SUPPLY CHAIN MANAGEMENT

THIRUVANANTHAPURAM

SPECIFICATION

11 kV and 33 kV station class Polymer type Lightning Arrester

APPLICABLE TO KSEBL	**Rev#0**	DOC. NO.: **SCM-SPEC/XM/33kV LA**
		EFF. DATE: **31/03/2021**

Number of Pages: 30

Technical Specification and Evaluation Committee for Transmission Material

(i) Document Approval & Control Status

	Compiled by	Verified by	Approved by
Name	**Smt.Sindhu.P**	**Smt.Geetha.M**	**Mr. Sanal Kumar K**
Position	Assistant Executive Engineer (Supply Chain Management)	Executive Engineer (Supply Chain Management)	Chief Engineer (Supply Chain Management)
Date	16/04/2021	16/04/2021	16/04/2021
Signature	Sd/-	Sd/-	Sd/-

(ii) Amendments and History

Sec. #	*Rev. #*	*Date*	*History of Change*

1. PURPOSE:

Purpose of this document is to document updates & history, upkeep and publish the specifications related to **11 kV and 33 kV station class Polymer type Lightning Arrester** in a professional manner

2. SCOPE:

The Scope of this document is to inform and alert all relevant stakeholders including KSEBL. Public, KSERC etc regarding the current specifications and historical changes adopted in specifications of **11 kV and 33 kV station class Polymer type Lightning Arrester** used in field by KSEBL

3. RESPONSIBILITY:

The Executive Engineer (M), Office of Chief Engineer, Supply Chain Management shall compile and take necessary steps to publish the specification in KSEBL website and shall inform relevant stakeholders regarding updates and revisions

4. PROCEDURE FOR REVISION:

Modifications if any, in the technical specification will be incorporated as **Revisions.** Any changes in values, minor corrections in pages, incorporation of small details etc. will be considered as Minor Modification. **The Revisions due to minor modifications will be assigned as Rev. No.0.1, 0.2 etc.**

A complete updation of the technical specification will be considered as Major modification. **The Revisions due to major modifications will be assigned as Rev. No.1.0, 2.0 etc.**

All the details of regarding the revisions (both minor and major) will be incorporated in **"(ii)-Amendments and history"** above.

The concerned officers, in consultation with the Technical Committee will review and suggest changes required and the revision suggestion will be approved by **Chief Engineer (SCM).** Those who notice any discrepancy or have any suggestion regarding revision, may bring the matter to the attention of Chief Engineer (SCM) in writing or through e-mail id:**cescm@kseb.in**

CONTENTS

Technical specification of 11 KV and 33 KV station class Polymer type Lightning Arrester

1.1 SCOPE:-

1.2 This specification provides for the design, engineering, manufacture, assembly, stage testing, inspection and testing before dispatch, packing, forwarding and delivery at site of Metal Oxide (gapless), 30 kV & 10kV, 10 kA **Station Class II**polymer housed Surge Arrestors complete with discharge counter, insulating base and other accessories for all rating arresters except 10 kV surge arrester as specifiedhereunder.

1.3 It is not the intent to specify completely herein all the details of design and construction of Surge Arrestors. However, Surge Arrestors shall conform in all respects to the high Standard of design and workmanship and be capable of performing in continuous commercial operation upto Bidder's guarantee in a manner acceptable to Purchaser. The Arrestors offered shall be complete with all parts, necessary for their effective and trouble free operation. Such components shall be deemed to be within the scope of supply, irrespective of whether they are specifically brought out in the commercial order ornot.

2.1 STANDARDS:

2.2 The Surge Arrestors shall conform to the latest editions and amendments available at the time of supply, of the standards listedhereunder.

