SECTION –IV

TECHNICAL SPECIFICATION

OF

ELECTRICAL MATERIALS

Tender Notice No. NESCO Utility/ Saubhagya Material/ 17/ 18-19/13447 Dt.27.10.18

SCOPE OF MATERIALS:

Sl. No.	Name of Materials	Unit	Quantity
1	11KV 400A 3pole AB Switch(H)	Set	500
2	11KV 400A 3pole HG Fuse	Set	500
3	11KV'V' Cross arm (GI)	No	3000
4	40 mm dia. 3.0 mtr. long GI Earthing Device	No	2500

NB: 1. Bidder should be a manufacturer and copy of registration certificate to be furnished along the bid.

2. Bidders should put their authorized signature with office seal on each page of the documents.

3. Bidders should put their offer in the guaranteed particulars column furnished in the tender documents.

3. Purchaser reserves the right to increase or decrease the above quantities during placement of purchase order or may cancel without assigning any reason thereof .

TECHNICAL SPECIFICATION

TECHNICAL SPECIFICATION OF 11KV 3 POLE, 400 AMP , HORIZONTAL TYPE AB SWITCH

TECHNICAL SPECIFICATIONS FOR AB SWITCH

1. **SCOPE:-** This specification covers manufacturing testing and supply of 3 Pole, 400 AMP, 50 Hz, Single break, 11 KV class Air Break switches for outdoor installations to be used at 33/11 KV Sub-stations and for incoming & outgoing Lines suitable for operation under off load conditions.

1.1 DESCRIPTION OF THE MATERIALS:-The A.B. Switch sets shall confirm to the following parameters:-

Sl. No.	Description	Parameters of AB Switch
i)	Number of poles	3
ii)	Number of Post insulator per pole	2 nos. 12 KV class
iii)	Nominal system voltage (KV)	11
iv)	Highest System Voltage (KV)	12
v)	Rated frequency	50HZ
vI)	System earthing	Effectively earthed.
vII)	Rated nominal current Amp.	400
viii)	Altitude of installation	Not exceeding 1000 M

The post insulators used in the A.B. Switches shall have the following ratings

Sl.	Description	Parameters P.I. of AB Switches for 11 KV
i)	Power frequency withstand voltage (dry) KV (RMS)	65
ii)	Power frequency withstand voltage (wet) KV (RMS)	40
iii)	Impulse withstand voltage (dry) KV	
iv)	Power frequency puncture withstand voltage	1.3 times the actual dry flashover voltage of the unit

1.2 STANDARDS:- The AB Switch Set shall conform to the following standards:-

i) IS-9920 (Part-I to V.)

ii) IS-2544/1973 (for porcelain post insulators

iii) IS-2633 (for galvanization of ferrous parts.) or its latest amendments if any.

1.3 INSULATORS:-

12 KV class (for 11 KV AB Switches) Post Insulators complete with pedestal cap duly cemented to be used in the AB Switch Set conforming to IS-2544/1973

The bidder shall furnish the type test certificate of the post insulators from their manufacturer for reference.

The bidder shall mention make, type of insulation materials, metal fittings, Creep age distance, protected Creep age distance, tensile strength, compression strength, torsion strength and cantilever strength.

1.4 CLIMATIC CONDITIONS:-

The A.B. Switch set shall be suitable for operation under the following climatic

Conditions

1.	Maximum ambient air temperature.	45^0 C
2.	Maximum daily average air temperature	35^0 C
3.	Maximum yearly average ambient air temperature	30^0 C
4.	Maximum temperature attainable by a body exposed to the sun.	50^0 C
5.	Minimum ambient air temperature	0^0 C
6.	Maximum relative humidity.	100%
7.	Minimum number of rainy days per annum	70
8.	Average number of rainy days per annum	120
9.	Average annual rain fall.	150 cm.
10.	Number of months of tropical monsoon conditions	4
11.	Maximum wind pressure.	260 Kg./ mm^2
12.	Degree of exposure to atmospheric pollution.	Normally polluted atmosphere.

