MATERIAL SPECIFICATION CELL

TECHNICAL SPECIFICATION

OF

11KV, 22KV & 33KV PORCELAIN SURGE ARRESTER

Table of Contents

1.0 SCOPE

This specification covers the design, manufacture, assembly, testing at manufacturer's works, packing and delivery of 11kV (Distribution & Station Type), 22kV (Distribution & Station Type) and 33kV (Station Type) Metal Oxide (gapless) Porcelain Surge Arresters for Distribution Transformers, lines & in various substations of 11kV, 22kV & 33kV systems in the State of Maharashtra in India

It is not the intent to specify completely herein all the details of design and construction of Surge Arresters. However, Surge Arresters shall conform in all respect to the high standard of design and workmanship mentioned in Clause 5.0 and be capable of performing in continuous commercial operation upto tenderer's guarantee in a manner acceptable to MSEDCL, who will interpret the meanings of drawing and specifications and shall have the power to reject any work or material which in his judgement are not in accordance therewith. The Surge Arresters 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 supplier's supply, irrespective of whether they are specifically brought out in the specification and commercial order or not.

SERVICE CONDITIONS

The Surge Arresters and accessories shall be suitable for continuous, satisfactory operation under climatic conditions listed below: -

Environmental Conditions

a) Maximum ambient temperature 50^0 C

b) Maximum ambient temperature in shade 45^0 C

c) Minimum temperature of air in shade 35^0 C

d) Maximum daily average Temperature 40^0 C

e) Maximum yearly weighted average Temperature 32^0 C

f) Relative Humidity 10 to 100 %

g) Maximum Annual rainfall 1450 mm

h) Maximum wind pressure 150 Kg/m2

i) Maximum altitude above mean sea level 1000 meters

j) Isoceraunic level 50 days/year

k) Seismic level (Horizontal acceleration) 0.3 g

l) Climate: Moderately hot and humid tropical climate conducive to rust and fungus growth.

3.0 SYSTEM PARTICULARS

The equipment offered under this specification shall be suitable for 11 kV, 50 Hz, A.C. System.

Nominal System Voltage : 11kV, 22kV, 33kV

Highest System Voltage : 12kV, 24kV, 36kV

System Frequency : 50HZ

Neutral grounding : Effectively Earthed

Number of Phases : Three

4.0 APPLICABLE STANDARD

Unless otherwise specified elsewhere in this specification, the Surge Arresters shall conform to the latest revisions of the relevant standards listed below:

Sr. No.	Standard Ref. No.	Title
1.	IEC 60099-4- 2004-05	Specification for Surge Arresters without gap of A.C. System
2.	IS 3070 (Part-3) - 1993	Lightning Arresters for alternating current Systems
3.	IS 4759-1996	Hot dip zinc-coating on structural steel and other allied products
4.	IS 2629 - 1985	Recommended practice for Hot Dip Galvanizing of Iron & Steel
5.	IS-2633-1986	Method for testing uniformity of coating on zinc coated articles
6.	IS/IEC 62155-2003	Hollow Pressurized and Unpressurized Ceramic & Glass Insulators for use in Electrical Equipment with Rated Voltage greater than 1000 V

5.0 SPECIFIC TECHNICAL REQUIREMENT

The Surge Arresters shall conform to the Technical requirements given below.

A) 11kV Porcelain Surge Arrester

Sr. No.	Particulars	Requirement	
1.	Type of Arrester	Metal Oxide (Gapless) Porcelain Distribution type Surge Arrester with Disconnector	Metal Oxide (Gapless) Porcelain Station type Surge Arrester
2.	Housing	Porcelain	
3.	Type of mounting	Bracket type	Pedestal Type

4.	Applicable Standard	IEC 60099-4 & IS 3070 (Part-3) amended upto date	
5.	Nominal System Voltage / Highest System Voltage (kV)	11 kV/12 kV	
6.	Rated Voltage of Arrester * (kV rms)	9 kV rms	
7.	Continuous Operating Voltage (C.O.V.) (kV rms)	7.65 kV rms	
8.	Installation	Outdoor	
9.	Type of construction	Single Column, Single Phase	
10.	Connection	Phase to Earth	
11.	Nominal discharge current rating (8/20 micro sec wave) (kA Peak)	5 kA Peak	10 kA Peak
12.	Long Duration Discharge Class	Distribution Class	Class 2
13.	Minimum discharge capability (kJ/kV)	Distribution Class	As per line discharge Class 2 of IEC 60099-4 & IS 3070 (Part-3) amended upto date
14.	Minimum prospective symmetrical current (kA rms)	Not applicable	16 kA rms
15.	High Current Impulse Withstand Capability (4/10 micro second wave) (kA Peak)	65 kA Peak	100 kA Peak
16.	Overall temporary over voltage withstand capacity (kV rms)		
	i) 1 Sec	10.35 kVrms	
	ii) 10 Sec	9.9 kVrms	
	iii) 100 Sec	9.45 kVrms	
17.	Lightning Impulse Withstand Voltage of Arrester housing (1.2/50 micro second wave) (kV Peak)	75 kV Peak	
18.	One minute Power Frequency Withstand Voltage of Arrester housing Dry & Wet (kV rms)	28 kV rms	
19.	Long duration Current Impulse Withstand level	18 Impulse of long duration Current 75 Amp Peak for 1000 micro Sec.	As duty prescribed in line discharge class 2 of IEC 60099-4 & IS 3070 (Part-3) amended upto date
20.	Min. creepage distance of Porcelain Arrester housing (mm)	300 mm (min.)	
21.	Max. Partial Discharge when energized at 1.05 times of COV (Pico coulomb)	< 10 pC	

22.	Disconnecting Device	As per IEC 60099-4 & IS 3070 (Part-3) amended upto date	Not applicable
23.	Terminal arrangement	M10 Stud with suitable hardware	Built in clamping type, with universal take off arrangement (can be adjusted for horizontal & vertical takeoff)
24.	Earthing Terminal	M10 Stud with suitable hardware	The base of Surge Arrester shall be provided with two separate terminal distinctly marked for connection to earth