Sl. No.	**Standard Ref. No. (with latest amendments)**	**Title**
1.	IEC:60099-4 **edn 3**	Specification Part-4 for Surge Arrestors without gap for AC system
2.	IS 15086-PART 4	Specification for Lightning Arrestors for alternating current system.
3.	IS: 2629	Recommended practice hot dip galvanizing of iron and steel
4.	IS: 2633	Method for testing uniformity of Coating on zinc coated articles

5.	IS: 2147	Degree of protection provided by enclosures for low voltage Switchgear and control
6.	Safety	Indian Electricity Rules, 1956
7.	IEC 61462	Composite hollow insulators - Pressurized and unpressurized insulators for use in electrical equipment with rated voltage greater than 1 000 V - Definitions, test methods, acceptance criteria and design recommendations
8.	IEC-60815	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions. The rain sheds / petticoats shall be of ***polymeric material and shall confirm to IEC 60815***
9.	IEC-60270	Partial discharge measurement
10.	IEC-60-1	High voltage test techniques
11.	IEC-270-2	Insulation coordination

Note:

i) For the purpose of this specification all technical terms used hereinafter shall have the meaning as per IEC/ISSspecification.

ii) For the parameters of the Arrestor which are not specified in IEC specification for Surge Arrestors, the provisions of IS 15086-PART 4 shall beapplicable.

Surge Arrestors meeting with the requirements of other authoritative standards, which ensure equal or better quality than the standards mentioned above shall also be acceptable. Where the equipment offered by the Bidder conforms to other standards, salient points of difference between the standards adopted and the

specified standards shall be clearly brought out in the offer. Four (4) copies of the reference standards in English language shall be furnished along with the offer.

3.1. **CLIMATIC CONDITIONS:** The equipment is required to operate satisfactorily under the following site condition:

i)	Temperature a) Maximum in air under hotsun b) Minimum	 $50^{o}C$ $15^{o}C$
ii)	Relative Humidity a) Maximum b) Minimum	 100% 26%
iii)	Isocerounic level	45
iv)	Approx. no. of rainy days/year	180 days nearly
v)	Average rain fall/year	3000 mm
vi)	Altitude above mean sea level	Below 1000 meters
vii)	Max. wind pressure	130 Kg./m^2
viii)	Average number of dust storm days per annum	50
ix)	Seismic level- Horizontal acceleration	0.5g

The reference ambient temperature may be taken as $50^{o}C$.

3.2) **AUXILIARY POWER SUPPLY:- (applicable above 33kV):-** The equipment offered under this specification shall be suitable for the following auxiliary power supplies.

a)	Power Devices (like drive motors)	-415V, 3 Phase, 4 wire 50 Hz, neutral grounded AC supply

b)	AC Control and protective devices, lighting fixtures, space heaters	-240V, single space, 2 wire 50 Hz, neutral grounded AC supply
c)	DC alarm, control and protectivedevices	-110V, DC 2-Wire

Each of the foregoing supplies shall be made available by the Purchaser at the terminal point for each equipment for operation of accessories and auxiliary equipment. Bidder's scope shall include supply of interconnecting cables, terminal boxes, etc., The above supply voltages may vary as below and all devices shall be suitable for continuous operation over entire range of voltages.

i) ACSupply - voltage+10%&-15% frequency ± 5%

ii) DC Supply - 15% to +10%

4.0) SYSTEM PARAMETERS:-The Surge Arrestors offered under this specification shall conform to the parameters given below:

Sl.No	Particulars	System Voltage (kV (rms)	
1)	Nominal system voltage	33	11
2)	Highest system voltage	36	12
3)	1.2/50 microsecond impulse voltage withstand level		
a)	Transformer & reactors(kVp)	170	75
b)	Other equipment's andLines	170	75
4)	Minimum prospective symmetrical fault current for 1 second at Arrestor location (kA rms)	31.5	18.4
5)	Anticipated levels of Temporary over voltage and its duration		
a)	Voltage(p.u.)	1.5/1.2	1.5/1.2

b)	Duration(Seconds)	01/10/20	01/10/20
6)	System frequency(Hz)	50 ± 2.5 C/S	50 ± 2.5 C/S
7)	Neutral Grounding	Effectively earthed	Effectively earthed
8)	No. Phases	3	3

5.1 GENERAL TECHNICALREQUIREMENTS:

5.2 The Surge Arrestors shall conform to the technical requirements as perAnnexure-II

5.3 The energy handling capability of each rating of Arrestor offered, supported by calculations, shall be furnished in theoffer.

5.4 The grading ring on each complete Arrestor for proper stress distribution shall be provided if required for attaining all the relevant technicalparameters. (Applicable for Surge arresters above 33kV)

5.5 PROTECTIVELEVELS:- The basic insulation levels and switching impulse withstand levels of the lines and equipment to be protected, have been specified in clause 4.0, "Principal Parameters". The protective characteristics of the Arrestors offered shall be clearly specified in the schedule of guaranteed technical particulars.

5.6 GENERALREQUIREMENTS:

5.6.1 The materials and components not specifically stated in this specification but which are necessary for satisfactory operation of the equipment are deemed to be included in the scope of supply unless specificallyexcluded.

5.6.2 Unless otherwise brought out separately by the Bidder in the schedule of deviations the Surge Arrestors offered shall conform tothe specification scrupulously. All deviations from the specification shall be brought out in the schedule of deviations. The discrepancies between the specification and the catalogues or literature submitted as part of the offer shall not be considered as valid deviations unless specifically brought out in the schedule ofdeviations.

5.6.3 Any deviation which has not been specifically brought out in the schedule of deviations of the Bid Proposal Sheets, shall not be given effect to. The deviations brought out in the schedule shall be supported by authentic documents, standards and otherreferences.

5.6.4 The Surge Arrestors shall be suitable for hot linewashing.

5.6.5 DUTY REQUIREMENTS:- The surge arresters shall be capable of discharging over voltages occurring due to switching on unloaded transformer, reactors and long lines. **The arrester**

should have Repetitive Charge transfer withstand (1.1 * Qrs) of 1.32 Coulombs and thermal energy rating (Wth) 4.5 kJ/kV.

5.7 CONSTRUCTION:

5.7.1 All the units of Arrestors of same rating shall be inter- changeable without adversely affecting theperformance.

5.7.2 The Surge Arrestors shall be suitable for pedestal typemounting & mounting with suitable Insulating bracket.

5.7.3 **Fittings and accessories:-** Surge arresters should be supplied with suitable mounting bracket made of SMC. Surge arrester should be provided with terminal connector suitable for through connection / vertical / horizontal take-off.

5.7.4 All the necessary flanges, bolts, nuts, clamps etc., required for assembly of complete Arrestor with accessories including line terminals connection (galvanized) and mounting on **support structure** (**applicable to 33 kV only**) to be supplied by the Purchaser, shall be included in Bidder's scope of supply. The lightning arrestor shall be suitable for pedestal mounting/mounting with suitable insulating bracket on steel structures. Supporting structure shall be suitable to ensure the minimum working clearance as per IS. The minimum height shall not be less than **3700mm** from groundand steel structure should meet the required ASTMstandard. (Refer standard tender drawing for structure). The drilling details for mounting the Arrestor on Purchaser's support shall be supplied by the Supplier.

5.7.5 The minimum permissible separation between the Surge Arrestor and any earthed object shall be indicated by the Bidder in his offer.

5.7.6 **The end fittings shall be non-magnetic and of corrosion proof material.** ***The end fittings used in polymer arrester shall be made from aluminum through machining process/pressure die-casting process. Sand casted and gravity casted end fittings are not acceptable due to poor microstructure and porosity issues.***

5.7.7 ***MOV blocks shall have full metalization to have full face contact and to reduce contact resistance between adjacent discs.***

5.8 PolymerHousing:

5.8.1 Polymer housing material shall be silicon rubber. Polymer Rubber housing shall be free from lamination cavities or other flaws affecting the maximum level of mechanical and electrical strengths. Properties of the polymeric materials shall be specified in the offer and test reports for the same from a NABL accredited GOI/ State Government

laboratory/CPRI/ERDA shall be submitted for approval of the purchaser. The polymer material used for arrester housing must have resistant to tracking & erosion, and stabilized against UVradiation.

5.8.2 The surge arrester shall not fail due to housing contamination. ***TERT (Tracking & Erosion resistance test) Test shall be carried out on the material used for housing as per ASTM D 2303 and test report shall be submitted.***

5.8.3 ***Polymeric housing shall be made of Silicone:-*** The rain sheds / petticoats shall be of ***polymeric material and shall confirm to IEC 60815***

5.8.4 Deleted.

5.8.5 Deleted.

5.8.6 The rain sheds / petticoats shall be of polymeric material and shall confirm to the properties and type test reports shall be submitted and shall not be pre-moulded push on type or slip on type. The adhesion between the polymeric housing and the metal oxide resistors or any other metallic or non-metallic parts inside the housing must be strong enough, homogeneous, robust and resistant to thermal cycles and environmental stresses.

5.8.7 Polymer bounding to the core shall be effectively maintained even when surge arrestor discharges rated surgecurrent.

5.8.8 The Polymer weather shed design shall be preferably of self-cleaning type (Aero foil design.) The details of the Polymer housing shed profile such as distance, angle of inclination, gap between the shed, diameter(ID and OD) etc. shall be as per relevant standard and shall be indicated by the Bidder in his offer in the form, during detaileddrawing.

5.9 GALVANISATION, NICKEL PLATINGETC.:

5.9.1 All ferrous parts exposed to atmosphere shall be hot dip galvanised as per IS: 2629 as amended from time to time. Tinned copper/brass lugs shall be used for internal wiring of discharge counter. Screws used for electrical connections shall be either made of brass or nickelplated.

5.9.2 Ground terminal pads and name plate brackets shall be hot dipgalvanized.

5.9.3 The material shall be galvanized only after completing all shopoperations.

5.10 ACCESSORIES ANDFITTINGS:

5.10.1 Discharge counters shall be provided for the Arrestors except for the 11kV arresters. The discharge counter shall be provided with mille-ammeter (0-5mA) for measuring the leakage

current and shall not require any DC or AC Aux. supply. It shall be suitable for outdoor use. The installation of discharge counter shall not adversely affect the Arrestorperformance.

5.10.2 The discharge counter shall register operation whenever lightning or any other type of surge strikes the SurgeArrestor.

5.10.3 All necessary accessories and earthing connection leads between the bottom of the Arrestor and the discharge counter shall be in the Bidder's scope of supply. The connecting lead between discharge counter and Surge Arrestor shall be of copper flexible tape of size 25x4 mm and minimum of 1.5 meter length. The discharge counter shall be so designed thatthe readings of discharges recorded by the counter and the readings of mille-ammeter shall be clearly visible through an inspection window to a person standing on ground. The minimum height of Purchaser's support shall be 2.5M. Terminal connector conforming to IS: 5561 for (11kV & 33kV) shall be supplied along with thearrestor.

5.11 Each Surge Counter shall have terminals of robust construction for connection to Earthing lead and these shall be suitably arranged so as to enable the incoming and outgoing connections to be made with minimumbends.

Suitable grounding terminal shall be provided for earthing of surge arrestors up to water level. Proper functioning of the Surge counter with Surge Arrestor shall be ensured by the Supplier.

5.12 **NAMEPLATE:-** The arrestor shall be provided with non-corrosive legible name plate indelibly marked with the following information:

1. Manufacturer's name or trade mark and identification no. of the Arrestor being supplied. Ratedvoltage.
2. Purchase Order Number.
3. Maximum continuous operatingvoltage.
4. Type.
5. RatedFrequency.
6. Nominal dischargecurrent.
7. Long duration dischargeclass.
8. Year ofmanufacture.

6.0. TESTS:

6.1.1 **TypeTest:-** All the Lightning Arrester offered shall be fully type tested as per IEC: 60099-4 **ed 3.0** at the Government approved / NABL laboratory of the eligible county or independent

internationally recognized testing laboratory. The Bidder shall furnish one set of the type test reports for the Lighting Arrester of the type and Design offered by him along with the offer. The Type Test report shall not be older than 10 (Ten) years and shall be valid up to the expiry of validity of offer, otherwise the offer will not beconsidered.

The surge arrester should be short circuit tested for 40kA & 600A as per requirement of IEC 60099-4. The Surge Arrester Offered should be of same model as used for short circuit test.

The following type test reports shall be submitted with the technical bid.

1. Residual Voltage test
2. Test to verify repetitive charge transfer rating Qrs
3. Operating duty test
4. Insulation withstand test of housing
5. Power frequency voltage vs time characteristic
6. High current short circuit test 20kA
7. Low current short circuit test 600A
8. Long term stability under continuous operating voltage
9. Weather aging test on full arrester 1000 hrs
10. Bending moment test.
11. All applicable test on silicon rubber as per statndard IEC-1462 and TERT (Tracking & Erosion Resistance Test) as per ASTM D 2303.

6.1.2 ACCEPTANCE/SAMPLE ACCEPTANCE AND ROUTINETESTS:- All acceptance and routine tests as stipulated in the relevant standards shall be carried out by the supplier in presence of Purchaser's representative below tests shall be repeated at factory for accepting the product.

