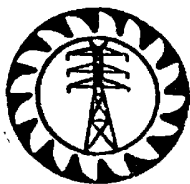


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CEB
SPECIFICATION

MEDIUM VOLTAGE SURGE ARRESTERS



CEYLON ELECTRICITY BOARD
SRI LANKA

Specification

for

MEDIUM VOLTAGE SURGE ARRESTERS

CEB Specification - 011: 2008

CEYLON ELECTRICITY BOARD

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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	11kV	33 kV
(b)	System highest voltage	12kV	36 kV
(c)	System frequency	50 Hz	50Hz
(d)	No. of phases	3	3
(e)	Neutral earthing	Effective	Non effective
(f)	System fault current	20kA	20kA

3.0 SERVICE CONDITIONS

(a)	Annual average ambient temperature	30°C
(b)	Maximum ambient temperature	40°C
(c)	Solar radiation	1.1 kW/m ²
(d)	Maximum relative humidity	90%
(e)	Environmental condition	Humid tropical climate with polluted atmosphere.
(f)	Operational altitude	Up to 1900 meters above MSL
(g)	Isokeraunic (Thunder day) level	90 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. However the CEB Specification shall supersede these standards in the event there is a discrepancy.

(a)	IEC 60099-4 (1999) Part 4	Surge Arresters – Metal-oxide surge arresters without gaps for a.c. systems
(b)	IEC 60099-5 (2000) Part 5	Surge Arresters – Selection and application recommendations
(c)	IEC 61109 (1992)	Composite insulator for a.c. over headlines with a nominal voltage greater than 1000V - Definitions, test methods and acceptance criteria.
(d)	IEC 60507 (1991)	Artificial pollution tests on high voltage insulators to be used on a.c.. Systems.

5.0 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 μ s)	kA	10	10
iv)	Line discharge Class		1	1
v)	High current impulse (4/10 μ s) - Peak	kA	100	100
vi)	Steep current (1/20 μ s) maximum impulse residual voltage - peak	kV	40	120
vii)	Maximum residual voltage at 10kA for (8/20 μ s)	kV	35	110
viii)	Switching impulse (30-100/60-200 μ s) maximum residual voltage - peak	kV	30	100
ix)	One second TOV withstand capability	kV	>1.15x12	>1.15x 36
x)	Type of housing Insulator		Polymeric	Polymeric
	1) Insulation withstand level			
	a) Lighting impulse (1.2/50 μ s) voltage - peak	kV	75	170
	b) Power frequency withstand voltage (wet)	kV	28	70
	2) Total creepage distance	mm	276	828
xi)	Energy absorption Capability (with 4/10 wave shape) at U_c	kJ/kV	Not less than 3.2	

(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) in order 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.

6.0 BASIC FEATURES

6.1 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:-

- Clamps suitable to receive Copper/Aluminium (Line) Conductors from 4mm - 16mm
- Flexible Copper earth connection lead of 450 mm in length shall be provided with a Copper lug of hole diameter of 8 mm.
- The mounting clamps suitable for bracket mounting on a structure made out of 100x50x6mm Channel Iron.

6.2 Manufacture

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

6.3 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.

6.4 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.

6.5 Partial Discharge

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

6.6 Arrester Disconnecter

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 disconnecter shall be tested as per IEC 60099-1.

6.7 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.

7.0 QUALITY ASSURANCE

The manufacturer shall possess ISO 9001: 2000 Quality Assurance Certification for the manufacture of Surge Arresters for the plant where the manufacture of Surge Arrester is done. The Bidder shall furnish a copy of the ISO Certificate certified as true copy of the original by the manufacturer, along with the offer.

8.0 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.

9.0 ADDITIONAL REQUIREMENTS**9.1 Rating Plate Markings**

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

9.3 Packing

Each set of Surge Arrester shall be packed in a suitable box. Number of these boxes shall be held 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 voltage rating, manufacturer's name / identification, Country of Origin, and the quantity shall be clearly marked on each packing.

10.0 INFORMATION TO BE SUPPLIED WITH THE OFFER

10.1 The following shall be furnished with the offer.

- (a) Product Catalogues / Technical literature describing the constructional features, materials used for components, operational feature of the equipment, indicating the model number etc.
- (b) Energy withstand capability & a description of the test carried out to measure the same.
- (c) Power frequency withstand voltage versus time characteristic curve covering the time range from 0.1 sec. to 24 minutes.
- (d) Dimensional drawings of the bracket mounting base, live conductor clamps, earth lead and automatic earth disconnecting device and overall dimensional drawing.
- (e) Drawing of name plate to scale incorporating the particulars called for.
- (f) Completed Schedule of Guaranteed Technical Particulars - Annex A
- (g) A copy of the Manufacturer's ISO 9001 Certificate conforming to Clause 7-Quality Assurance
- (h) Documents to prove manufacturing experience as per Clause 8.0.

10.2 Type Test Certificates

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

- (a) Insulation withstand test,
- (b) Residual voltage tests,
- (c) Long duration current impulse withstand test,
- (d) Operation duty test,
- (e) Tests of arrester disconnecting device,
- (f) Partial discharge test,
- (g) Seal leakage test,
- (h) Tracking & erosion test for polymeric insulation

The Type Test Certificates shall clearly identify the equipment concerned showing the manufacturer's identity. Type Test Report shall include a complete drawings and the model/type of the offered Arrester.

Type Test Report shall be from a recognized independent testing authority acceptable to the purchaser.

11.0 SAMPLE

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

12.0 INSPECTION AND TESTING

12.1 Inspection

The successful Bidder shall make necessary arrangements for pre-shipment inspection by an Inspector sent by the CEB or by an authority acceptable to the CEB to carry out the in his presence the necessary Sample/Acceptance tests as per Clause 12.2, conforming to IEC 60099-4 on equipment and materials offered. Routine test report as per Clause 9.2 shall be furnished for the observation of the Inspector.

12.2 Acceptance/ Sample Test

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

12.3 Routine Test

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

13.0 TECHNICAL LITERATURE, DRAWINGS

Technical Literature in English Language on installation, operation and maintenance shall be supplied with the Surge Arresters, and they shall be descriptive and self explanatory, complete with necessary circuit diagrams and drawings.

14.0 ANNEX

- A - Schedule of Guaranteed Technical Particulars - To be filled by the Bidder
- B - Non Compliance schedule - To be filled by the Bidder

Schedule of Guaranteed Technical Particulars
(To be filled by the Bidder for the offered Arrester)

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 (1.2/50 μ s) withstand voltage	(kV peak)	
	ii) Power frequency wet withstand voltage	(kV)	
	c) Total creepage distance	mm	
7)	High current impulse (4/10 μ s) withstand level	(kA peak)	
8)	Standard nominal discharge current (8/20 μ s)	kA	
9)	Energy absorption Capability (with 4/10 wave shape) at U _c	kJ/kV	
10)	Steep current (1/20 μ s) maximum impulse residual voltage	(kV peak)	
11)	Maximum residual voltage at 10kA for (8/20 μ s)	(kV peak)	
12)	Switching impulse (30-100/60-200 μ s) maximum residual voltage	(kV peak)	
13)	Pressure relief class (Minimum prospective symmetrical fault 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 versus time characteristics curve as per class 10.1(c)	Yes/No	
19)	Whether the ISO 9001 Certificate as per Clause 7.0 is furnished	Yes/No	
20)	Whether the acceptance tests as per Clause 12.2 will be carried out at the time of inspection Place of testing	(Yes/No)	
	Whether the rating plate marking as per Clause 9.1 provided.	Yes/No	

.....
Seal and Signature of the Manufacturer/Date

Date:

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's life and operating characteristics. Each non- compliance shall be referred to the relevant specification clause.

Clause No.	Non Compliance

Seal & Signature of the Manufacturer/Bidder

Date: