	Yes/No

PART- 'C'

Bidder has to mention below deviation if any, quoting relevant clause of specification.

Signature and seal of Tenderer