B) 22kV Porcelain Surge Arrester

Sr. No.	Particulars	Requirement	
1.	Type of Arrester	Metal Oxide (Gapless) Porcelain Distribution type Surge Arrester with Disconnector	Metal Oxide (Gapless) Porcelain Station type Surge Arrester
2.	Housing	Porcelain	
3.	Type of mounting	Bracket type	Pedestal Type
4.	Applicable Standard	IEC 60099-4 & IS 3070 (Part-3) amended upto date	
5.	Nominal System Voltage / Highest System Voltage (kV)	22 kV/24 kV	
6.	Rated Voltage of Arrester * (kV rms)	18 kV rms	
7.	Continuous Operating Voltage (C.O.V.) (kV rms)	15.3 kV rms	
8.	Installation	Outdoor	
9.	Type of construction	Single Column, Single Phase	
10.	Connection	Phase to Earth	
11.	Nominal discharge current rating (8/20 micro sec wave) (kA Peak)	5 kA Peak	10 kA Peak
12.	Long Duration Discharge Class	Distribution Class	Class 2
13.	Minimum discharge capability (kJ/kV)	Distribution Class	As per line discharge Class 2 of IEC 60099-4 & IS 3070 (Part-3) amended upto date
14.	Minimum prospective symmetrical current (kA rms)	Not applicable	40 kArms

15.	High Current Impulse Withstand Capability (4/10 micro second wave) (kA Peak)	65 kA Peak	100 kA Peak
16.	Overall temporary over voltage withstand capacity (kV rms)		
	i) 1 Sec	20.7 kVrms	
	ii) 10 Sec	19.8 kVrms	
	iii) 100 Sec	18.9 kVrms	
17.	Lightning Impulse Withstand Voltage of Arrester housing (1.2/50 micro second wave) (kV Peak)	125 kV Peak	
18.	One minute Power Frequency Withstand Voltage of Arrester housing Dry & Wet (kV rms)	50 kV rms	
19.	Long duration Current Impulse Withstand level	18 Impulse of long duration Current 75 Amp Peak for 1000 micro Sec.	As duty prescribed in line discharge class 2 of IEC 60099-4 & IS 3070 (Part-3) amended upto date
20.	Min. creepage distance of Porcelain Arrester housing (mm)	600 mm (min.)	
21.	Max. Partial Discharge when energized at 1.05 times of COV (Pico coulomb)	< 10 pC	
22.	Disconnecting Device	As per IEC 60099-4 & IS 3070 (Part-3) amended upto date	Not applicable
23.	Terminal arrangement	M10 Stud with suitable hardware	Built in clamping type, with universal take off arrangement (can be adjusted for horizontal & vertical takeoff)
24.	Earthing Terminal	M10 Stud with suitable hardware	The base of Surge Arrester shall be provided with two separate terminal distinctly marked for connection to earth

C) 33kV Porcelain Surge Arrester

Sr. No.	Particulars	Requirement
1.	Type of Arrester	Metal Oxide (Gapless) Porcelain Station type Surge Arrester

2.	Housing	Porcelain
3.	Type of mounting	Pedestal Type
4.	Applicable Standard	IEC 60099-4 & IS 3070 (Part-3) amended upto date
5.	Nominal System Voltage / Highest System Voltage (kV)	33 kV/36 kV
6.	Rated Voltage of Arrester * (kV rms)	30 kV rms
7.	Continuous Operating Voltage (C.O.V.) (kV rms)	24 kV rms
8.	Installation	Outdoor
9.	Type of construction	Single Column, Single Phase
10.	Connection	Phase to Earth
11.	Nominal discharge current rating (8/20 micro sec wave) (kA Peak)	10 kA Peak
12.	Long Duration Discharge Class	Class 2
13.	Minimum discharge capability (kJ/kV)	As per line discharge Class 2 of IEC 60099-4 & IS 3070 (Part-3) amended upto date
14.	Minimum prospective symmetrical current (kA rms)	40 kA rms
15.	High Current Impulse Withstand Capability (4/10 micro second wave) (kA Peak)	100 kA Peak
16.	Overall temporary over voltage withstand capacity (kV rms)	
	i) 1 Sec	34.5 kV rms
	ii) 10 Sec	33 kV rms
	iii) 100 Sec	31.5 kV rms
17.	Lightning Impulse Withstand Voltage of Arrester housing (1.2/50 micro second wave) (kV Peak)	170 kV Peak
18.	One minute Power Frequency Withstand Voltage of Arrester housing Dry & Wet (kV rms)	70 kV rms
19.	Long duration Current Impulse Withstand level	As duty prescribed in line discharge class 2 of IEC 60099-4 & IS 3070 (Part-3) amended upto date
20.	Min. creepage distance of Polymer Arrester housing (mm)	900 mm (min.)
21.	Max. Partial Discharge when energized at 1.05 times of COV (Pico coulomb)	< 10 pC

22.	Terminal arrangement	Built in clamping type, with universal take off arrangement (can be adjusted for horizontal & vertical takeoff)
23.	Earthing Terminal	The base of Surge Arrester shall be provided with two separate terminal distinctly marked for connection to earth

*Rated Voltage means max permissible r.m.s. value of power frequency voltage at which Surge Arresters are designed to operate correctly.

The energy handling capability of Surge Arrester offered, supported by calculations shall be furnished in the offer.

PROTECTIVE LEVELS:

The basic insulation levels of lines and equipments to be protected have been specified in relevant IS. The required protective levels of the Surge Arresters have been specified above. The protective characteristics of the Surge Arresters offered shall be clearly brought out in the Guaranteed Technical Particulars.

The Surge Arresters shall be capable of discharging over voltages occurring due to switching on unloaded transformer, reactors and long lines.

The reference current of Surge Arresters shall be high enough to eliminate the influence of grading and stray capacitance on the measured reference voltage. Values and calculations shall be furnished with offer.

The Surge Arrester shall be fully stabilized thermally to give a life expectancy of one hundred (100) years under site conditions and take care of effect of direct solar radiation.

The Surge Arrester shall be suitable for circuit breaker duty cycle in the given system.

