TECHNICAL SPECIFICATION

TECHNICAL SPECIFICATION FOR LIGHTNING ARRESTORS

1. SCOPE :

1.1. This Specification covers design, manufacture, testing at manufacturer's Works, packing, supply, delivery of 42 KV & 12 KV classes of gapless Lightning Arrestors complete with fittings and accessories.

1.2. These arrestors shall be of Heavy Duty, Station Class / Distribution Class and Gapless Zinc Oxide type.

1.3. Arrestors shall be hermetically sealed units suitable for outdoor installation on self-supporting base or structures.

2. STANDARD :

Arrestors shall conform in general to IEC-99-4 document or its latest amendment and IS/IEC as follows:

i) IEC-99-4: Gapless Lightning Arrestor
ii) IS 3070 P-III : Metal Oxide Surge Arrestors without gaps for AC Systems.
iii) IEC 99 P-III: Artificial Pollution Testing of Lightning Arrestor
iv) IEC 270: Partial Discharge Measurement.
v) IS 2071: Methods of H V Testing
vi) IS 6209: Methods for Partial Discharge Measurement
vii) IS 5621: Hollow Insulators for use in electrical equipment

3. DEVIATION :

Normally the offer should be as per Technical Specification without any deviation. But any deviation felt necessary to improve performance, efficiency and utility of equipment must be mentioned in the 'Deviation Schedule' with reasons duly supported by documentary evidences and advantages of such deviation. Such deviations suggested may or may not be accepted. But deviations not mentioned in Deviation Schedule will not be considered.

4. DUTY REQUIREMENT :

The Surge Arrestors are being provided to protect the following equipment whose insulation levels are indicated in the table given below:

Equipment to be protected	L I for 42 KV system (KVp)	L I for 12 KV system KVp)
Power Transformer	+/-170	+/-75
Instrument Transformer	+/-170	+/-75
CB/Isolator Phase to ground	+/-170	+/-75
Across open poles	+/-195	-

4.1. The Lightning Arrestors shall be capable of discharging Lightning and switching surges and temporary power frequency over voltages .The Surge Arrestor shall be capable of discharging over voltages occurring during switching of unloaded transformers and long lines.

4.2. The Arrestors shall be capable of withstanding Maximum Continuous Operating Voltages (M.C.O.V).

4.3. The Arrestors supplied shall be suitable for heavily polluted atmosphere.

4.4. The reference current of the Arrestors shall be high enough to eliminate the influence of grading and stray capacitance on the measured reference voltages.

5. FITTINGS & ACCESSORIES :

5.1 Arrestor rating upto 42 KV shall be directly mounted on structure as there is no surge counter.

5.2 Each single pole arrestor shall be provided with suitable name plate, at the base with the following data :

i) Name of device
ii) Manufacturer's name and trade mark, type and identification
iii) Year of manufacture
iv) Voltage rating & frequency rating.
v) Nominal discharge current
vi) MCOV (Maximum Continuous Operating Voltage in KV).
vii) Discharge class.
viii) Energy Discharge capability (KJ/KV rating)
ix) Purchase Order reference.
x) Applicable Standard.
xi) Pressure Relief rated current in KA rms (for arrestors fitted with Pressure Relief device)
xii) Serial Number

5.3 Clamp type terminal connector shall be suitable for either ACSR DOG Conductor for 42 KV and WEASEL / RABBIT Conductor for 12 KV system voltage class L.A. having horizontal/ vertical take off. Detailed particulars have been indicated in the specification for Clamps and Connector in this bid document.

5.4 Two ground terminal connectors suitable for G.I strip of required size shall be provided on diagonally opposite sides.

5.5 Necessary hardware such as nuts, bolts, spring washers, etc. shall be supplied for different units.

5.9 12 KV Lightning Arrestor should be of ***Distribution Type*** and should have suitable ***Fault Indicator.***

6 CONSTRUCTIONAL FEATURES :

6.1 The arrestor elements shall be designed in such a way as to obtain robust construction with excellent mechanical and electrical properties even after repeated operation. The lightning arrestors should be adequately designed to operate satisfactorily under temporary power frequency over voltage as given in Specific Technical Parameters, after discharging two shots of respective long duration surges. Uniform density of zinc oxide element shall be maintained to provide uniform current distribution.

6.2 The lightning Arrestors shall be of adequate Pressure Relief Class as per IEC-99-4 , fitted with Pressure Relief Devices and Arc diverting ports to minimise possibilities of shattering of porcelain housing.

6.3 Sufficient creepage distance shall be provided to reduce excessive uneven voltages over the porcelain due to contamination, for which the arrestor shall not fail.

6.4 Seals shall be provided in such a way that these are always effectively maintained even when discharging the maximum rated lightning current.

