CHAPTER 12: TECHNICAL SPECIFICATION FOR 398KV, 198KV, 120KV & 30KV SURGE ARRESTER

TECHNICAL SPECIFICATION FOR SURGE ARRESTERS FOR 400KV, 220KV, 132KV & 33KV SYSTEMS

SCOPE

This Section covers the specifications for design, manufacture, testing, transportation delivery at site, erection, and commissioning of class heavy duty, gapless metal (zinc) oxide Surge Arrestors complete with fittings & accessories for 400 kV, 220 kV, 132 kV and 33 kV systems.

STANDARDS

The design, manufacture and performance of Surge Arrestors shall comply with IS: 15086 Part-4 / IEC: 60099-4 unless otherwise specifically specified in this Specification

GENERAL REQUIREMENT

The surge arrestor shall draw negligible current at operating voltage and at the same time offer least resistance during the flow of surge current. The surge arrester shall be used in solidly earthed system.

The surge arrestor shall consist of non-linear resistor elements placed in series and housed in electrical grade porcelain housing of specified creepage distance.

The assembly shall be hermetically sealed with suitable rubber gaskets with effective sealing system arrangement to prevent ingress of moisture.

The surge arrestor shall not operate under power frequency and temporary over voltage conditions but under surge conditions, the surge arrestor shall change over to the conducting mode.

The surge arrestor shall be suitable for circuit breaker performing 0-0.3sec.-CO-3min-CO- duty in the system.

Surge arrestors shall have a suitable pressure relief system to avoid damage to the porcelain
housing and providing path for flow of rated fault currents in the event of arrestor failure..

The reference current of the arrestor shall be high enough to eliminate the influence of grading and stray capacitance on the measured reference voltage.

The Surge Arrestor shall be thermally stable and the bidder shall furnish a copy of thermal stability test with the bid.

The arrestor shall be capable of handling terminal energy for high surges, external pollution and transient over voltage and have low losses at operating voltages.

ARRESTOR HOUSING

The arrestor housing shall be made up of porcelain housing and shall be homogenous, free from laminations, cavities and other flaws of imperfections that might affect the mechanical and dielectric quality. The housing shall be of uniform brown colour, free from blisters, burrs and other similar defects.

Arrestors shall be complete with insulating bases, fasteners for stacking units together, surge counters with leakage current meters and terminal connectors.

The housing shall be so coordinated that external flashover shall not occur due to application of any impulse or switching surge voltage up to the maximum design value for arrestor. The arrestors shall not fail due to contamination. The arrester housings shall be designed for pressure relief class as given in Technical Parameters of the specification.

Sealed housings shall exhibit no measurable leakage.

FITTINGS & ACCESSORIES

The surge arrestor shall be complete with insulating bases, fasteners for stacking units together, surge counters with leakage current meters and terminal connectors.

The terminals shall be non-magnetic, corrosion proof, robust and of adequate size and shall be so located that incoming and outgoing connections are made with minimum possible bends. The top metal cap and base of surge arrestor shall be galvanized. The line terminal shall have a built-in clamping device which can be adjusted for both horizontal and vertical takeoff.

Grading corona control rings if necessary, shall be provided on each complete arrestor pole for proper stress distribution.

SURGE MONITOR

A self-contained discharge counter suitably enclosed for outdoor use and requiring no auxiliary or battery supply for operation shall be provided for each single pole unit. Leakage current meter with scale range of 0 to 5mA peak/root 2 to measure leakage current of surge arrestor shall also be supplied within the same enclosure. The number of operations performed by the arrestor shall be recorded by a suitable non-resettable cyclometric counter and surge monitor shall be provided with an inspection window. There shall be a provision for putting ammeter to record the current/alarm contacts suitable for communication to SCADA in the control room if the leakage current exceeds the permitted value. Similar provision shall be considered for surge counter also.

Surge monitor shall be mounted on the support structure at a suitable height so that the reading can be taken from ground level through the inspection window and length of connecting leads of minimum 5kV rating up to grounding point and bends shall be minimum.

TESTS

Test on Surge Arrestors

The Surge Arrestors offered shall be type tested and shall be subjected to routine and acceptance tests in accordance with IS: 15086 (Part-4). In addition, the suitability of the Surge Arrestors shall also be established for the following:

- Residual voltage test
- Reference voltage test
- Leakage current at M.C.O.V
- P.D. test
- Sealing test
- Thermal stability test
- Aging and Energy capability test
- Watt loss test

Each metal oxide block shall be tested for guaranteed specific energy capability in addition to routine/acceptance test as per IEC/IS.

The surge arrestor housing shall also be type tested and shall be subjected to routine and acceptance tests in accordance with IS: 2071.

Galvanization Test

All Ferrous parts exposed to atmospheric condition shall have passed the type tests and be subjected to routine and acceptance tests in accordance with IS: 2633 & IS 6745.

NAME PLATE

The name plate attached to the arrestor shall carry the following information:

Rated Voltage

Continuous Operation Voltage

Normal discharge current

Pressure relief rated current

Manufacturers Trade Mark

Name of Sub-station

Year of Manufacturer

Name of the manufacture

Purchase Order Number along with date.

Energy Absorption Capability

PRE-COMMISSIONING TESTS

Contractor shall carry out following tests as pre-commissioning tests. Contractor shall also perform any additional test based on specialties of the items as per the field instructions of the equipment Supplier or Employer without any extra cost to the Employer. The Contractor shall arrange all instruments required for conducting these tests along with calibration certificates and shall furnish the list of instruments to the Employer for approval.

Operation check of LA counters.

Insulation resistance measurement.

Third harmonic resistive current measurement (to be conducted after energisation.)

TYPE AND RATINGS may be read as:

SLNo.	Particulars				
		420 kV	245 kV	145 kV	36 kV
I	II	III	IV	V	VII
1	Rated voltage of arrester, kV	398	216	120	30
2	Continuous operating voltage, kV	267	168	102	25
2	Rated frequency, Hz	50	50	50	50
3	Nominal discharge current ofarrester, kA	20	20/10	10	10
4	(i) Min. switching surge residualvoltage (2kA),kVp	IEC	IEC	IEC	IEC
	(i) Max. switching surge residualvoltage (500 kA),kVp	IEC	IEC	IEC	IEC
5	Maximum residual voltage at,				
	(i) 5 kA nominal dischargecurrent, kV (peak)	IEC	IEC	IEC	IEC
	(ii) 10kA nominal dischargecurrent, kV (peak)	IEC	IEC	IEC	IEC
	(iii) 20kA nominal dischargecurrent, kV (peak)	IEC	IEC	IEC	IEC
	(iv) Steep fronted wave residualvoltage, kV (peak)	IEC	IEC	IEC	IEC
6	One minute power frequency withstand voltage of arresterhousing, kV (rms)	650	460	275	70
7	1.2 / 50 ■ second impulsewithstand voltage of arrester housing, kV (peak)	1425	1050	650	170
8	Switching impulse withstand voltage (250/2500 micro second) of arrester housing dryand wet, kV (peak)	1050	-	-	-
9	Creepage distance of insulatorhousing (mm)	13020	7595	4495	1116
10	Line discharge class	4	3	3	3
11	Short time current rating, kA for 3sec	63	50	40	31.5
12	Pressure Relief Class	A	A	A	A
13	Minimum cantilever strength (upright)	10kN	8N	6KN	4KN