The Surge Arresters shall protect transformers, circuit breakers, disconnecting switches, instrument transformers, shunt reactors etc. with insulation level specified in the relevant specifications.

The Surge Arresters shall be capable of withstanding meteorological and short circuit forces under site conditions.

Station type Surge Arresters shall be fitted with pressure relief devices and arc diverting parts & shall be tested as per the requirements of IEC 60099-4 & IS 3070 (Part-3) amended upto date.

A grading ring shall be provided if necessary, on each complete Station type Surge Arrester for proper stress distribution.

6.0 GENERAL REQUIREMENT

Each Surge Arrester shall be sealed single phase unit. The Surge Arrester shall not have any air volume enclosed within. The non linear blocks shall be sintered metal

oxide material. The Surge Arrester shall be robust with excellent mechanical and electrical properties.

The end fittings shall be non magnetic and of corrosion proof material. The end fittings used in Porcelain Arrester shall be made out of 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.

MOV blocks shall have full metallization to have full face contact and to reduce contact resistance between adjacent discs. MOV blocks shall have lead free insulating collar and the insulation thickness must be consistent and of sufficient thickness to pass the 65 kA 4/10µs test & 100kA 4/10µs test for Distribution type & Station type Surge Arrester respectively.

MOV blocks shall be tested 100% at source and as a confirmation should have the following values printed on Aluminium sprayed surface.

a. Batch No.
b. AC reference voltage measured at reference current
c. Residual voltage measured at nominal discharge current
d. Power loss value measured at continuous operating voltage

Each and every individual unit of Surge Arrester shall be hermetically sealed and fully protected against ingress of moisture. The hermetic seal shall be effective for entire life time of Arresters and under the service conditions specified. Manufacturers should device a suitable routine production testing to verify the efficiency of sealing. The tenderer shall furnish in his bid sectional view of the Arresters showing details of sealing.

For Station Type Arrester a suitable pressure-relieving device shall be provided to avoid damage to the external insulator in case of a severe discharge. The tenderer shall furnish in the bid, a sectional view of the Arresters, showing details of pressure relief device employed for station type Arrester.

The corresponding units of Surge Arresters of same rating shall be interchangeable without adversely affecting the performance.

The Distribution & Station Type Surge Arrester shall be suitable for bracket type & pedestal type mounting respectively.

All the necessary flanges, bolts, nuts, clamps etc. required for assembly of complete Surge Arrester with accessories and mounting on MSEDCL's support structure shall be included in bidder's scope of supply and shall be galvanized.

The mounting details for mounting the Surge Arresters on MSEDCL's support shall be given along with the offer.

The minimum permissible separation between the single-phase Surge Arresters of a Three Phase bank and between Surge Arrester and any nearby earthed object shall be furnished by the bidder in his bid.

The Surge Arrester shall be suitable for hotline washing.

Porcelain housing

Porcelain Housing shall be free from lamination cavities or other flaws affecting the mechanical and electrical strengths.

The Porcelain Rubber housing shall be thoroughly vitrified & non-porous.

The Surge Arrester shall not fail due to housing contamination. Housing shall be so coordinated that external flashover will not occur due to application of any impulse or switching surge voltage up to maximum design value of Surge Arrester.

The Creepage Distance of the Arrester housing shall be min. 300mm.

Petticoats shall be preferably of self cleaning type (Aerofoil design).

The Arrester housing shall confirm to the requirements of IEC 60099-4 & IS 3070 (Part-3) amended upto date.

GALVANIZATION

Line terminal pads, ground terminal pads, and nameplate bracket shall be hot dip galvanized.

The material shall be galvanized only after completing shop operations.

All exposed ferrous parts shall be hot dip galvanized as per IS 2629 amended upto date.

7.0 DISCONNECTING DEVICE

Distribution Type Arrester for 11kV & 22kV system be provided with a suitable disconnecting device. This shall be connected in series with the ground lead and should not affect the sealing system of the Arrester. The disconnecting device shall conform to the requirement specified in IEC 60099-4 & IS 3070 (Part-3) amended upto date.

TERMINAL ARRANGEMENT

A. (FOR STATION TYPE SURGE ARRESTER)

All current carrying parts shall be designed and manufactured to have minimum contact resistance.

The contact surface must be machined smooth to obviate excessive current density.
The terminal connector should be built in clamping type with Universal take off arrangement (can be adjusted for both horizontal & vertical takeoff) and should have adequate current carrying capacity.

Terminal connector should have four bolts to hold the conductor. All nuts, washers, bolts etc. shall be stainless steel/hot dip galvanized.

The base of the Surge Arrester shall be provided with two separate terminal distinctly marked for connection to earth.

B. (FOR DISTRIBUTION TYPE SURGE ARRESTER)

Line Terminal & Ground Terminal shall be supplied with M10 Stud with suitable hardware for line & Earth Connection.

9.0 NAME PLATE:

The Surge Arresters shall be provided with non-corrosive legible nameplate. Name plate material should be 2.5mm thick metal photo anodised aluminium plate of satin finish printed photographically using the metal photo process, with image sealed below the anodized layer colours other than black may be embedded by resist for screen process.

Any other better form of name plate if proposed to be used the same shall be got approved.

Following information shall be engraved on name plate.

a) Maharashtra State Electricity Distribution Company Ltd.
b) Order No. & Date
c) Manufacturer's name or trade mark and identification Sr. No. of the supplied Surge Arrester
d) Rated voltage
e) Maximum continuous operating voltage
f) Type
g) Rated frequency
h) Nominal discharge current
i) Long duration discharge class
j) Minimum prospective symmetrical current (kA rms) (For Station type Surge Arrester)
k)Year of manufacture

The nameplate should be fitted rigidly so that during life of Arrester, there should not be any possibility of removal of name plate.

10.0 TESTS

(A) TYPE TESTS

The tenderer shall furnish following Type Test reports of the offered Surge Arrester for all the Type Tests as per IEC 60099-4 & IS 3070 (Part-3) amended upto date and this specification alongwith the offer.

All these Type Tests shall be carried out at laboratories which are accredited by the National Accreditation Board of Testing and Calibration Laboratories (NABL) of Government of India to prove that Surge Arresters offered meet the requirements of the specification. These Type Tests should have been carried out within ten years (10) prior to the date of opening of the tender.

