



Kashmir Power Distribution Corporation Ltd.

Office of the Chief Engineer Planning & Procurement,
PDD Complex Bemina Srinagar,
Tel: 0194-2493280, 0194-2493281, Email:
ceppkpdcl@gmail.com

TECHNICAL SPECIFICATIONS OF

11 kV/33 kV Gapless Surge Arrester

Prepared By	Checked by	Checked by	Checked by	Approved by
1. Er. Ruheela Tabasum AEE, Planning Divi.1st. 2.Er.Nusrat Gul AEE, Planning Divi.1st. 3.Tasheen Hakani (JE) 4.Beenish Rashid Kirmani (J E)	Er. Manzoor Ahmad Dar, Executive Engineer, Planning Division 1 st KPDCL.	Er. Muzaffar Mukhtar, Shah Superintending Engineer, Planning Circle , KPDCL.	Er., . Muzaffar Mukhtar, Shah Chief Engineer, Planning & Procurement Wing, KPDCL Srinagar	Techno Economic Committee vide No. MD/KPDCL/TS- I/3266-72 Dated : 06. 01 - 2023
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This Tender Specification for procurement of 11 kV/33 kV Gapless Surge Arrester for Overhead Power Lines may be subjected to the modification by the purchaser as per actual field requirement. Supplier to submit the Guaranteed Technical Particulars (GTP) and Drawings, after the award of the contract, for approval of the purchaser.

1. CLIMATIC AND ISOCERAUNIC CONDITIONS (CIC).

The composite insulators to be supplied against this specification shall be suitable for satisfactory continuous operation under following tropical conditions.

- 1.1 Maximum Temperature of Air in sun : 45 ° C
- 1.2 Maximum Temperature of Air in Shade : 30.6 ° C
- 1.3 Minimum Temperature of Air in shade : - 20 ° C
- 1.4 Average daily ambient Air Temperature : 30° C
- 1.5 Relative humidity : 15% to 90%
- 1.6 Average rainfall per annum : 800 mm
- 1.7 Approx. altitude above mean sea level : 1600 Mtrs
- 1.8 Isoceraunic level (Days/Year) (i.e. Average number of Thunderstorm): 54
- 1.9 Wind Zone : WZ-3
- 1.10 Seismic Zone i.e. SZ-5
- 1.11 Climate: HSZ (Heavy Snow Zone)
- 1.12 Average Number of Rainy Days Per Year :- 106

2. COMMUNICATION AND TRANSPORT:

The nearest railway station is Jammu on the broad gauge line and is connected to the Divisional Stores by a metal road. The equipment is required to pass en-route through various tunnels on NH-44 (Nandni, Nashri and Jawahar Tunnel). It will be the responsibility of the supplier to ensure timely and proper delivery of the equipment on door delivery basis, at Srinagar, through road transport. The supplier shall also ensure the weights and dimensions of the packages which are suitable to be carried by road transport upto Srinagar.

TECHNICAL SPECIFICATION FOR GAPLESS METAL OXIDE DISTRIBUTION TYPE SURGE ARRESTERS WITH POLYMERIC HOUSING

1 SCOPE

This specification covers the design, manufacture, testing, supply and performance requirements for gapless metal oxide, polymeric housed distribution type surge arresters for outdoor use.

2 DEFINITIONS

2.1 SURGE ARRESTER

A device designed to protect electrical apparatus from high transient over voltages.

2.2 GAPLESS METAL-OXIDE SURGE ARRESTER

A surge arrester having one or several non-linear metal-oxide resistors with highly non-linear voltage-current characteristics, connected in series, but having no integrated series or parallel spark gaps.

2.3 POLYMERIC HOUSED SURGE ARRESTER

A surge arrester with a housing made of polymeric material without air voids neither between the housing and the metal-oxide resistors nor the housing itself. Arresters must have directly molded housings. Arresters manufactured by slip-on, pre molded housing will not be accepted in view of the weak interface between the housing and the assembled disc.

2.4 SHORT CIRCUIT TEST / MODE OF FAILURE PERFORMANCE

Behavior of the arrester during and after a simulated internal failure with different power frequency short circuit currents.

2.5 BONDING BETWEEN HOUSING AND METAL-OXIDE RESISTORS/INTERFACIAL SEALING

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.

3. SYSTEM PARAMETERS

The arrester must be able to operate under the system parameters mentioned in this specification.

Nominal System Voltage	11 kV	33 kV
Frequency	50 Hz	50 Hz

Grounding of Neutral	Solidly	Impedance
Temporary Overvoltage (Earth Fault Factor)	10.4 kV for 10 sec.	39.2 kV for 5sec
Highest System Voltage	12 kV	36 kV
Short Circuit Levels	28 kV	70 kV
Insulation Withstand Level (BIL)	75 kV	170 kV

4. PRODUCT REQUIREMENTS

a. POLYMERIC HOUSING MATERIAL

The polymer material which is used for the arrester housing must be tracking and erosion resistant, stabilized against UV radiation and have proven records of at least 15 years in similar applications (like MV/HV cable terminations, insulators and arresters) in country.

b. HOUSING AND MECHANICAL REQUIREMENTS

The arrester shall meet the following specifications:

	11 kV	33 kV
Creepage Length	300 mm (min.)	900mm
Pull Strength	1000 N (min)	1500N
Cantilever Load	75 Nm (min)	100Nm
Torsion	30 Nm (min)	40Nm

c. ELECTRICAL REQUIREMENTS

The arrester shall meet the following specifications based on IEC 60099-4:

	11kV	33 kV
Arrester Max. Cont. Operating Voltage Uc	8 kV rms	25 kV rms
Arrester Rated Voltage Ur	10 kV rms	30 kV rms
Nominal Discharge Current In	5 kAmp	10 kAmp
Long Duration Discharge Class	75A, 1000µs	75A, 1000µs
Max. Residual Voltage @ In	26.1 kVp	105.4kVp
Lightning Impulse 1,2/50µs WithstandVoltage	75 kVp	170 kVp
Wet Power Frequency Withstand Voltage	28 kV rms	70 kV rms

d. ACCESSORIES

The mounting accessories shall be designed to match all mechanical and electrical requirements specified for the arrester.

i. Mounting

Arresters shall be suitable for vertical and horizontal mounting.

ii. Terminals

iii. Terminals shall be made of M10 bolts to allow the connection of line and ground leads.

iv. Disconnectors

The earth end shall get connected to the earth terminal of the arrester through disconnector. The function of the disconnector is that in the event of, operation of surge arrester, the current shall pass to earth and the disconnector shall disconnect (isolate) the earth terminal and it shall remain suspended on the mounting of the arrester. There by it will be disconnected from the earth and shall provide visual indication to the patrolling personnel. The line can be recharged without isolating the damaged arrester. The Suggestive arrangements of disconnector is given in the drawing attached here with

e. CORROSION PROTECTION

The arrester and all its accessories shall be adequately protected against corrosion. All exposed ferrous components, unless of stainless steel or other non-corrosive metal, shall be hot-dip galvanized. Hardware shall be of stainless steel.

5. TESTING

The arresters shall be tested in accordance with the following latest standards.

- IEC 60099-4/ 2004-05 Standard

a. TYPE TEST FOR ARRESTERS WITH POLYMERIC HOUSING

All the tenderers must submit copies of type test certificates along with laboratory approved drawings for the products offered by them. Type tests should be carried out in accordance with the latest version of specified standard at Govt. approved / NABL accredited lab and test reports should not be older than 7 years as on date of opening the tender. Surge arresters shall be manufactured with the same configuration & raw materials as used in the surge arrester for which typetest reports are carried.

- a. Insulation Withstand Test on Arrester Housing
- b. Residual Voltage Tests
- c. Long Duration Current Impulse Withstand Test
- d. Operating Duty Test

- e. Partial Discharge Voltage Test
- f. Accelerated ageing test
- g. Power frequency voltage versus time characteristics
- h. Weather Ageing Test

The arrester shall prove its resistance against pollution bypassing following type test:

- 1000hrs salt fog test at maximum continuous operating voltage U_c applied.

- i. Short Circuit Test/Mode of Failure Test

The arrester shall prove its withstand capability with respect to internal failures by passing the following type tests:

Short Circuit Test in accordance with IEC 60099-4/2004-05 Standard. The recommended procedure shall be used for testing. The minimum symmetric fault current shall be 20KA rms for a minimum of 0.2s for high current short circuit test. The fault current shall be initiated preferably by prefailing the arrester within 5 ± 3 minutes with a power frequent AC voltage.

For low current short circuit test, the test shall be performed only by over voltage method.

During the test no parts must be ejected and the arrester has to maintain its integrity. All flames must self-extinguish within one minute after the test

b. ROUTINE TESTS

The manufacturer shall carry out the following routine tests on each single arrester in accordance with IEC 60099-4/ 2004-05 Standard.

- AC Reference Voltage Test (final arrester)
- Partial Discharge Test (final arrester including hardware's /accessories)
- Residual Voltage Test (final arrester or metal-oxide resistors)

The manufacturer shall provide a routine test report including all relevant details with respect to the test limits.

Sample test are not acceptable.

c. ACCEPTANCE TESTS

The acceptance tests shall be carried out as per IEC: 60099-4/ 2004-05 standard.

