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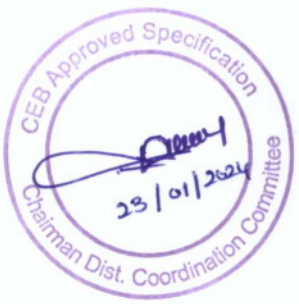
CEB

SPECIFICATION

MEDIUM VOLTAGE SURGE ARRESTERS



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SPECIFICATION FOR MEDIUM VOLTAGE SURGE ARRESTERS

1.0 SCOPE

This specification covers the general requirements of the design, manufacture, testing, supply and delivery of Surge Arresters of Gapless Metal-Oxide type for 11kV and 33kV Distribution System of the CEB.

2.0 SYSTEM PARAMETERS

(a)	Nominal voltage (U)	11 kV	33 kV
(b)	System highest voltage (Um)	12 kV	36 kV
(c)	System frequency	50 Hz	50 Hz
(d)	Method of earthing	Effectively earthed for overhead systems and resistive earth for underground cable system	Non-effectively earthed
(e)	System fault level	25 kA	25 kA

3.0 SERVICE CONDITIONS

i.	Annual average ambient temperature	30 °C
ii.	Maximum ambient temperature	40 °C
iii.	Maximum relative humidity	90%
iv.	Solar Radiation	4.5 kWh/m^2/day
v.	Environmental conditions	Humid tropical climate with heavily polluted atmosphere
vi.	Operational altitude	From M.S.L. to 1900 m above M.S.L.
vii.	Isokeraunic (Thunder days) level	100 days

4.0 APPLICABLE STANDARDS

The equipment and components supplied shall be in accordance with the latest editions of the standards specified below and amendments thereof.

(a)	IEC 60099-4:2014	Surge Arresters – Metal-oxide surge arresters without gaps for a.c. systems
(b)	IEC 60099-5:2018	Surge Arresters – Selection and application recommendations
(c)	IEC 61109:2008	Composite insulator for a.c. over headlines with a nominal voltage greater than 1000V - Definitions, test methods and acceptance criteria.

(d)	IEC 60507:2013	Artificial pollution tests on high voltage insulators to be used on a.c.. Systems.

However, in the event of discrepancy, details given in this CEB specification supersede above standards.

5.0 BASIC FEATURES

5.1 Technical Parameters

(a) Minimum Technical Requirements

			Nominal Voltage 11kV	Nominal Voltage 33kV
i.	Rated voltage	kV	12	>36
ii.	Continuous Operating Voltage	kV	Not less than 9.6	Not less than 28.8
iii.	Standard nominal discharge current (8/20 µs)	kA	10	10
iv.	Arrester Class		Distribution	Distribution
v.	Arrester Designation (As per IEC 60099-4:2020)		DH	DH
vi.	Thermal charge transfer rating	C	≥1.1	≥1.1
vii.	High current impulse (4/10µs) – Peak	kA	100	100
viii.	Steep current (1/20µs) maximum impulse residual voltage – peak	kV	40	120
ix.	Maximum residual voltage at 10kA for (8/20µs)	kV	35	110
x.	Switching impulse (30-100/60-200µs) maximum residual voltage – peak	kV	30	100
xi.	One second TOV withstand capability	kV	>1.15x12	>1.15x 36
xii.	Type of housing Insulator		Polymeric	Polymeric
xiii.	Insulation withstand level			
xiv.	Lighting impulse (1.2/50µs) voltage - peak	kV	75	170
xv.	Power frequency withstand voltage (wet)	kV	28	70
xvi.	Total creepage distance	mm	276	828

(b) Power Frequency Voltage vs Time Characteristics

The manufacturer shall provide the power frequency voltage vs time characteristics, preheated to 60°C with no prior energy and with prior energy (specified by the manufacturer) horder to verify the TOV capability of the Arrester.

If a particular manufacturer is unable to meet the TOV condition of $1.15U_r$ (rated voltage of the Arrester) for 1 sec. duration, has the option of offering of an Arrester of a higher rating.

5.2 Design

The Surge Arresters shall be designed for outdoor service conditions stipulated in Clause No. 3.0 above. They will be connected between phase and earth to protect distribution transformers and switchgear. It shall be complete with the following: -

a) Clamps suitable to receive Copper/Aluminium (Line) Conductors from 4mm - 16mm

b) Flexible Copper earth connection lead of 450 mm in length shall be provided with a Copper lug suitable for M12 bolt, for the connection to earth terminal.

c). The mounting clamps suitable for bracket mounting on a structure made out of 100x50x6mm Channel Iron.

5.3 Manufacture

The Surge Arrester shall be of the non-linear metal-oxide resister type without spark gaps and the non-linear metal-oxide resister shall be housed in a hermetically sealed insulator casing to prevent ingress of moisture.

5.4 Insulator Details

The housing insulator of the surge arrester shall be of polymeric type and the insulator sheds shall be designed to minimize trapping of contamination.

The complete arrester shall withstand a 1000h salt fog test at continuous voltage as described in IEC 61109 / IEC 60507. Additional cycle tests as described in IEC 61109 shall also be passed satisfactorily.

5.5 Moisture Sealing

The manufacturing procedure shall include an effective leak test and the manufacturers shall carry out the Special Thermal Stability Test as specified in IEC 60099-4.

5.6 Partial Discharge

Each surge arrester shall be tested to prove absence of partial discharge contact noise as specified in IEC 60099 – 4.

5.7 Arrester Disconnector

The Surge Arrester shall have a device for disconnecting it from the system in the event of arrester failure to prevent a persistent fault in the system and it shall give a visible indication when the arrester has failed. The arrester disconnector shall be tested as per IEC 60099-1.

5.8 Insulating Bracket

A robust insulating bracket together with suitable mounting clamps to mount the Surge Arrester to 100x50x6mm Channel Iron Cross Arms shall be supplied with the Surge Arrester. The power frequency withstand voltage of the insulating bracket shall not be less than 20kV.

6.0 REQUIREMENTS FOR SELECTION

6.1 Quality Assurance

The manufacturer shall possess ISO 9001:2015 or latest Quality Assurance Certification for the design, manufacture and testing of Surge Arresters. The certificate shall be valid throughout the delivery period of this bid. In the event the meters are manufactured in a plant under the license of the manufacturer, the manufacturing plant shall possess ISO 9001:2015 or latest Quality Assurance Certificate for manufacturing and testing of Surge Arresters. The Bidder shall furnish a copy of the ISO certificate certified as true copy of the original by the manufacturer, along with the offer.

6.2 Manufacturing Experience

Manufacturer shall have a minimum of 10 years experience of the manufacture of 12 kV & 36kV Metal Oxide Gapless Arresters and shall have supplied to minimum of ten Electricity Utilities internationally during last 10 years. The manufacturer shall submit proof documents such as supply records, the name and particular of the purchasers, quantity sold, and the year of sale.

6.3 Type Tests

Type Test Certificates conforming to the above referred standards or any other international standard which is not less stringent, issued by an accredited independent testing laboratory acceptable to the CEB shall be furnished with the offer. Type Test Certificates shall clearly indicate the relevant standard, items concerned, showing the manufacturers identity, type No. /catalogue No. and basic technical parameters. In case if the submitted type tests are according to any other international standard which is not less stringent than the specified, then the copy of the used standard in English shall be submitted with offer.

Proof of accreditation and accredited scope by a national/ international authority shall be forwarded with the offer. Test certificates shall be complete including all the pages as issued by the testing authority. Type test certificates shall be in English language. Parts of test certificates shall not be acceptable.

Following Type Test certificates conforming to IEC 60099-4, IEC 60507 and IEC 61109 shall also be submitted with the offer.

a) Insulation withstand tests on the arrester housing.
b) Residual voltage tests.
c) Test to verify long term stability under continuous operating voltage.

d) Heat dissipation behaviour verification of test sample.
e) Operation duty test.
f) Power-frequency voltage versus time.
g) Tests of arrester disconnector.
h) Short-circuit tests.
i) Test to verify the dielectric withstand of the internal components of an arrester.
j) Seal leakage test.
k) Weather ageing tests.

7.0 INFORMATION TO BE FURNISHED WITH THE OFFER

The following shall be furnished with the offer.

a) Technical details in English clearly identifying the offered items, but not limited to:
   i. The Comprehensive catalogues.
   ii. Dimensional drawings of the bracket mounting base, live conductor clamps, earth lead and automatic earth disconnecting device and overall dimensional drawing.
   iii. Schematic diagrams.
   iv. Calculations, graphs and tables.
   v. Literature describing the operational features.
   vi. Power frequency withstand voltage versus time characteristic curve covering the time range from 0.1 sec. to 24 minutes.
   vii. Name plate drawing to scale, incorporating the particulars called for in clause 9.2.
   viii. Constructional & mounting details with electrical clearances.
   ix. Materials used for components & relevant literature and electrical properties and mechanical properties.

b) ISO 9001:2015 or latest Quality Assurance Certificate in accordance with clause 6.1.

c) Manufacturer shall furnish a list of supplies with supplied item, purchaser (specifying address contact persons and contact details, country), year & quantity to prove his manufacturing experience and outside the country sales in accordance with Clause 6.2.

d) Type Test Certificates in accordance with the clause 6.3.

e) Duly filled and signed 'Annex - B: Schedule of Technical Requirements and Guaranteed Technical Particulars'.

f) Other relevant Technical Details, protection operating curves and Calculations.

Not furnishing above documents and details may result in offer being rejected.

8.0 SAMPLES

One complete set of the offered model of the surge arrester shall accompany with the Bid to facilitate analysis and evaluation.

9.0 PACKING AND LABELING/ MARKING

9.1 Packing

Each set of Surge Arrester shall be packed in a suitable box. Number of these boxes shall beheld together in a firm position and measures shall be taken to avoid damage against jerks and collision between adjacent units during transportation.