The following acceptance tests shall be carried out in presence of KSEBLrepresentative:-

List of Acceptance test reports

1. Lightning Impulse residual voltage test on complete arrester/ unit of arrester
2. Reference voltagetest
3. Leakage checktest
4. Partial dischargetest
5. Visual / Dimensionalcheck

6. Functional (operational) tests on surge monitor/counter at nominal is chargecurrents
   (a) 100 Amps with 8/20 microsecond waveshape.
   (b) 10/20 KA with 8/20 microsecond waveshape.

7. Peel off test (removal of housing) shall be performed on 3 random samples from supplied lot to confirm cage design.

8. Galvanization test on metal parts.

9. Water immersion test for a duration of 24hrs, to check the water penetration, on any one randomly selected sample from every 50(fifty) or below nos. of LA offered for inspection, shall be carried out and report shall be submitted.

6.1.3 Acceptance tests, whenever possible shall be conducted on the complete arrester unit. The number of samples to be subjected toacceptance tests shall be decided by the purchaser at the time of actualtesting

The following routine test reports shall be submitted.

List of Routine test reports

1. Measurement of referencevoltage
2. Lightning Impulse Residual voltagetest
3. Partial dischargetest
4. Tests on dischargecounter
5. Visual / Dimensionalcheck

6.4 SURGEMONITOR:- The following routine test shall be performed in the presence of KSEBL's representative:

i) Tests for satisfactory operation of surge counter while dischargingsurges.

ii) Test for correctness of leakage current meter before and after the passageofsurges.

Iii) Visual examinationtests.

7.0) INSPECTION:-

7.1) The inspection may be carried out by the KSEBL at any stage of manufacture. The successful Bidder shall grant free access to the KSEBL's representative at all times to the works and all other places of manufacture, where equipment are being manufactured and the Contractor shall provide all facilities without extra charges, for unrestricted inspection of the Contractor's works, raw materials, manufacture of the equipment., all the accessories and for conducting necessary test as detailedherein.

7.2) The Contractor shall keep the KSEBL informed in advance, about the manufacturing program so that arrangement can be made forinspection.

7.3) No material shall be dispatched from its point of manufacture unless the material has been satisfactorily inspected andtested.

7.4) The KSEBL reserves the right to insist for witnessing the acceptance/routine testing of the bought outitems.

7.5) The Contractor shall submit their internal inspection report containing manufacturer's test certificates before offering the material forinspection.

7.6) The acceptance of any quantity of equipment shall in no way relieve the Contractor of his responsibility for meeting all the requirements of this specification and shall not prevent subsequent rejection if such equipment are later found to bedefective.

8.0) **DRAWINGS:-**

8.1) The supplier shall within four weeks from the date of order, submit four sets of final versions of following drawings along with soft copy for purchaser's approval.

List of Drawing:-

i) General outline drawings of the complete Arrestors with technical parameters.

ii) Drawing showing clearance from grounded and other live objects and between adjacent poles of Surge Arrestors, required at various heights of Surge Arrestors.

iii) Drawings showing details of pressure relief devices.

iv) Detailed drawing of discharge counters along with the wiring and schematic drawing of discharge counter and meter.

v) Outline drawing of insulating base.

vi) Details of grading rings, if used.

vii) Mounting details of Surge Arrestors.

viii) Details of line terminal and ground terminals.

ix) Volt-time characteristics of Surge Arrestors.

x) Details of galvanizing being provided on different ferrous parts.

xi) The detailed dimensional drawing of polymer housing such as ID, OD, thickness and insulatordetailssuchheight,profileofpetticoats,angleofinclinationandgap between successive petticoats, total Creepage distanceetc.,

8.2) The bidder shall submit four sets of final versions of complete and correct equipment drawings for Purchaser's approval along with bid in a sealed envelope. The Purchaser shall communicate his comments/approval on the drawings to the Supplier within 15 days from the date of issue of P.O. The submission of complete and correct readable drawings for approval is the responsibility of the bidder/supplier. The Supplier shall, if so required by the purchaser, modify the drawings and resubmit four copies of the modified drawings for Purchaser's approval within two weeks from the date of Purchaser's comments.

8.3) The successful Bidder shall also supply one set of all the approved drawings and instruction manual containing handling, installation, testing and commissioning, operation and maintenance of the equipment at the time of dispatch of material to consignee with each equipment for our field staff. In addition, 5 sets of such bound manuals and final approved drawings shall be supplied for reference and record in our design office.

One set of all the approved drawings and manual of instructions will be supplied with every unit (3No unit) and without which the supply will not be considered as complete supply.

8.4) I) Two copies of acceptance test reports shall be furnished to the Purchaser. One copy will be issued to store for acceptance.

ii)All records of routine test reports shall be maintained by the Supplier athis works for periodic inspection by the Purchaser.

9.0) Marking:- Each Unit shall legibly and indelibly be marked to show the following.

I) Name or Trade Mark of the Manufacture.

ii) Month and Year of Manufacture.

Iii) Country of manufacture.

10.0) PACKING AND FORWARDING:-

10.1) The material shall be packed in crates suitable to withstand handling during transport and outdoor storage during transit. The supplier shall be responsible for any damage to the material during transit, due to improper and inadequate packing. The easily damageable material shall be carefully packed and marked with the appropriate caution symbols. Wherever necessary, proper arrangement for lifting, such as lifting hooks etc. shall be provided. Any material found short inside the packing cases shall be supplied by supplier without any extra cost.

10.2) Each consignment shall be accompanied by a detailed packing list containing the following information:-

1) Name of the consignee.

2) Details of the consignment.

3) Destination.

4) Total weight of consignment.

5) Sign showing upper/lower side of the crate.

6) Handling and unpacking instructions.

7) Bill of material indicating contents of each package.

NOTE:- In case the equipment offered by the Supplier does not meet with the requirement of technical specification the offer of the Firm shall not be considered.

Sd/-

Chief Engineer (SCM)

TECHNICAL REQUIREMENTS FOR METAL OXIDE (GAPLESS) SURGE ARRESTORS

SL.No	Particulars	Required parameters (System of Voltages)	
		33kV	11 kV
1	Rated Arrestor Voltage		
2	M.C.O.V. (kV rms)		
3	Installation		
4	Class		
5	Typeofconstruction for 10 kA ratedArrestor.		
6	Nominal discharge current corresponding to 8/20 micro sec wave shape (kA rms)		
7	Minimum discharge capacity		
8	Type of mounting		
9	Connection (Between phase to earth P/E) (Between phase to phase P/P)		
10	Long duration discharge class		
11	Max. Switching Surge kV(P) Protective level voltage at 1000 Amp		
12	Max. residual voltage kV(P) for nominal discharge current 10 KA with 8/20 micro second wave		
13	Max. Residual voltage kV (P) steep fronted current impulse of 10 KA.		
14	Minimum pros symmetrical fault current for pressure relief test (kA rms)		

15	Terminal connector		
16	Take off		
17	Voltage (KV rms) -corona		
18	Maximum radio interference voltage (Microvolt) when energised at MCOV		
19	Whether insulating base and discharge counter with milli - ammeter are required.		
20	Minimum Creepage distance of Arrestor housing (mm)		

Sd/-

Chief Engineer (SCM)

SCHEDULE OF GUARANTEED AND TECHNICAL PARTICULARS OF 33KV & SUPPORTING STRUCTURE

FOR 33KV LA & 11KV LIGHTNING ARRESTERS

Sl. No.	Description	33kV LA & SS
1)	Name of Manufacturer	
2)	(a) Type and designation number	
	(b) Whether heavy duty or not	
3)	Model	
4)	Applicable IS/ IEC Reference	
5)	No. of units per Arrester	
6)	Rated voltage (kV)	
7)	Continuous operating voltage (kV)	
8)	Installation	
9)	Arrestor construction	
10)	Nominal discharge current 8/20 micro second wave)KA	
11)	Repetitive Charge transfer	

a)	Charge transfer capability(Qrs)	
b)	Thermal energy (Qth)	
12)	Reference current(mAp)	
13)	Reference voltage (min kV rms)	
14)	Rated frequency(Hz)	
15)	Maximum residual voltage at (8/2µs impulse wave)	
a)	5 KAp (kVp)	
b)	10KAp (kVp)	
c)	20KAp (kVp)	
16)	Maximum steep current impulse residual at 10kAp(kVp)	
17)	Maximum switching current impulse residual at 500A(kVp)	
18)	Temporary overvoltage withstand capability(with prior energy) for	
a)	1 sec (kVrms)	
b)	10 sec (kVrms)	

c)	100 sec (kVrms)	
19)	Lightning impulse voltage withstand capability (Dry) (kVp)	
20)	Power frequency voltage withstand capability (Wet) (kVrms)	
21)	Maximum partial discharge (pC)	
22)	High current impulse withstand capability (4/10µs impulse wave) (kAp)	
23)	Total creepage distance of polymer housing (mm)	
24)	Cantilever strength	
25)	Total weight of complete Arrester Unit	
26)	Height of complete unit from base to line side	
27)	Minimum clearance	
	1) Between arresters centre to centre	
	2) Arrester and adjoining earthed objects (mm)	
28)	Maximum resistive component of current at Maximum continuous	

	operating voltage Micro amps	
29)	Maximum capacitive component of current at MCOV- (Milli amps)	
30)	Mounting flange dimensional details	
31)	Earthing arrangement provided for earthing side of arresters	
32)	Number of sections in complete unit	
33)	Maximum permissible length of rod between	
	i) Arrester and surge counter	
	ii)Surge counter and earth	
34)	Technical particulars of	
a)	Surge counter	
b)	Surge monitor	
35)	Particulars of terminal connection	
36)	Weight of supporting structure	
37)	Weight of structure before galvanizing	

38)	Weight of structure after galvanizing	
39)	Galvanizing thickness	

Name ,Address, Mobile No&

Mail id of Bidder

SCHEDULE OF GUARANTEED AND TECHNICAL PARTICULARS OF 33KV & SUPPORTING STRUCTURE FOR 33KV LA & 11KV LIGHTNING ARRESTERS

Sl. No.	**Description**	**11kV LA**
1)	Name of Manufacturer	
2)	(a) Type and designation number	
	(b) Whether heavy duty or not	
3)	Model	
4)	Applicable IS/ IEC Reference	
5)	No. of units per Arrester	
6)	Rated voltage (kV)	
7)	Continuous operating voltage (kV)	
8)	Installation	
9)	Arrestor construction	
10)	Nominal discharge current 8/20 micro second wave)KA	
11)	Repetitive Charge transfer	

a)	Charge transfer capability(Qrs)	
b)	Thermal energy (Qth)	
12)	Reference current(mAp)	
13)	Reference voltage (min kV rms)	
14)	Rated frequency(Hz)	
15)	Maximum residual voltage at (8/2µs impulse wave)	
a)	5 KAp (kVp)	
b)	10KAp (kVp)	
c)	20KAp (kVp)	
16)	Maximum steep current impulse residual at 10kAp(kVp)	
17)	Maximum switching current impulse residual at 500A(kVp)	
18)	Temporary overvoltage withstand capability(with prior energy) for	
a)	1 sec (kVrms)	
b)	10 sec (kVrms)	

c)	100 sec (kVrms)	
19)	Lightning impulse voltage withstand capability (Dry) (kVp)	
20)	Power frequency voltage withstand capability (Wet) (kVrms)	
21)	Maximum partial discharge (pC)	
22)	High current impulse withstand capability (4/10µs impulse wave) (kAp)	
23)	Total creepage distance of polymer housing (mm)	
24)	Cantilever strength	
25)	Total weight of complete Arrester Unit	
26)	Height of complete unit from base to line side	
27)	Minimum clearance	
	1) Between arresters centre to centre	
	2) Arrester and adjoining earthed objects (mm)	
28)	Maximum resistive component of current at Maximum continuous	

	operating voltage Micro amps	
29)	Maximum capacitive component of current at MCOV- (Milli amps)	
30)	Mounting flange dimensional details	
31)	Earthing arrangement provided for earthing side of arresters	
32)	Number of sections in complete unit	
33)	Maximum permissible length of rod between	
	i) Arrester and surge counter	
	ii)Surge counter and earth	
34)	Technical particulars of	
a)	Surge counter	
b)	Surge monitor	
35)	Particulars of terminal connection	
36)	Weight of supporting structure	
37)	Weight of structure before galvanizing	

38)	Weight of structure after galvanizing	
39)	Galvanizing thickness	

Name ,Address, Mobile No&

Mail id of Bidder