6.5 Housing of Insulators shall be of **Porcelain**, glazed and completely vitrified and free from blow holes, micro-cracks or void. **Porcelain,** housing shall be so coordinated that external flashover will not occur due to application of any impulse or switching surge voltage up to the maximum design value for the arrestor.

6.6 The end fittings shall be made of non-magnetic and corrosion proof material. It is preferable that the LAs shall be hermetically sealed with inert gas (Nitrogen).

6.7 Arrestors shall be suitable for mounting on a support structure.

6.8 12 KV Class Distribution Type Lightning Arrestor should have provision for *Disconnector.*

7 APPLICATION :

The lightning Arrestors are used for protection of incoming and outgoing line and also of the power transformers from lightning surge as well as from power frequency over voltage.

8 TENDER DRAWINGS, CATALOGUES:

General outline drawing giving plan, elevation, side view and sectional view, top and bottom connection arrangement with pitch circle diameter and other dimensions of the complete assembly with surge counter and leakage current measuring meter where applicable, Size of terminals and lifting lugs, shipping weight etc are to be indicated.

9 CONTRACT DRAWINGS AND MANUALS :

9.1 In the event of placement of Order, six (6) copies of drawings and descriptive literatures shall be furnished to the Chief Engineer, P&CD, Vidyut Bhavan (4th floor), Salt Lake, Kolkata - 700 091 for approval :

i) General Outline Drawing showing plan, elevation and end views with dimensions and showing full mounting details with weights.

ii) Dimensional Drawing showing the Arrestor mounted on its base and where applicable with surge counter and leakage current measuring meter.

iii) Details of Bushing top terminals & terminal connectors.

iv) Shipping Dimensional Drawings with weights.

v) Position of Centre of gravity and clearances with adjacent grounded metallic structures.

vi) Diagram Plate showing electrical connections of the surge counter and leakage current measuring meter where applicable.

vii) Rating Plate.

viii) Complete foundation drawings for the structure of Lightning arrestor, where applicable.

9.2 Ten (10) sets of approved drawings and operation and maintenance manuals shall be submitted for our record and distribution to site.

10 <u>TEST REPORTS AND TYPE TESTS</u> :

The Bidder should submit the Complete Type Test Reports as stipulated in latest relevant IS/IEC with complete Identification, Date & Sl.No., carried out within 5(Five) Years from Due Date of Tender, from CPRI/ NABL accredited/Govt. Recognized Test House or Laboratory on Tendered Item of identical design, With Tender Documents failing which their offer may not be technically accepted.

Following Type test reports need to be submitted along with the technical bid :

1. Insulation withstand test on the Arrestor housing

11 TEST AT FACTORY AND TEST CERTIFICATES :

i) Each LA. shall comply with the requirements of routine test as specified in the relevant IEC:99-4 & IS:3070 (Part - III).

ii) Routine test at manufacturer's works shall be carried out in presence of representative of WBSEDCL.

iii) All routine & acceptance tests shall be carried out at the manufacturer's works on every lot offered for inspection as per relevant IEC & IS. Selection of samples for acceptance test as well as rejection and retesting shall be guided by relevant IEC & IS. Six (6) copies of Test Reports shall be submitted to the Chief Engineer (P&CD), Vidyut Bhavan (4^{th} floor), Salt Lake, Kolkata - 700 091 for approval. Adequate extra copies should also be submitted to Chief Engineer (P&CD) Vidyut Bhavan (4^{th} floor), Salt Lake, Kolkata - 700 091 for distribution to site.

iv) The Tenderer shall give at least 15 (fifteen) days' advance notice intimating the actual date of inspection and details of all tests that are to be carried out. Relevant Type & Routine Tests' Certificates obtained from the competent Authorities for all accessories/ bought out items shall have to be furnished.

12. **TYPE TESTS after issuance of order**:

Besides submission of Type Test Report, carried out within five years as per Tender Specification, Type Test at the discretion of Ordering authority, shall have to be arranged by the successful contractor from any lot offered for inspection, sample chosen at random after successful Routine Test by our Inspection Team, as per relevant ISS from NABL accredited/Govt. Recognized Test House or Laboratory in presence of WBSEDCL'S representative. In case of failure of the materials after type test the WBSEDCL will have the right to reject the total supplied lot of the said materials and the party have to replace the complete lot of materials at his own cost including transportation of materials at site.

However the necessary cost of the Type Test charges will be reimbursed to the party on production of necessary supporting documents.