Each packing shall contain a copy of installation instruction in English Language. The voltagerating, manufacturer's name / identification, Country of Origin, and the quantity shall be clearly marked on each packing.

9.2 Identification and Labelling/ Marking

The following ratings and data of the arresters shall be provided and it shall be weather proof and corrosion proof. The plate shall be positioned at the bottom flange base and visible from the ground level.

(a) Number and year of the standard adopted
(b) Rated voltage / frequency
(c) Continuous operating voltage
(c) Arrester type and discharge class
(d) Nominal discharge current
(e) Manufacturer's identification (name or trade mark etc.)
(f) Year of manufacture
(g) Serial number

10.0 INSPECTION AND TESTING

10.1 Routine Tests

The Routine Test Certificates conforming to the relevant standards (depending on the choice of the applicable standards) shall be furnished for the observation of the Engineer appointed by CEB at the time of inspection. In addition, the routine test certificates shall be sent with the shipment.

The following Routine Tests shall be carried out on all the arresters as per IEC 60099-4 and the test report shall be made available for the observation of the CEB Inspector at the time of inspection.

(a) Power frequency reference voltage test.

(b) Residual voltage tests.

(c) Partial discharge test.

(d) Leakage test

10.2 Inspection

The Successful bidder shall make necessary arrangements for inspection by an Engineer appointed by the CEB and also to carry out in his presence necessary Acceptance tests on procured item and material without any additional cost. Acceptance test reports shall be a part of the shipping document. CEB may waive off the inspection either with the condition of witnessing the acceptance tests by an independent body acceptable to CEB or completely. In such a situation a notice of waive off will be issued in advance to the supplier.

10.3 Acceptance Tests

Unless specified below, visual inspection, dimensional checks, sample tests specified in the relevant standards, selected type tests and the routine tests conducted for the selected sample in addition to the complete routine test reports shall form the acceptance test report.

The following acceptance test for Class 1 surge arrester, as per IEC 60099-4 shall be witnessed by the CEB Inspector.

a) Power frequency reference voltage test

b) Partial discharge test.

c) Lightning Impulse Residual voltage test.

d) Thermal Stability test

11.0 ANNEXES

Annex – A: Schedule of Technical Particulars – To be filled by the Manufacturer

Annex – B: Non - Compliance Schedule

Annex A - SCHEDULE OF TECHNICAL REQUIREMENTS AND GUARANTEED TECHNICAL PARTICULARS

(CEB Requirements shall be filled by the procurement entity and information of the offer shall be filled by the manufacturer)

			Offered Values
1)	Name of manufacturer and country of origin		
2)	Rated voltage	(kV)	
3)	Maximum continuous operating voltage (MCOV)	(kV)	
4)	Whether Type Test Reports as per cl. 10.2 is furnished	(Yes/No)	
5)	Classification of arrester as per IEC 60099-4		
6)	Arrester housing;		
	a) Material		
	b) Insulation withstand level		
	i) Lighting impulse (1.2/50µs) withstand voltage	(kV peak)	
	ii) Power frequency wet withstand voltage	(kV)	
	c) Total creepage distance	mm	
7)	High current impulse (4/10µs) withstand level	(kA peak)	
8)	Standard nominal discharge current (8/20µs)	kA	
9)	Thermal charge transfer rating	C	
10)	Steep current (1/20µs) maximum impulse residual voltage	(kV peak)	
11)	Maximum residual voltage at 10kA for (8/20µs)	(kV peak)	
12)	Switching impulse (30-100/60-200µs) maximumresidual voltage	(kV peak)	
13)	Pressure relief class (Minimum prospective symmetricalfault current)	kA	
14)	Arrester terminals		
	a) Type of material		
	b) Applicable conductor size.	mm^2	
15)	Dimensions and weight	(mm x mm),kg	
16)	Insulating Bracket		
	a) Power frequency withstand voltage	(kV)	
	b) Cantilever strength	(Nm)	
17)	Whether the arrester earth lead for disconnector provided?	Yes/No	
18)	Whether the power frequency withstand voltage versustime characteristics curve as per clause 7(c) vi.	Yes/No	

19)	Whether the ISO 9001:2015 Certificate as per Clause 6.1 isfurnished?	Yes/No	
20)	Whether the acceptance tests as per Clause 10.3 will be carried out at the time of inspection Place of testing?	(Yes/No)	
21)	Whether the rating plate marking as per Clause 9.2 provided.?	Yes/No	

.....
Signature of the Manufacturer and seal

.....
Date

I/We certify that the above data are true and correct

.....
Signature of the Bidder and seal

.....
Date

CEB Approved Specification
23/01/2024
Chairman Dist. Coordination Committee

Annex B - Non-Compliance Schedule

On this schedule the bidder shall provide a list of non-compliances with this specification, documenting the effects that such non-compliance is likely to have on the equipment life and operating characteristics. Each non-compliance shall be referred to the relevant specification clause.

Clause No.	Non-Compliance

.....
Signature of the Manufacturer

.....
Date

I/We certify that the above data are true and correct

.....
Signature of the Bidder and seal

.....
Date

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