The detailed Type Test reports along with the relevant oscillograms/certified drawings etc. are to be submitted along with the offer.

(a) The following Type Tests shall be made as per IEC 60099-4 & IS 3070 (Part-3) amended upto date and this specification.

i) Insulation Withstand Test
ii) Residual Voltage test
iii) Long duration Current Impulse Withstand Test
iv) Operating Duty Test
v) Power Frequency Voltage versus Time curve

vi) Pressure relief Test (when fitted with relief device) (For Station type Surge Arrester)
vii) Tests of Arrester Disconnector (when fitted) (For Distribution type Surge Arrester)
viii) Artificial pollution test on Porcelain housed Arrester
ix) For Porcelain housed Arrester
a. Temperature Cycle Test on hollow Porcelain Housing
b. Porosity Test
x) Galvanizing Test on exposed ferrous metal Parts
xi) Internal Partial Discharge Test
xii) Bending moment Test (For station Type Surge Arrester)

The MSEDCL reserves the right to demand repetition of some or all the Type Tests in presence of MSEDCL's representative at MSEDCL's cost. For this purpose, the tenderer shall quote unit rates for carrying out each Type Test. However, such unit rates will not be considered for evaluation of the offer. In case the unit fails in the Type Tests, the complete supply shall be rejected.

Successful tenderer shall submit all Type Test reports of offered Surge Arrester as per relevant IS /IEC standards to office of the Chief Engineer (Testing & QC) Cell and get approved as per Tender conditions.

The original Type Test reports should be made available for verification.

(B) ROUTINE AND ACCEPTANCE TESTS

Surge Arresters manufactured & to be supplied against MSEDCL's tender shall be subjected to Routine Tests & Acceptance tests as per IEC 60099-4 & IS 3070 (Part-3) amended up to date in the presence of MSEDCL" s representative without any extra cost to the MSEDCL before dispatch.

The tenderer should have full facilities to carry out all the Routine Tests & Acceptance tests as per IEC 60099-4 & IS 3070 (Part-3) amended up to date.

Routine Tests:

The minimum requirement of Routine Tests to be made by the manufacturer shall be as follows as per IEC 60099-4 & IS 3070 (Part-3) amended up to date on each Arrester offered for inspection.

i) Measurement of Reference Voltage
ii) Residual Voltage Test
iii) Internal Partial Discharge Test
iv) Test for leakage check of arrestor unit with sealed housing

Acceptance Tests:

The sample criteria for Acceptance Tests shall be nearest lower whole number to the cube root of number of Arresters in the lot available for inspection in accordance with the IEC 60099-4 & IS 3070 (Part-3) as amended up to date.

i) Measurement of Power Frequency Voltage on the complete Arrester at the reference Current
ii) Lightning Impulse Residual Voltage Test
iii) Internal Partial Discharge Test

iv)Special Thermal Stability Test

In addition to above, following acceptance tests should be carried out.

v)Visual Examination & Verification of Dimension
vi)Galvanizing test on exposed ferrous metal parts

11.0 INSPECTION

No Surge Arrester shall be dispatched without inspection and testing. The inspection may be carried out by the MSEDCL at any stage of manufacture. The successful Tenderer shall grant free access to the MSEDCL's representative at a reasonable time when the work is in progress. Inspection and acceptance of any equipment under this specification by the MSEDCL, shall not relieve the supplier of his obligation of furnishing equipment in accordance with the specification and shall not prevent subsequent rejection if the equipment is found to be defective. The supplier shall keep the MSEDCL informed in advance, about the manufacturing program so that arrangement can be made for inspection.

12.0 QUALIFYING REQUIREMENTS: As per Tender

13.0 QUALITY ASSURANCE PLAN

QAP shall be submitted by the successful bidder for approval of purchaser before manufacturing. The QAP shall be discussed by the purchaser with the supplier before it is finalized.

14.0 PERFORMANCE GUARANTEE

The equipment offered shall be guaranteed for satisfactory performance for a period of 30 months from the date of receipt of complete equipment at site in good condition or 24 months from the date of satisfactory commissioning, whichever is earlier. In case of failure within this period, the supplier shall make necessary repairs / replacement of the faulty surge Arrester at no extra cost to the MSEDCL.

15.0 DRAWINGS

All drawings shall conform to International Standards. All drawings shall be "A3" size only.

List of drawings and documents:

The tenderer shall furnish following drawings along with the offer.

i) General outline drawings of the complete Arrester with technical parameters
ii) Drawing showing clearance from grounded and other live objects and between adjacent poles of Surge Arresters required at various heights of Surge Arresters
iii) Drawings showing details of pressure relief devices.
iv) Details of grading rings if used.
v) Mounting details of Surge Arresters.
vi) Details of line terminal and ground terminals.
vii) Volt Time Characteristics of Surge Arrester
viii) The detailed dimensional drawing of Polymer housing such as ID, OD, thickness and insulator details such as height, profile of petticoats, angle of inclination and gap between successive petticoats, total creepage distance etc.
ix) Name plate drawing & type
x) Sectional view of the Arresters showing details of sealing.

The successful tenderer shall get approval of drawings from office of CE (Testing & QC) Cell, MSEDCL, Mumbai as per tender conditions.

Six sets of the type test reports, duly approved by the MSEDCL, shall be submitted by the supplier for distribution, before commencement of supply. Adequate copies of acceptance and routine test certificates, duly approved by the MSEDCL, shall accompany the dispatched consignment.

The manufacturing of the equipments shall be strictly in accordance with the approved drawings and no deviation shall be permitted without the written approval of the MSEDCL. All manufacturing and fabrication work in connection with the equipment prior to the approval of the drawing shall be at the supplier's risk.

Approval of drawings/work by MSEDCL shall not relieve the supplier of his responsibility and liability for ensuring correctness and correct interpretation of the latest revision of applicable standards, rules and codes of practices. The MSEDCL shall have the power to reject any work or material, which in his judgment is not in accordance therewith.

16.0 PACKING AND FORWARDING

The equipment shall be packed in suitable crates so as to withstand handling during transport and outdoor storage during transit. The supplier shall be responsible for any damage to the equipment 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. Supplier without any extra cost shall supply any material found short inside the packing cases.

Each consignment shall be accompanied by a detailed packing list containing the following information.

i) Name of the consignee
ii) Details of consignment
iii) Destination
iv) Total weight of consignment
v) Sign showing upper/lower side of the crate
vi) Handling and unpacking instructions
vii) Bill of materials indicating contents of each package

The supplier shall ensure that the packing list and bill of material are approved by the MSEDCL before dispatch.

17.0 SCHEDULES

The tenderer shall fill in the following schedule which form part of the tender specification and offer. If the schedules are not submitted duly filled in with the offer, the offer shall be liable for rejection.

Schedule – “A” Guaranteed Technical Particulars.

SCHEDULE "A"
GUARANTEED TECHNICAL PARTICULARS
9KV 5KA PORCELAIN SURGE ARRESTER

Sr. No.	Particulars	MSEDCL Requirement	To be offered by bidder
1.	Name of manufacturer	Mfg to give details	Text
2.	Works address	Mfg to give details	Text
3.	Type of Arrester	Metal Oxide (Gapless) Porcelain Distribution type Surge Arrester with Disconnector	Text
4.	Housing	Porcelain	Text
5.	Type of mounting	Bracket type	Text
6.	Applicable standard	IEC 60099-4 & IS 3070 (Part-3) amended upto date	Text
7.	Nominal System Voltage/Highest System Voltage (kV)	11 kV /12 kV	Text
8.	Rated Frequency (Hz)	50 Hz	Text
9.	No. of units	Single	Text
10.	Rated voltage of Surge Arrester (kV rms)	9 kV rms	Text
11.	Continuous Operating Voltage (C.O.V.) (kV rms)	7.65 kV rms	Text
12.	Maximum leakage current at continuous operating voltage (micro amps)	Mfg to give details	Text
13.	Installation	Outdoor	Text
14.	Type of construction	Single Column, Single Phase	Text
15.	Connection	Phase to Earth	Text
16.	Nominal discharge current (8/20 micro sec wave) (kA Peak)	5 kA Peak	Text
17.	Long Duration Discharge Class	Distribution class	Text
18.	Minimum discharge capability (kJ/kV)	Distribution class	Text
19.	Maximum residual voltage at Nominal Discharge current (8/20 micro sec. wave) (kV Peak)	Mfg to give details	Text

20.	Maximum steep current impulse residual Voltage at nominal discharge current (kV Peak)	Mfg to give details	Text
21.	High Current Impulse Withstand Capability (4/10 micro second wave) (kA Peak)	65 kA Peak	Text
22.	Temporary Power Frequency over voltage withstand capacity (KV rms)		
	i)1 Sec	10.35 kV rms	Text
	ii)10 Sec	9.9 kV rms	Text
	Iii)100 Sec	9.45 kV rms	Text
23.	Long duration Current Impulse Withstand level	18 Impulse of long duration Current 75 Amp Peak for 1000 micro Sec.	Text
24.	Protective ratio	Mfg to give details	Text
25.	Min. creepage distance of Arrester housing (mm)	300 mm (min.)	Text
26.	Reference Current (mA Peak)	Mfg to give details	Text
27.	Max. Partial Discharge at 1.05 times COV (pC)	< 10 pC	Text
28.	Lightning Impulse Withstand voltage of Arrester housing (1.2/50 microsecond wave) kV Peak	75 kV Peak	Text
29.	One minute Power Frequency Withstand Voltage of Arrester housing Dry & Wet (kV rms)	28 kV rms	Text
30.	Disconnecting Device	As per IEC 60099-4 & IS 3070 (Part-3) amended upto date	Text
31.	Dimensions of Arrester		
	i)Max. Diameter of Porcelain housing (mm)	Mfg. to give details	Text
	ii)Complete height of Arrester (from base to line side) (mm)	Mfg. to give details	Text
	iii)Min. creepage distance of Arrester housing	300 mm (min.)	Text
	iv)Net weight of each Arrester (kg)	Mfg. to give details	Text
32.	Construction of Arrester		
	i)Material of valve	Mfg. to give details	Text

	ii)Details of sealing	Mfg. to give details	Text
	iii)No. of unit per Arrester	One	Text
33.	Material of Top & Bottom Metal Cap	Mfg. to give details	Text
34.	Terminal arrangement	M10 Stud with suitable hardware	Text
35.	Min. clearance between centre to centre of Surge Arrester	Mfg. to give deails	Text
36.	Min. clearance between Surge Arrester & Earthing objects	Mfg. to give deails	Text
37.	Earthing Terminal	M10 Stud with suitable hardware	Text

SCHEDULE "A"
GUARANTEED TECHNICAL PARTICULARS
9KV 10KA PORCELAIN SURGE ARRESTER

Sr. No.	Particulars	MSEDCL Requirement	To be offered by bidder
1.	Name of manufacturer	Mfg to give details	Text
2.	Works address	Mfg to give details	Text
3.	Type of Arrester	Metal Oxide (Gapless) Porcelain Station type Surge Arrester	Text
4.	Housing	Porcelain	Text
5.	Type of mounting	Pedestal type	Text
6.	Applicable standard	IEC 60099-4 & IS 3070 (Part-3) amended upto date	Text
7.	Nominal System Voltage/Highest System Voltage (kV)	11 kV /12 kV	Text
8.	Rated Frequency (Hz)	50 Hz	Text
9.	No. of units	Single	Text
10.	Rated voltage of Surge Arrester (kV rms)	9 kV rms	Text
11.	Continuous Operating Voltage (C.O.V.) (kV rms)	7.65 kV rms	Text
12.	Maximum leakage current at continuous operating voltage (micro amps)	Mfg to give details	Text
13.	Installation	Outdoor	Text
14.	Type of construction	Single Column, Single Phase	Text
15.	Connection	Phase to Earth	Text
16.	Nominal discharge current (8/20 micro sec wave) (kA Peak)	10 kA Peak	Text
17.	Long Duration Discharge Class	Class 2	Text
18.	Minimum discharge capability (kJ/kV)	As per line discharge Class 2 of IEC 60099-4 & IS 3070 (Part-3) amended upto date	Text
19.	Maximum residual voltage at Nominal Discharge current (8/20 micro sec. wave) (kV Peak)	Mfg to give details	Text

20.	Maximum steep current impulse residual Voltage at nominal discharge current (kV Peak)	Mfg to give details	Text
21.	Maximum switching impulse residual Voltage at 500 Amp (kV Peak)	Mfg to give details	Text
22.	Minimum prospective symmetrical current (kA rms)	16 kA rms	Text
23.	High Current Impulse Withstand Capability (4/10 micro second wave) (kA Peak)	100 kA Peak	Text
24.	Temporary Power Frequency over voltage withstand capacity (KV rms)		
	i)1 Sec	10.35 kV rms	Text
	ii)10 Sec	9.9 kV rms	Text
	iii)100 Sec	9.45 kV rms	Text
25.	Long duration Current Impulse Withstand level	As duty prescribed in line discharge class 2 of IEC 60099-4 & IS 3070 (Part-3) amended upto date	Text
26.	Protective ratio	Mfg to give details	Text
27.	Min. creepage distance of Arrester housing (mm)	300 mm (min.)	Text
28.	Reference Current (mA Peak)	Mfg to give details	Text
29.	Max. Partial Discharge at 1.05 times COV (pC)	< 10 pC	Text
30.	Lightning Impulse Withstand voltage of Arrester housing (1.2/50 microsecond wave) kV Peak	75 kV Peak	Text
31.	One minute Power Frequency Withstand Voltage of Arrester housing Dry & Wet (kV rms)	28 kV rms	Text
32.	Dimensions of Arrester		
	i)Max. Diameter of Porcelain housing (mm)	Mfg. to give details	Text
	ii)Complete height of Arrester (from base to line side) (mm)	Mfg. to give details	Text
	iii)Min. creepage distance of Arrester housing (mm)	300 mm (min.)	Text

	iv)Net weight of each Arrester (kg)	Mfg. to give details	Text
33.	Construction of Arrester		
	i)Material of valve	Mfg. to give details	Text
	ii)Details of sealing	Mfg. to give details	Text
	iii)No. of unit per Arrester	One	Text
34.	Material of Top & Bottom Metal Cap	Mfg. to give details	Text
35.	Terminal arrangement	Built in clamping type, with universal take off arrangement (can be adjusted for horizontal & vertical takeoff)	Text
36.	Min. clearance between centre to centre of Surge Arrester	Mfg. to give details	Text
37.	Min. clearance between Surge Arrester & Earthing objects	Mfg. to give details	Text
38.	Earthing Terminal	The base of Surge Arrester shall be provided with two separate terminal distinctly marked for connection to earth	Text

SCHEDULE "A"
GUARANTEED TECHNICAL PARTICULARS
18KV 5KA PORCELAIN SURGE ARRESTER

Sr. No.	Particulars	MSEDCL Requirement	To be offered by bidder
1.	Name of manufacturer	Mfg to give details	Text
2.	Works address	Mfg to give details	Text
3.	Type of Arrester	Metal Oxide (Gapless) Porcelain Distribution type Surge Arrester with Disconnector	Text
4.	Housing	Porcelain	Text
5.	Type of mounting	Bracket type	Text
6.	Applicable standard	IEC 60099-4 & IS 3070 (Part-3) amended upto date	Text
7.	Nominal System Voltage/Highest System Voltage (kV)	22 kV /24 kV	Text
8.	Rated Frequency (Hz)	50 Hz	Text
9.	No. of units	Single	Text
10.	Rated voltage of Surge Arrester (kV rms)	18 kV rms	Text
11.	Continuous Operating Voltage (C.O.V.) (kV rms)	15.3 kV rms	Text
12.	Maximum leakage current at continuous operating voltage (micro amps)	Mfg to give details	Text
13.	Installation	Outdoor	Text
14.	Type of construction	Single Column, Single Phase	Text
15.	Connection	Phase to Earth	Text
16.	Nominal discharge current (8/20 micro sec wave) (kA Peak)	5 kA Peak	Text
17.	Long Duration Discharge Class	Distribution class	Text
18.	Minimum discharge capability (kJ/kV)	Distribution class	Text
19.	Maximum residual voltage at Nominal Discharge current (8/20 micro sec. wave) (kV Peak)	Mfg to give details	Text

20.	Maximum steep current impulse residual Voltage at nominal discharge current (kV Peak)	Mfg to give details	Text
21.	High Current Impulse Withstand Capability (4/10 micro second wave) (kA Peak)	65 kA Peak	Text
22.	Temporary Power Frequency over voltage withstand capacity (KV rms)		
	i) 1 Sec	20.7 kVrms	Text
	ii)10 Sec	19.8 kVrms	Text
	Iii)100 Sec	18.9 kVrms	Text
23.	Long duration Current Impulse Withstand level	18 Impulse of long duration Current 75 Amp Peak for 1000 micro Sec.	Text
24.	Protective ratio	Mfg to give details	Text
25.	Min. creepage distance of Arrester housing (mm)	600 mm (min.)	Text
26.	Reference Current (mA Peak)	Mfg to give details	Text
27.	Max. Partial Discharge at 1.05 times COV (pC)	< 10 pC	Text
28.	Lightning Impulse Withstand voltage of Arrester housing (1.2/50 microsecond wave) kV Peak	125 kV Peak	Text
29.	One minute Power Frequency Withstand Voltage of Arrester housing Dry & Wet (kV rms)	50 kV rms	Text
30.	Disconnecting Device	As per IEC 60099-4 & IS 3070 (Part-3) amended upto date	Text
31.	Dimensions of Arrester		
	i)Max. Diameter of Porcelain housing (mm)	Mfg. to give details	Text
	ii)Complete height of Arrester (from base to line side) (mm)	Mfg. to give details	Text
	iii)Min. creepage distance of Arrester housing	600 mm (min.)	Text
	iv)Net weight of each Arrester (kg)	Mfg. to give details	Text
32.	Construction of Arrester		
	i)Material of valve	Mfg. to give details	Text

	ii)Details of sealing	Mfg. to give details	Text
	iii)No. of unit per Arrester	One	Text
33.	Material of Top & Bottom Metal Cap	Mfg. to give details	Text
34.	Terminal arrangement	M10 Stud with suitable hardware	Text
35.	Min. clearance between centre to centre of Surge Arrester	Mfg. to give deails	Text
36.	Min. clearance between Surge Arrester & Earthing objects	Mfg. to give deails	Text
37.	Earthing Terminal	M10 Stud with suitable hardware	Text