1.5 TECHNICAL DETAILS:-

1.5.1 The 11 KV A.B. Switch Set shall be gang operated single **(with double tandem pipe)** air break

outdoor type horizontal mounting having 2 nos. 12 KV post insulator per phase. The operating mechanism shall be suitable for manual operation from the ground level and shall be so designed that all the three phases shall open or close simultaneously. The Switches shall be robust in construction, easy in operation and shall be protected against over travel or straining that might adversely affect any of its parts. The required base M.S. Channel, phase coupling rod, operating rod with intermediate guide braided with flexible electrolytic copper, tail piece of required current carrying capacity and operating mechanism with _ON' & _OFF' positions shall be provided. The operating rod shall be medium gauge of 32mm diameter nominal bore G.I. pipe single piece 6 meters. The phase coupling rod for gang operation shall medium gauge 25mm dia nominal bore G.I. Pipe. Rotating post insulators shall be provided with suitable bearing mounted on a base channel with 6 mm thick thrust collar and 6mm split pin made out of stainless steel. The operating down rod shall be coupled to the spindle (minimum dia - 32mm) for gang operation through another suitable bearing by two numbers 10mm dia through stainless steel bolts with double nuts. The post insulators should be fixed with the base channel using Galvanized Nuts and Bolts.

All the bearings shall be provided with grease nipple. All ferrous parts shall be galvanized and polished. The pipes shall be galvanized in accordance with IS-4736/1968.

1.5.2 **Mounting: -** The A.B. Switches shall be suitable for horizontal mounting in all type of sub-station structures.

1.5.3 **Switching Blades**: - It shall be made out of electrolytic copper with silver plated. The approximate size shall be 250mm x 50 x 8mm for 11 KV. The switch shall have such a spring mechanism so as to ensure that the speed of the opening of contact is independent of speed of manual operation.

1.5.4 **Fixed Contacts:**- The fixed jaw type female contacts (80x50x8)mm for 11 KV shall be made of electrolytic copper (minimum 95 % copper composition) duly electroplated controlled by Stainless Steel high pressure spring housed in robust G.I. Cover.

It is essential that provision shall be made in fixed female contacts to take the shock arising from the closing of moving contact blade without the same being transmitted to the post insulator. The arrangement made in this regard shall be specifically shown in the drawing.

1.5.5 **Arcing Horn**:- As the switches are generally meant for isolating transmission line and distribution transformers, suitable arcing horns shall be provided for breaking the charging current horn shall be made of 10 mm dia G.I. Rod with spring assisted operation.

1.5.6 **Terminal Connectors**:- Terminal connectors for both movable and fixed should be of copper flats of same size similar to that of moving contact blades (minimum 95% copper composition). The fixed connector shall of size 80 mm x 50 x 8 mm and the size of movable connector shall be size 80 x 50 x 8 mm with machine finishing duly silver plated with 2 nos. of 3/8" stainless steel bolts, nuts, plain washers & spring washers should be provided along with 2 nos solder less bimetallic sockets for each connector suitable sockets for each connector suitable up to 100 mm^2 AAA conductor.

1.5.7 **Spacing**:- The minimum clearance between phase to the switch shall be 1200 mm. The operating down rod shall be at a transverse distance of 300 mm from the outer limb of the switch. The centre spacing between two post insulators of the same phase shall be 560 mm. In the open position of the A.B. Switches the moving blade shall rotate through anangle of 90^0. This shall be exhibited in the drawing.

1.5.8 **Drawing & Literatures**:- Drawings of 11 KV, 400 amp , 3 Pole, single break A.B. Switch shall be furnished along with the tender.

The details of construction and materials of different parts of the A.B. Switches shall clearly be indicated in the tender and illustrative pamphlet / literature for the same shall be submitted along with the tender.

1.6 TESTS & TEST CERTIFICATE

1.6.1 **Type Test**:- Certificates for the following type tests conducted within five years proceeding to the date of opening of tender on prototype set of A.B Switch in a Govt. Approved Testing Laboratory preferably at CPRI, Bhopal/ Bangalore shall have to be submitted for reference and scrutiny.

i. Impulse voltage dry test

ii. Power frequency voltage dry test

iii. Power frequency voltage wet test

iv. Temperature of resistance.

v. Measurement of resistance.

vi. Test to prove the capability of carrying the rated peak short circuit current and the rated short time current.

vii. Mainly active load breaking capacity test.

viii. Transformer off-load breaking test.

ix. Line charging breaking capacity test.

x. Operation tests.

xi. Mechanical endurance test.

xii. Mechanical strength test for the post insulator as per IS-2544/1973.

xiii. Test for galvanization of metal (ferrous) parts as perm IS-2633/1973.

Besides, mechanical endurance test will have to be conduct on one set in the presence of our authorized person who shall be deputed to carryout acceptance tests before delivery of the materials.

1.6.2 Routine Tests: - The following routine tests shall have to be conducted on each sets and results are to be furnished for consideration of deputing inspecting officer for inspection and conducting testing of the materials.