1. Power frequency reference voltage test
2. Lightning impulse residual voltage test
3. Internal partial discharge test
4. Visual examination & Dimensional verification

6. MARKING

Each arrester shall be provided with a nameplate, bearing the following information, as a minimum, in English language:

- Arrester Type

- IEC standard
- Continuous Operating Voltage Uc
- Rate Voltage Ur
- Nominal Discharge Current
- Rated Short Circuit Current
- Manufacturers name or trademark
- Month & Year of manufacture
- Date of supply with period of guarantee

7. PACKING AND TRANSPORTATION

Arresters shall be securely packed, complete with all accessories, in strong non-returnable boxes, in such a manner as to prevent damage during transportation.

8. STANDARDS:

The design, manufacture and performance of Surge Arrestors shall comply with IS: 3070 Part-3 and other specific requirements stipulated in the specification. Unless otherwise specified, the equipment, material and processes shall conform to the latest applicable Indian/International Standards as listed hereunder:

IS:2071-1993 (Part-1)	Methods of High Voltage Testing General Definitions & Test Requirements.
IS:2071-1974(Part-2)	Test Procedures
IS:2629-1985	Recommended Practice for hot dip galvanizing on Iron & Steel
IS:2633-1986	Method for Testing uniformity of coating of zinc coated Articles.
IS:3070-1993 (Part – 3)	Specification for surge arrester for alternating current systems. Metal-Oxide lightning Arrestors without gaps
IS:4759-1996	Specification for hot dip zinc coating on Structural Steel and Other allied products.
IS:5621-1980	Hollow Insulators for use in Electrical Equipment.
IS:6209-1982	Methods of Partial discharge measurement.
IS:6745	Method for determination of mass of zinc coating on zinc coated iron and steel articles
ANSI/IEEE-C.62.11	Metal oxide, Surge Arrester for AC Power Circuits.
IEC –60099-4	Surge Arrestors

The equipment complying with any other internationally accepted standards shall also be considered if it ensures performance equivalent to or superior to the Indian Standards.

9. Challenge Clause:

The purchaser reserves the right to have the material, received after inspection by the authorized inspecting officer, again tested for any parameter(s), from approved/NABL accredited testing house/in house technique of the purchaser. The results if found deviating/unacceptable or in non-compliance with the approved

DTP'S, the lot shall be rejected and the bidder shall arrange to replace the rejected lot within thirty(30) days of such detection at his cost including to & fro transportation.

General Technical Specifications of Surge Arrestors

S.No.	Description	33 kV Surge Arrestors	11 kV Surge Arrestors
A	System Parameters:		
1	Nominal system voltage	33 kV	11kV
2	Highest system voltage	36 kV	12kV
3	System earthing	Solidly earthed system	Effectively earthed system
4	Frequency (Hz)	50	50
5	Lightning Impulse withstand Voltage (kVP)	170	75
6	Power frequency withstand Voltage (kV rms)	70	28
7	Connection to system	Phase to earth	Phase to earth
B	Surge Arrestors		
8	Type of Surge Arrestor	Gapless Metal oxide outdoor	Gapless Metal oxide outdoor
9	Arrestor rating (kV rms)	30	9
10	Continuous Operating voltage (kV rms)	25	7.65
11	Standard Nominal Discharge Current Rating (kA)	10	10
	(8x20 micro impulse shape)		
12	Line discharge class	2	2
13	Degree of protection	IP-67	IP-67
14	Lightning Impulse at 10 kA	85	45
15	Partial discharge at 1.05 COV not greater than	50 (PC)	50 (PC)
16	Energy capability corresponding to		
	a) Arrestor rating (kJ/kV)	4.5	4.5
	b) COV (kJ/kV)	4.9	4.9
17	Peak current for high current impulse operating duty of arrestor classification 10 kA	100	100
C	Insulator Housing		
18	Power frequency withstand test voltage	70	28
	(wet) (kV rms)		
19	Lightning impulse withstand/tests	170	75

	voltage (kVP)		
20	Pressure Relief Class	40	40
21	Creepage distance not less than	900 mm	300 mm
D	Galvanisation		
	<u>Fabricated Steel Aticles</u>		
22	-- 5 mm thick cover	610 g/m ²	610 g/m ²
23	Under 5 mm but not less than 2 mm thickness	460 g/m ²	460 g/m ²
24	Under 2 mm but not less than 1.2 mm thickness	340 g/m ²	340 g/m ²
E	Castings		
25	Grey Iron, malleable iron	610 g/m ²	610 g/m ²
26	Threaded works other than tubes & tube fittings		
	a) Under 10 mm dia	270 g/m ²	270 g/m ²
	b) 10 mm dia & above	300 m ²	300 m ²