SCHEDULE "A"
GUARANTEED TECHNICAL PARTICULARS
18KV 10KA PORCELAIN SURGE ARRESTER

Sr. No.	Particulars	MSEDCL Requirement	To be offered by bidder
1.	Name of manufacturer	Mfg to give details	Text
2.	Works address	Mfg to give details	Text
3.	Type of Arrester	Metal Oxide (Gapless) Porcelain Station type Surge Arrester	Text
4.	Housing	Porcelain	Text
5.	Type of mounting	Pedestal type	Text
6.	Applicable standard	IEC 60099-4 & IS 3070 (Part-3) amended upto date	Text
7.	Nominal System Voltage/Highest System Voltage (kV)	22 kV /24 kV	Text
8.	Rated Frequency (Hz)	50 Hz	Text
9.	No. of units	Single	Text
10.	Rated voltage of Surge Arrester (kV rms)	18 kV rms	Text
11.	Continuous Operating Voltage (C.O.V.) (kV rms)	15.3 kV rms	Text
12.	Maximum leakage current at continuous operating voltage (micro amps)	Mfg to give details	Text
13.	Installation	Outdoor	Text
14.	Type of construction	Single Column, Single Phase	Text
15.	Connection	Phase to Earth	Text
16.	Nominal discharge current (8/20 micro sec wave) (kA Peak)	10 kA Peak	Text
17.	Long Duration Discharge Class	Class 2	Text
18.	Minimum discharge capability (kJ/kV)	As per line discharge Class 2 of IEC 60099-4 & IS 3070 (Part-3) amended upto date	Text
19.	Maximum residual voltage at Nominal Discharge current (8/20 micro sec. wave) (kV Peak)	Mfg to give details	Text

20.	Maximum steep current impulse residual Voltage at nominal discharge current (kV Peak)	Mfg to give details	Text
21.	Maximum switching impulse residual Voltage at 500 Amp (kV Peak)	Mfg to give details	Text
22.	Minimum prospective symmetrical current (kA rms)	40 kA rms	Text
23.	High Current Impulse Withstand Capability (4/10 micro second wave) (kA Peak)	100 kA Peak	Text
24.	Temporary Power Frequency over voltage withstand capacity (KV rms)		
	i)1 Sec	20.7 kVrms	Text
	ii)10 Sec	19.8 kVrms	Text
	iii)100 Sec	18.9 kVrms	Text
25.	Long duration Current Impulse Withstand level	As duty prescribed in line discharge class 2 of IEC 60099-4 & IS 3070 (Part-3) amended upto date	Text
26.	Protective ratio	Mfg to give details	Text
27.	Min. creepage distance of Arrester housing (mm)	600 mm (min.)	Text
28.	Reference Current (mA Peak)	Mfg to give details	Text
29.	Max. Partial Discharge at 1.05 times COV (pC)	< 10 pC	Text
30.	Lightning Impulse Withstand voltage of Arrester housing (1.2/50 microsecond wave) kV Peak	125 kV Peak	Text
31.	One minute Power Frequency Withstand Voltage of Arrester housing Dry & Wet (kV rms)	50 kV rms	Text
32.	Dimensions of Arrester		
	i)Max. Diameter of Porcelain housing (mm)	Mfg. to give details	Text
	ii)Complete height of Arrester (from base to line side) (mm)	Mfg. to give details	Text
	iii)Min. creepage distance of Arrester housing (mm)	600 mm (min.)	Text

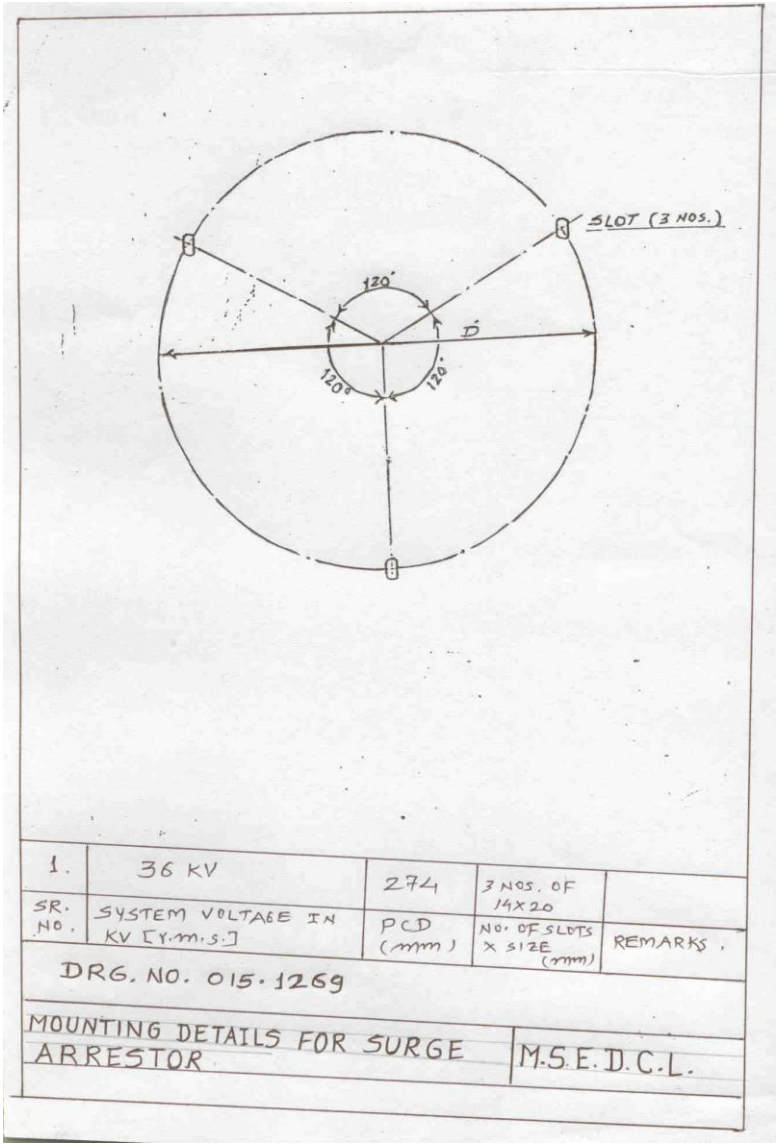
	iv)Net weight of each Arrester (kg)	Mfg. to give details	Text
33.	Construction of Arrester		
	i)Material of valve	Mfg. to give details	Text
	ii)Details of sealing	Mfg. to give details	Text
	iii)No. of unit per Arrester	One	Text
34.	Material of Top & Bottom Metal Cap	Mfg. to give details	Text
35.	Terminal arrangement	Built in clamping type, with universal take off arrangement (can be adjusted for horizontal & vertical takeoff)	Text
36.	Min. clearance between centre to centre of Surge Arrester	Mfg. to give details	Text
37.	Min. clearance between Surge Arrester & Earthing objects	Mfg. to give details	Text
38.	Earthing Terminal	The base of Surge Arrester shall be provided with two separate terminal distinctly marked for connection to earth	Text

SCHEDULE "A"
GUARANTEED TECHNICAL PARTICULARS
30KV 10KA PORCELAIN SURGE ARRESTER

Sr. No.	Particulars	MSEDCL Requirement	To be offered by bidder
1.	Name of manufacturer	Mfg to give details	Text
2.	Works address	Mfg to give details	Text
3.	Type of Arrester	Metal Oxide (Gapless) Porcelain Station Type Surge Arrester	Text
4.	Housing	Porcelain	Text
5.	Type of mounting	Pedestal type	Text
6.	Applicable standard	IEC 60099-4 & IS 3070 (Part-3) amended upto date	Text
7.	Nominal system voltage/Highest system voltage (kV rms)	33 kV / 36 kV	Text
8.	Rated Frequency (Hz)	50 Hz	Text
9.	No. of units	Single	Text
10.	Rated voltage of Surge Arrester (kV rms)	30 kV rms	Text
11.	Continuous Operating Voltage (C.O.V.) (kV rms)	24 kV rms	Text
12.	Maximum leakage current at continuous operating voltage (micro amps)	Mfg to give details	Text
13.	Installation	Outdoor	Text
14.	Type of construction	Single Column, Single Phase	Text
15.	Connection	Phase to Earth	Text
16.	Nominal discharge current (8/20 micro sec wave) (kA Peak)	10 kA Peak	Text
17.	Long Duration Discharge Class	Class 2	Text
18.	Minimum discharge Capability (kJ/kV)	As per line discharge Class 2 of IEC 60099-4 & IS 3070 (Part-3) amended upto date	Text

19.	Maximum residual voltage at nominal discharge current (8/20 micro sec. wave) (kV Peak)	Mfg to give details	Text
20.	Maximum steep current impulse residual voltage at nominal discharge current (kV Peak)	Mfg to give details	Text
21.	Maximum switching impulse residual voltage at 500 Amp (kV Peak)	Mfg to give details	Text
22.	Minimum prospective symmetrical current (kArms)	40 kA rms	Text
23.	High Current Impulse Withstand Capability (4/10 micro second wave) (kA Peak)	100 kA Peak	Text
24.	Temporary over voltage withstand capacity (KV rms)		
	i)1 Sec	34.5 kV rms	Text
	ii)10 Sec	33 kV rms	Text
	iii)100 Sec	31.5 kV rms	Text
25.	Long duration Current Impulse Withstand level	As duty prescribed in line discharge Class 2 of IEC 60099-4 & IS 3070 (Part-3) amended upto date	Text
26.	Protective ratio	Mfg to give details	Text
27.	Min. creepage distance of Arrester housing (mm)	900 mm (min.)	Text
28.	Reference Current (mA Peak)	Mfg to give details	Text
29.	Max. Partial Discharge at 1.05 times COV (pC)	< 10 pC	Text
30.	Lightning Impulse Withstand voltage of Arrester housing (1.2/50 microsecond wave) kV Peak	170 kV Peak	Text
31.	One minute Power Frequency Withstand Voltage of Arrester housing Dry & Wet (kV rms)	70 kV rms	Text
32.	Dimensions of Arrester		
	i)Max. Diameter of Porcelain housing (mm)	Mfg. to give details	Text
	ii)Complete height of Arrester (from base to line side) (mm)	Mfg. to give details	Text
	iii)Min. creepage distance of Arrester	900 mm (min.)	Text

	housing (mm)		
	iv)Net weight of each Arrester (kg)	Mfg. to give details	Text
33.	Construction of Arrester		
	i)Material of valve	Mfg. to give details	Text
	ii)Details of sealing	Mfg. to give details	Text
	iii)No. of unit per Arrester	One	Text
34.	Material of Top & Bottom Metal Cap	Mfg. to give details	Text
35.	Terminal arrangement	Built in clamping type, with universal take off arrangement (can be adjusted for horizontal & vertical takeoff)	Text
36.	Min. clearance between centre to centre of Surge Arrester	Mfg. to give details	Text
37.	Min. clearance between Surge Arrester & Earthing objects	Mfg. to give details	Text
38.	Earthing Terminal	The base of Surge Arrester shall be provided with two separate terminal distinctly marked for connection to earth	Text



SR. NO.	SYSTEM VOLTAGE IN KV [r.m.s.]	PCD (mm)	NO. OF SLOTS X SIZE (mm)	REMARKS
1.	36 KV	274	3 NOS. OF 14X20	

DRG. NO. 015.1269

MOUNTING DETAILS FOR SURGE ARRESTOR

M.S.E.D.C.L.