1. Power frequency voltage dry test
2. Measurement of resistance of main circuit
3. Tests to prove satisfactory operation.
4. Dimension check
5. Galvanization test.

1.7 GUARANTEED TECHNICAL PARTICULARS:-

The Bidder shall furnish the guaranteed technical particulars duly filled in the format at

Appendix-I along with the tender.

1.8 COMPLETENESS OF EQUIPMENT:-

Any fittings, accessories for apparatus which may not have been specifically mentioned in this specification but which are usual or necessary in equipment of similar plant shall be deemed to be included in the specification and shall be supplied by the Tender without extra charge. All plant and equipment shall be completed in all details whether such details are mentioned in the specification or not.

1.9 INSPECTION:-Routine and acceptance tests shall be conducted at the place of manufacturer. The bidder are requested to furnish details of equipment which will be used for testing along with tender. The bidder of those manufacturers who do not have adequate testing facilities for conducting routine and acceptance test are liable for cancellation. The successful bidder has to furnish routine test certificate and guaranteed certificate for approval prior to offer of materials for inspection for each consignment of offer.

The Third Party Independent Evaluation Agency (TPIEA) if required may be engaged by NESCO Utility who shall have right to conduct pre & post despatch inspection jointly with NESCO Uility / independently of the equipment / materials procured by the Purchaser.

GUARANTED TECHNICAL PERTICULARS OF 11KV 400AMP 3 POLE AB SWITCH

Slno.	Perticulars	Requirement	Bidder's Offer
1	2	3	4
1	Maker's name & Address	To be specified by the bidder	
2	Type of Switch	Rotating Type	
3	Suitable for mounting	Horizontal only	
4	No. of Breakers per phase	Single Break	
5	No. of Post Insulators per phase	2nos. of 12KV Post Insulators per phase as per IS:2544/73	
6 (a)	Post Insulators Maker's Name & Country of Manufacture of Post Insulator	Techno Ceramic / Allied Ceramic /JSI/ equivalent Type Test certificates to be provided along with the offer.	
(b)	Type of cementing	Original Cementing. The insulator to be cemented with MCI (Hot dip galvanised /Al Alloy cap and MCI/Forged steel hot deep galvanized pedestral)	
(c)	Power frequency withstand voltage (Dry)	65KV RMS	
(d)	One minute Power frequencywithstand voltage (wet)	40KV RMS	
(e)	Visible discharge voltage	9KV RMS	
(f)	Dry flash over voltage	70 KV	
(g)	Power frequency puncture withstand voltage	110KV	
(h)	Creapage distance	320 mm	
(7)	Impulse withstand voltage for positive & negative polarity (1.2/50 micro second wave)		
(a)	Across the isolating distance	85KV Peak	
(b)	To earth & between poles	75KV Peak	
8	Rated one minute Power frequency withstand voltage		
(a)	Across the Isolating distance	32KV(RMS)	
(b)	To earth & between poles	28KV(RMS)	
9(a)	Rated voltage nominal/maximum	11/12KV	
(b)	Rated normal current and rated frequency	400 Amps. 50hz	

10	Rated short-circuit making capacity	20KA (Peak)	
11	Rated Short-time current	16KA	
12	Rated peak withstand current	40KA	
13	Rated mainly active load breaking capacity	10KA	
14	Rated transformer off load breaking capacity	16.3A	
15	Rated line charging capacity	2.5A(RMS)	
16	Rated cable charging capacity	10A(RMS)	
17	Minimum clearance betweenadjacent phase		
(a)	Switch closed (center to center)	Mm	
(b)	Switch opened (Center of post insulator to the edge of the blade)	Mm	
18	Temperature rise The Temperature rise should not exceed the maximum limit to $65^{O}C$ at an ambient temperature not exceeding $40^{O}C$.	The Temperature rise of contacts & terminals are within permissible limit of $65^{0}C$ & $50^{o}C$ respectively.	
19	Vertical clearance from top of insulator cap to mounting channel.	254 mm	
20	Type of Contact: -	a) Self aligned, high pressure jaw type fixed contacts of electrolytic copper of size 80 mm x 50 mm x 8 mm duly silver plated. Each contact should be riveted with three nos. Copper rivets with a bunch (minimum 3 mm thick) consisting of copper foils, each may vary from 0.15 mm to 0.25 mm. These total thickness of copper foils per jaw should be 6 mm. Jaw assemblies are to be bolted through stainless steel bolts and nuts with stainless steel flat and spring washer.	
		b) Solid rectangular blade type moving contact of electrolytic copper size 250 mm x50 mm x 8 mm duly silver plated ensuring a minimum deposit of 10 micron of silver on copper contacts or as may be prescribed under relevant ISS / IEC.	

<table>
<tr><td></td><td></td><td>c) Pressure springs are to be used in each jaw contacts having 8nos. of turns X28mm heights X14.4mm diameter with 14 SWG wire (minimum six nos. of stainless Steel springs shall be used)</td><td></td></tr>
<tr><td>21.</td><td>Terminal connectors:</td><td>Terminal connectors for both movable and fixed should be of copper flats of same size similar to that of moving contact blades (minimum 95% copper composition). The fixed connector shall of size 80 mm x 50 x 8 mm and the size of movable connector shall be size 80 x 50 x 8 mm with machine finishing duly silver plated with 2 nos. of 3/8” stainless steel bolts, nuts, plain washers & spring washers should be provided along with 2 nos solder less bimetallic sockets for each connector suitable sockets for each connector suitable up to 100 mm² AAA conductor.</td><td></td></tr>
<tr><td>22</td><td>Terminal support</td><td>Movable terminal contact is supported by G.I. angle of size 50 X 50x5mm on each phase and the moving contact are to be bolted through 2 no stainless steel bolts and nuts with suitable stainless steel flat and spring washers.</td><td></td></tr>
<tr><td>23.</td><td>Galvanization</td><td>a) Iron parts shall be dip galvanized as per IS-2633/1972.</td><td></td></tr>
<tr><td></td><td></td><td>b) b) The pipe shall be galvanized as per IS-4736/1968.</td><td></td></tr>
<tr><td>24.</td><td>Details of Phase</td><td></td><td></td></tr>
<tr><td>a)</td><td>Coupling Rod</td><td>25 mm nominal bore G.I. pipe medium gauge.</td><td></td></tr>
<tr><td>b)</td><td>Operating Rod</td><td>ISI mark 32 mm nominal bore G.I. pipe medium gauge single length 6 mtrs. The detailed dimension of the G. I. pipe as per IS-1239 (Pt. I) as mentioned below :-</td><td></td></tr>
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<tr><td>Nominal base (mm)</td><td>Outside Diameter (mm)</td><td>Diameter thickness (mm)</td><td>Diameter thickness (mm)</td></tr>
<tr><td></td><td>Max</td><td>Min</td><td></td></tr>
<tr><td>25</td><td>34.2</td><td>33.3</td><td>3.25</td></tr>
<tr><td>32</td><td>42.9</td><td>42</td><td>3.25</td></tr>
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</td><td></td></tr>
<tr><td>(c)</td><td>Arcing Horn</td><td>10 mm dia G.I. rod with spring assisted operation</td><td></td></tr>
<tr><td>(d)</td><td>Force of fixed contact spring</td><td>30 lbs to 50 lbs</td><td></td></tr>
</table>

(e)	Copper braided flexible taps	320mm long 2no. tin coated copper braided flexible tape both end seated with cupper sheets duly punched for fixing	
(f)	Quick break device	Lever mechanism	
g)	Bearings	4 nos. self lubricated bearing to be provided with grease nipple including 4th bearing being a thrust bearing.	
h)	Locking arrangement	Pad Lock & Key arrangement at both _ON' & _OFF' position.	
i)	Earth Terminal:	To be provided at base channels.	
25.	Supporting Channels	75 x 40 x 5mm hot dip galvanized Chanel.	
26.	Weight of each pole complete	To be specified by the tender	
27	Detailed Drawing	To be provided by the bidder	

NB- Every AB Switch should bear the marking of manufacturer's name ,Purchaser's name , P.O. No., Sl. No. etc.

Name & Signature of Bidder with seal

TECHNICAL SPECIFICATION OF 11KV 3 POLE, 400 AMP , HORIZONTAL TYPE HG FUSE

1. **SCOPE:-** This specification covers the manufacture, testing, loading, transportation and delivery of 11KV, 400Amp, 3Pole H.G. Fuse Sets to be used at Sub-stations suitable for operation under off load conditions.

2. (a) The 11 KV H.G. Fuses shall be suitable for out door operation in horizontal configuration under the climatic conditions specified. It shall be of the following ratings:-

1	Number of Poles	3
2	No.of Insulator per Pole	2 nos. 12 KV post Insulators
3	Nominal system Voltage	11 KV
4	Highest System of Voltage	12 KV
5	Rated frequency	50 Hz
6	System Frequency	Effectively earthed
7	Rated normal current	200 Amps
8	Altitudes of installation	Not exceeding 1000 M.

(b) The post insulator used in the H.G. Fuse set shall have the following ratings :-

1	Power frequency withstand voltage (dry)	33 KV (RMS)
2	Power frequency withstand voltage (wet)	35 KV (RMS)
3	Impulse withstand voltage (dry)	75 KV (Peak)
4	Power frequency withstand voltage	1.3 times the actual dry flashover voltage of the unit

3. STANDARDS :-

The H.G. Fuse set shall confirm to the following standards.
IS- 5792-1973 (for high voltage expulsion fuses and similar fuses).
IS- 2544-1973, IS- 9385-1980 (for porcelain post insulators or its latest amendments if any).
IS-2633-1979 (for Galvanisation of ferrous parts).

4. INSULATOR MAKE :- 12 KV post insulator complete with pedestal cap duly cemented to be used in 11 KV H.G. Fuse sets confirming to IS-2544/1973.

5. **TECHNICAL DETAILS :-** The H.G. Fuses shall have adjustable arcing horns made of solid copper rod having 8.23 mm dia. The horns shall be fitted with screwing devices with flynuts for fixing and tightening the fuse wire. It shall have robust terminal connectors of size 80 mm x 50 mm x 8 mm made of copper casting (95 % minimum copper composition) duly silver plated with two numbers of 12 mm dia brass bolts and double nuts with flat brass washers. The connectors should be capable of connecting crimpable

conductor upto 100 Sq. mm size(ACSR/ Alloy) with bimetallic solderless sockets. The H.G Fuse Set shall suitable for horizontal mounting on sub-station structures. The minimum clearance between the adjacent phases of the fuse set shall be 760 mm and the centre to centre (distance between two post insulators of the same phase) shall be 410 mm. All metal (ferrous) parts shall be galvanized and polished. Only 12 KV post insulator (orginal cemented and not pin insulators shall be used for the H.G. Fuse Set.

6. **CLIMATIC CONDITIONS :-** The H.G. fuse set shall be suitable for operation under the following climatic conditions.:-

1	Maximum ambient air temperature	45^0 C
2	Maximum daily average air temperature	35^0 C
3	Maximum yearly average ambient air temperature	30^0 C
4	Maximum temperature attainable by a body exposed to the sun.	50^0 C
5	Minimum ambient air temperature	0^0 C
6	Maximum relative humidity	100%
7	Average number of thunderstorm days per annum	70 days
8	Average number of rainy days per annum	120
9	Average annual rain fall.	150CM
10	Number of months of tropical monsoon conditions	4
11	Maximum wind pressure	260 Kg/mm
12	Degree of exposure to atmospheric pollution.	Normally polluted atmosphere.

7. DRAWIING & LITERATURES: Two copies of drawings of 11KV, 400Amp, 3 Pole H.G. Fuse shall be furnished along with the tender for reference. The details of construction and materials of different parts of the H.G Fuse shall clearly be indicated in the tender and illustrative pamplet/ literature for the same shall be submitted along with the tender.

8. Type Test :-

Certificate for the following type tests conducted on a prototype set of HG Fuse in a NABL approved test house/CPRI shall have to be submitted along with offer.

i) Impulse voltage dry test
ii) Power frequency voltage dry test
iii) Power frequency voltage wet test
iv) Temperate of resistance.
v) Test to prove the capability of carrying the rated peak short circuit current and the rated short time current.
vi) Mainly active load braking capacity test.
vii) Transformer off-load breaking test.
viii) Line charging breaking capacity test.
ix) Operation tests.

x) Mechanical endurance test.

xi) Mechanical strength test for the post insulator as per IS:2544/1973, 5350 (Pt- II)/1970 & relevant IEC.

xii) Test for galvanization of metal (ferrous) parts as per IS- 2633/1973.

9. ROUTINE/ACEPTANCE TESTS :-

The inspection may be carried out by the Purchaser at any stage of manufacture. The successful bidder shall grant free access to the Purchaser's representative at a reasonable time when the work is in progress. The following routine tests shall have to be conducted on each set and results are to be furnished for consideration of deputing inspecting officer for inspection and conduction testing of the materials at the works of the manufacturer. the supplier shall give fifteen days advance intimationt the Purchaser to enable him to depute his representative for witnessing the tests.

i) Power frequency voltage dry test

ii) Tests to prove satisfactory operation.

iii) Dimension Check

iv) Galvanisation test.

10. **Guaranteed Technical Particulars :**

The bidders are required to furnish the guaranteed technical particulars duly filed in the proforma along with the bid.

11. **Completeness of Equipment :**

Any fittings accessories or apparatus which may not have been specifically mentioned in this specification but which are usually necessary in equipment of similar plant shall be deemed to be included in the specification and shall be supplied by the bidder without extra charge. All plant and equipment shall be complete in all details whether such details are mentioned in the specification or not.

12. **Inspection :**

Routine and acceptance test shall be conducted at the place of manufacturer. The bidders are requested to furnish details of equipments which will be used for testing along with the bid. The bids of these manufacturers who do not have adequate testing facilities for conducting routine and acceptance test are liable for cancellation. The successful bidder has to furnish routine test certificate and guarantee certificate for each consignment of materials to be inspected at the time of offer of materials for inspection.

The Third Party Independent Evaluation Agency (TPIEA) if required may be engaged by NESCO Utility who shall have right to conduct pre & post despatch inspection jointly with NESCO Uility / independently of the equipment / materials procured by the Purchaser.

GUARANTEED TECHNICAL PARTICULARS OF 11 KV 400Amp. 3 pole HG Fuse

Sl. No	Particulars	Requirement	Bidders offer
		11 KV 400 Amps. 3 pole H.G Fuse.	
1	Maker's name & Address	To be specified by the bidder	
2	Operating voltage	11 KV	
3	No. of Post Insulators per phase	2 nos. of 12 KV Post Insulators per phase as per ISS:2544/1973	
4	Suitable for mounting	Horizontal	
5	Rated normal current & normal frequency	400 Amp., 50 Hz	
6	Vertical clearance from the top of insulator to mounting channel	254 mm (minimum)	
7	Height of the riser for carrying the horn.	150 mm from the cap top of insulator	
8 (a)	**Post Insulators :** Maker's Name & Country of Manufacture of Post Insulator	To be specified by the bidder (as per CPRI Test Report).	
(b)	Type of cementing	Original Cementing only as per IS: 2544/1973 & relevant IEC.	
(c)	1 minute Power frequency withstand voltage (Dry)	45KV RMS	
(d)	1 minute Power frequency withstand voltage (wet)	35KV RMS	
(e)	Visible discharge voltage	9KV RMS	
(f)	Dry flash over voltage	85 KV RMS	
(g)	Power frequency puncture withstand voltage	1.3 times of actual dry flash over voltage (110 KV) .	
(h)	Creapage distance	320 mm (minimum). Actual creepage distance for which type test has been conducted is to be supplied.	
9.	Impulse withstand voltage for positive & negative polarity (1.2/50 micro second wave)		
(a)	Across the isolating distance	85KV (Peak)	
(b)	To earth & between poles	75KV (Peak)	
10.	One minute Power frequency		
(a)	Across the Isolating distance	32KV(RMS)	
(b)	To earth & between poles	28KV(RMS)	

11	Details of Arcing Horn	8.32 mm dia. solid copper rod silver plated provided with screwing arrangement on the fuse carrier made of copper casting for fixing fuse wire (Total length -635 mm). All the bolts, Nuts and washers should be made out of Brass.	
12	Riser Unit (150 mm height total)	a) Riser cum Connector made out of copper flat (with minimum 95% copper composition having riser size (80 mm height x30mm width x8 mm thickness) and connector of size (80 mmx50mmx 8mm) duly silver plated and machine finishing provided with 2 nos.12 mm dia. brass bolts and double brass nuts with flat brass washers and 2 nos. solderless bimetallic socket per each connector suitable upto 100 mm^2 conductor.	
		b) 100 mm height G.I Riser made of 19 mm nominal bore medium gauge G.I pipe welded with 2 nos. of G.I flat of 30mmx5mm of both ends fixed with 10mm dia. stainless steel bolts and nuts with flat & stainless steel spring washer.	
13.	Galvanization	a) All ferrous parts shall be hot-dipped Galvanized as per IS.2633/1972 (Latest Amendment) , IS :2629/1985 (1^{st}. Revision),& all non-ferrous parts shouldbe duly electroplated with silver.	
14	Supporting Channel	75mmx40mmx6mm M.S.Channel. (Hot dip galvanized)	
15	Weight of each pole	16 Kg (Approx.)To be specified by the Bidder	
16	Detailed drawing submitted ?	To be provided by bidders	
N.B	i) Ferrous parts shall be duly galvanized as per IS :2629/1985(1^{st}. Revision), (Amendment-2) and non-ferrous parts shall be silver plated.		
	ii) Certificate from a Government approved laboratory(NABL accredited) regarding composition of copper in electrolytic copper casting of materials should be submitted during inspection of materials at the cost of Bidder.		
	iii) Type Test Certificate : The type test certificate , conducted within five years , preceding to date of opening of the tender from Govt. testing laboratory (NABL accredited / CPRI) shall be furnished.		

Name & Signature of Bidder with seal

TECHNICAL SPECIFICATIONS OF 11 KV "V" CROSS ARM

6.0.1 Qualifying Criteria :-

The prospective bidder may source the above items from manufacturers /suppliers full filling the technical specification.

Hot Dip Galvanised 'V' Cross arms 11KV construction at intermediate and light angle pole shall be fabricated from grade 43A mild steel of channel section and for heavy angle poles, end poles and section poles fabricated from grade 43A mild steel of angle section. The grades of structural steel shall conform to IS – 226: 1975.

Except where otherwise indicated all dimensions are subject to the following tolerances: dimensions up to and including 50mm:+1mm: and dimensions greater than 50mm: +2%

All steel members and other parts of fabricated material as delivered shall be free of warps, local deformation, unauthorized splices, or unauthorized bends. Bending of flat strap shall be carried out cold. Straightening shall be carried out by pressure and not by hammering.

Straightness is of particular importance if the alignment of bolt holes along a member is referred to its edges.

Holes and other provisions for field assembly shall be properly marked and cross referenced. Where required, either by notations on the drawing or by the necessity of proper identification and fittings for field assembly, the connection shall be match marked. A tolerance of not more than 1mm shall be permitted in the distance between the center lines of bolt holes.

The holes may be either drilled or punched and, unless otherwise stated, shall be not more than 2mm greater in diameter than the bolts. When assembling the components force may be used to bring the bolt holes together (provided neither members nor holes are thereby distorted) but all

force must be removed before the bolt is inserted. Otherwise strain shall be deemed to be present and the structure may be rejected even though it may be, in all other respects, in conformity with the specification.

The back of the inner angle irons of lap joints shall be chamfered and the ends of the members cut where necessary and such other measures taken as will ensure that all members can be bolted together without strain or distortion. In particular, steps shall be taken to relieve stress in cold worked steel so as to prevent the onset of embitterment during galvanizing.

Similar parts shall be interchangeable.

Shapes and plates shall be fabricated and assembled in the shop to the greatest extent practicable. Shearing flame cutting and chipping shall be done carefully, neatly and accurately. Holes shall be cut, drilled or punched at right angles to the surface and shall not be made or enlarged by burning. Holes shall be clean-cut without torn or ragged edges, and burrs resulting from drilling or reaming operations shall be removed with the proper tool.

Shapes and plates shall be fabricated to the tolerance that will permit field erection within tolerance, except as otherwise specified. All fabrication shall be carried out in a neat and workmanlike manner so as to facilitate cleaning, painting, galvanizing and inspection and to avoid areas in which water and other matter can lodge.

Contact surfaces at all connections shall be free of loose scale, dirt, burrs, oil and other foreign materials that might prevent solid seating of the parts.

6.0.2 Fabrication has to be made as per drg. of „ V „ X-arm .

GALVANISING

All type of cross arms back clamps, F clamps & stay clamps shall be hot dip galvanized, are as following:
All galvanizing shall be carried out by the hot dip process, in accordance with Specification IS 2629. However, high tensile steel nuts, bolts and spring washer shall be electro galvanized to Service Condition 4. The zinc coating (610 gms per sq.mt) shall be smooth, continuous and uniform. It shall be free from acid spot and shall not scale, blister or be removable by handling or packing.

There shall be no impurities in the zinc or additives to the galvanic bath which could have a detrimental effect on the durability of the zinc coating.
Before picking, all welding, drilling, cutting, grinding and other finishing operations must be completed and all grease, paints, varnish, oil, welding slag and other foreign matter completely removed.
All protuberances which would affect the life of galvanizing shall also be removed.

The weight of zinc deposited shall be in accordance with that stated in Standard IS 2629 and shall not less than 0.61kg/m^2 with a minimum thickness of 86 microns for items of thickness more than 5mm, 0.46kg/m^2 (64 microns) for items of thickness between 2mm and 5mm and 0.33kg/m^2 (47 microns) for items less than 2mm thick.

Parts shall not be galvanized if their shapes are such that the pickling solutions cannot be removed with certainty or if galvanizing would be unsatisfactory or if their mechanical strength would be reduced. Surfaces in contact with oil shall not be galvanized unless they are subsequently coated with an oil resistant varnish or paint.

In the event of damage to the galvanizing the method used for repair shall be subject to the approval of the Engineer in Charge or that of his representative.

In no case the repair of galvanisation on site will be permitted.

The threads of all galvanized bolts and screwed rods shall be cleared of spelter by spinning or

brushing. A die shall not be used for cleaning the threads unless specifically approved by the Engineer in Charge. All nuts shall be galvanized. The threads of nuts shall be cleaned with a tap and the threads oiled.

Partial immersion of the work shall not be permitted and the galvanizing tank must therefore be sufficiently large to permit galvanizing to be carried out by one immersion.

After galvanizing no drilling or welding shall be performed on the galvanized parts of the equipment excepting that nuts may be threaded after galvanizing. To avoid the formation of white rust galvanized materials shall be stacked during transport and stored in such a manner as to permit adequate ventilation. Sodium dichromate treatment shall be provided to avoid formation of white rust after hot dip galvanization.
The galvanized steel shall be subjected to test as per IS-2633.

6.0.3 *11 KV V Cross Arm (GI) :*

The Cross arm is to be made out of ISMC 75x40 with 50mmx6mm flat packing on top & bottom flange of the channel where the insulator pin is to be mounted conforming to REC construction standard & drawing . Galvanized the V cross arm as per IS-2633/1972.(Latest Amendment) , IS :2629/1985 (1^{st}. Revision).

Guaranteed Technical Particulars of 11KV 'V' Cross Arm

Sl. No.	Description	Specified	Bidders Offer
1	Type of Cross Arm	ISMC 75x40	
2	Channel Weight	7.14 Kg/mtr	
3	Grade of Steel	FY 250	
4	Steel Standard	IS:2062-1992	
5	Fabrication Standard	IS:802 (part - 2) - 1978	
6	Dimension	(75x40x4.8)mm	
7	Size of M S Flat welded at both ends	50x8mm	
8	Steel Tensile Strength	1500kgf/cm²	
9	Working Load	200/300/350/400Kg	
10	Total Weight (with tolerance per meter $\pm$ 4%)	11.2 Kg (approx.)	

Signature of the bidder with Seal

TECHNICAL SPECIFICATION OF 40 MM DIA.GI EARTHING DEVICE:

1. **Scope :-**

This specification provides for design, manufacturing, testing before dispatch, supply & delivery of Earthing Device (Heavy Duty) (for use in Sub-station earthing).

2. **APPLICABLE STANDARDS** :-

The Earthing Device must be made out of 40 mm nominal Bore & 3.2 mm (Medium Gauge- No minus Tolerance allowed) wall thickness Hot Dip G.I. Pipe (as per IS ;- 1239,m Part-1, 1990 & REC construction Standard –J-2) , ISI marked of reputed Make & 3 mtrs length tapered finished smooth at one end for a length of 75 mm & Clamp at the other end.

Staggered drills hole of 12 mm Dia of interval of 150mm shall be made before galvanization.

The GI Earthing Clamp/ Strip (C- Clamp Type) is to be of 50mm width, 6mm thickness & flange length of 65 mm in each side. This should be suitable for termination of 4 nos of GI Flat earth electrodes. The Clamp/ Strip & Earthing pipe after fabrication will be hot dip galvanized confirming to IS: 2629/85 with latest amendments. The clamp shall have two holes in both sides suitable for 5/8 x 2" Bolt & provided with two GI bolts& Nuts in each side of 12mm dia 50mm long half threaded with spring washer as per IS: 3043/1982.The galvanization tests are to be conducted as per IS: 2633/72 & IS: 6745/72 & its latest amendments.

Guaranteed Technical Particulars of Earthing Device

(To be submitted along with Offer)

	Pariculars	Bidder's Offer
1.	Location of Factory or Place of Manufacture	
2.	Maker's Name, Address & Country	
3.	Size of	
a	Pipe 40 mm dia. (ISI Marked)	
b	Earthing Strips	
4.	Length (3 mtr. long)	
5.	Thickness of Pipe	
6.	Galvanization Process	
7.	Galvanization thickness	
a	For Earthing device	
b	For Connecting Flat	
8.	Galavanization tests to be conducted as per ISS	
9.	Any other Particulars (like details of Clamp/ G.I. Bolts)	
10.	Details of Drawings submitted	

Name & Signature of Bidder with seal