13. Documents to be submitted at the time of physical delivery at consignee stores :

The following documents to be submitted by the vendors to the consignee Stores at the time of despatch to stores by the vendors:-

a) Copy of Purchase Order.
b) Copy of Despatch Instruction.
c) Inspection Test Certificate.
d) Guarantee Certificate.
e) Proforma Invoice.
f) Calculation Sheet for price Variation on the basis of IEEMA or CACMAI as applicable with base date of order.
g) Seal list and packing list.
h) Challan in triplicate.
i) Way bill, if applicable.

SPECIFIC TECHNICAL PARAMETERS- I

	TYPE OF ARRESTOR	***STATION CLASS HEAVY DUTY GAPLESS***	***DISTRIBUTION CLASS***
i)	Nominal system voltage (KV)	33	11
ii)	Highest system voltage (KV)	36	12
iii)	System Neutral Earthing	NEE(Grounded Through Earthing Transformer)	EE
iv)	BIL of transformers (KVp)	170	75
v)	System fault level (KA)	25	16
vi)	Maxm. System BIL (KVp)	170	75
	LA RATINGS :		
i)	Rated Voltage (KV)	42	12
ii)	Maxm. Continuous operating voltage (KVrms)	36	10
iii)	Nominal Discharge Current (KAp)	10	5
iv)	Line discharge class	2	Distribution Class
v)	Minimum Energy Discharge capability (KJ/KV) [If there is any Deviation the same may be mentioned in the Deviation Sheet]	4	--
vi)	Temporary over voltage withstand capability (KVrms) for 10.0 secs	42	12
vii)	Insulation Housing withstand voltages		
	i) Lightning Impulse(Dry)	Minimum values as per IEC	
	ii) Power frequency(wet)		
	for 10 KA		
	for 5 KA		
viii)	Minimum creepage Distance acceptable (mm)	1100	300
	i) Pressure Relief Class	To be tested in accordance with IEC	
ix)	(Minimum) High Current Impulse withstand (4/10) KA (peak)	100	65
x)	Maxm.Lightning Impulse (8/20 micro-second impulse) residual voltage (KVp) :		
	5 KA	112	40
	10KA	-	-
xi)	Maxm. switching surge (30/60 micro-second wave) protective level (KVp)		
	500 Amps	98	--
	1000 Amps	-	-
	2000 Amps	-	-
xii)	Maxm. Steep Impulse (1/20 micro-seconds impulse) residual voltage at 10 KA (KVp)	130	45
xiii)	Partial Discharge (pico-coulomb) when energised at 1.05 times its continuous operating voltage shall not exceed	less than 50 pico-coulomb	less than 500 pico-coulomb
xiv)	Terminal connection	Suitable for ACSR Dog Conductor	Suitable for Weasel/Rabit ACSR Conductor
xv)	Rated Frequency (Hz)	50	50
xvi)	Minimum Visible Corona Discharge voltage(KV rms)	-	-

GUARANTEED TECHNICAL PARAMETERS

	TYPE OF ARRESTOR		***STATION CLASS HEAVY DUTY GAPLESS (42KV)***	***DISTRIBUTION CLASS (12KV)***
i)	Nominal system voltage (KV)			
ii)	Highest system voltage (KV)			
iii)	System Neutral Earthing			
iv)	BIL of transformers (KVp)			
v)	System fault level (KA)			
vi)	Maxm. System BIL (KVp)			
	LA RATINGS :			
i)	Rated Voltage (KV)			
ii)	Maxm. Continuous operating voltage (KVrms)			
iii)	Nominal Discharge Current (KAp)			
iv)	Line discharge class			
v)	Minimum Energy Discharge capability (KJ/KV)			
	[If there is any Deviation the same may be mentioned in the Deviation Sheet]			
vi)	Temporary over voltage withstand capability (KVrms) for 10.0 secs			
vii)	Insulation Housing withstand voltages			
	i) Lightning Impulse(Dry)			
	ii) Power frequency(wet)			
	for 10 KA			
	for 5 KA			
viii)	Minimum creepage Distance acceptable (mm)			
	i) Pressure Relief Class			
ix)	(Minimum) High Current Impulse withstand (4/10) KA (peak)			
x)	Maxm.Lightning Impulse (8/20 micro-second impulse) residual voltage (KVp) :			
	5 KA			
	10KA			
xi)	Maxm. switching surge (30/60 micro-second wave) protective level (KVp)			
	500 Amps			
	1000 Amps			
	2000 Amps			
xii)	Maxm. Steep Impulse (1/20 micro-seconds impulse) residual voltage at 10 KA (KVp)			
xiii)	RIV/Partial Discharge (micro-volt / pico-coulomb) when energised at 1.05 times its continuous operating voltage shall not exceed			
xiv)	Terminal connection			
xv)	Rated Frequency (Hz)			
xvi)	Minimum Visible Corona Discharge voltage(KV rms)			

Date: Signature:

Place: Name:

Name of the Company:

Seal of the Company: