KINGDOM OF CAMBODIA

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ELECTRICITE DU CAMBODGE

TECHNICAL SPECIFICATION

EDC-DTS-MV008

MV Polymer Strain Insulators

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ELECTRICITE DU CAMBODGE

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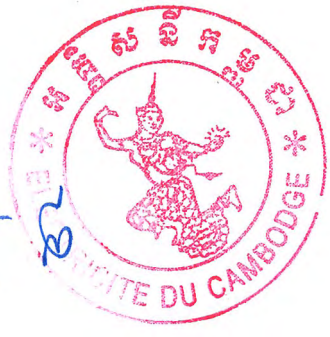
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MV Polymer Strain Insulators

1 Scope

This specification covers the design, manufacturing, testing, supply, delivery and performance requirements for 35 kV and 22 kV polymer strain insulators and accessories to be used on MV distribution systems of Electricité du Cambodge.

2 Standards

The equipment shall comply with the latest editions of the amendments to the standards/specifications listed below:

IEC: International Electrotechnical Commission

IEC 60383	: Insulators for Overhead Lines with a Nominal Voltage above 1000 V
IEC 60383-1	: Insulators for overhead lines with a nominal voltage above 1000 V-Part 2: Insulator strings and insulator sets for a.c. systems -Definitions, test methods and acceptance criteria
IEC 60471	: Dimensions of clevis and tongue couplings of string insulator units
IEC 61109	: Insulators for overhead lines – Composite suspension and tension insulators for a.c. systems with a nominal voltage greater than 1 000 V – Definitions, test methods and acceptance criteria.
IEC/TR 62039	: Selection guide for polymeric materials for outdoor use under HV stress
IEC/TR 62662	: Guidance for production, testing and diagnostics of polymer insulators with respect to brittle fracture of core materials

ISO: International Standard Organization

ISO 2063	: Metallic coating-protection of iron and steel against corrosion
ISO/IEC 17025	: General requirements for the competence of testing and calibration laboratories
ISO 9001	: Quality management systems – Requirements

The Supplier may propose alternative standards, provided it is demonstrated that the standards give an equivalent degree of quality as the referenced ones. Acceptability of any alternative standard is at the discretion of EDC.

3 Definitions

The definition of the relevant IEC standards apply to this technical specification.

4 Testing and Inspection

4.1 General Notes for Test

MV polymer strain insulators may be inspected at the manufacturer's factory by EDC's representatives.

The inspection and routine tests shall be carried out in accordance with the provisions of the relevant IEC recommendations.

The polymer strain insulators shall be subjected to test as specified below.

4.2 Type Tests

All type tests required by the relevant IEC shall be carried out.

Type test reports shall be carried out by internationally recognized electrical testing laboratories.

Full copies of type test reports shall be submitted within the bid of the manufacturer/supplier. Type test reports older than 10 years will not be accepted.

If the manufacturer is certified by EDC, it is not necessary to submit type test reports for the considered equipment.

Nevertheless, in case the testing laboratory is not internationally recognized, the testing laboratory shall be mandatorily accredited ISO/IEC 17025 by an international or national accreditation body specialized in testing laboratories accreditation/acceptance. In that case, the testing laboratory shall prove mandatorily its capability/capacity to carry out all type tests mentioned in the type tests reports by suppling: Full description of all tests the laboratory can carry out, list of testing equipment with full characteristics, drawing of testing rooms with location of testing equipment, ...etc., supported by pictures and copy of the ISO/IEC 17025 accreditation certificate.

Acceptability of any accredited testing laboratory is at the discretion of the EDC.

4.3 Routine Test

These tests shall be carried out on each insulator to be supplied, at the manufacturer's factory to ensure that the product is in accordance with the insulator on which the type test has been carried out.

The manufacturer shall supply a certificate giving the result of all the tests carried out on the insulator.

The routine tests shall be carried out as per requirements of the relevant IEC 61109.

4.4 Acceptance Test

These tests shall be applied on insulator to be supplied, selected at random from the lot by EDC.

The sizes of samples are indicated in the table below:

Lot Size	**Sample Size**	
Number	**X**	**Y**
Below 2 000	4	3
2 000<N<5 000	8	4
5 000<N<10 000	12	6

When more than 10 000 insulators are concerned they shall be divided into an optimum number of equal lots comprising between 2 000 and 10 000 insulators. The result of the tests shall be evaluated separately for each lot.

The insulators shall be selected by the EDC representative from the lot at random.

The samples shall be subjected to the applicable sampling tests.

The sampling tests are:

- Verification of dimensions (X + Y)
- Verification of the locking system Y
- Verification of tightness of the interface between end fittings & Insulator housing Y
- Verification of the specified mechanical load SML X
- Galvanizing test Y

In the event of a failure of the sample to satisfy a test, the retesting procedure shall be as follows:

If only one insulator or metal part fails to comply with the sampling tests, a new sample equal to twice the quantity originally submitted to the tests shall be subjected to retesting. The retesting shall comprise the test in which failure occurs. If two or more insulator or metal parts fail to comply with any of the sampling tests or if any failure occurs during the retesting, the complete lot is considered as not complying with this standard and shall be withdrawn by the manufacturer.

Provided the cause of the failure can be clearly identified, the manufacturer may sort the lot to eliminate all the insulators with these defects. The sorted lot then be resubmitted for testing. The number then selected shall be three times the first chosen quantity for tests. If any insulators fail during this retesting, the complete lot is considered as not complying with this standard and shall be withdrawn by the manufacturer.

5 Quality Management

Design, development and production of the proposed equipment shall be ISO 9001 certified. The ISO 9001 certificate shall be submitted within the bid.

6 General

Composite strain insulators complete with fittings shall be supplied. Each insulator shall be supplied with clevis and tongue end fittings to enable the strain insulator to be attached to an eye nut on the cross arm.

7 Design

This specification covers 35 kV and 22 kV Polymer Strain Insulator for use in strain position on MV overhead distribution system.

7.1 Ambient conditions

The insulators shall be suitable to operate in the ambient conditions described here after:

Altitude	Sea level to 1,000 meters
Climate	Tropical
Annual Rainfall	1,300 mm.140 days

Monsoon Period	June to November
Ambient Air Temperatures:	
Average	27.5°C
Minimum	13.3°C
Maximum	40.5°C
Relative Air Humidity	65-100%
Soil Thermal Resistivity,:	
Average	1.20c m/W
Maximum	3.00c m/W
Solar Emissivity	0.8
Solar absorption	0.8
Wind Velocity:	
Average	37 km/h (10.3 m/s)
Maximum	72 km/h (20 m/s)

7.2 Design and Construction

All insulator units offered shall comply with the characteristics and performance requirements set down in the table here below:

Characteristics	**Requirements**	
Electrical System	35kV	22kV
Highest voltage	38kV	24kV
Impulse withstand voltage (1.25/50µs) Dry	170 kV minimum	145 kV minimum
50Hz withstand voltage (1 min)	70 kV minimum	50 kV minimum
Mechanical		
Mechanical failing load	100 kN minimum	70 kN minimum
Dimension		
Minimum Creepage distance: (1) Pollution level II area (medium): 20 mm/kV Pollution level III area (heavy): 25 mm/kV	 760 mm 950 mm	 480 mm 600 mm
Standard coupling	Clevis and Tongue	Clevis and Tongue

(1) Pollution level III area: Coastal band of 10 km large. Pollution level II area: rest of Cambodia.

The insulators shall be constructed on a fibber glass core rod with a one-piece EPDM or silicone rubber sheath/weather shield. The end fittings shall be compression crimped to the core and sheath to ensure a weatherproof seal.

7.3 Corrosion Protection

Ferrous parts, unless of stainless steel, shall be hot dip galvanized.

The minimum weight of zinc deposited generally shall be 610 g/mm², which is equivalent to a minimum average thickness of coating of 85 microns (µm) with a preference for 1,005 g/mm², which is equivalent to a minimum average thickness of coating of 140 microns (µm).

7.4 Dimensions

The supplier shall guarantee that the dimensions and tolerances of the insulators offered are in accordance with his detailed drawing which shall accompany his quotation.

The number of fins (disks) shall not exceed 8 for 35 kV insulators and 6 for 22kV.

All components shall comply with the relevant standards.

7.5 Fittings

The fittings supplied with each insulator shall consist of one (1) galvanized steel bow shackle, one (1) 16 mm galvanized steel pins complete with stainless steel cotter pins and one (1) clevis thimble to suit the particular conductor for which it is to be used.

7.6 Markings

Each insulator shall be marked with the name and trademark of the manufacturer and the year of manufacture. In addition, each unit shall be marked with the specified mechanical failing load. These markings shall be legible and indelible.

8 Accessories for Strain Insulators

Each strain insulator unit shall be supplied complete with accessories which will be used to connect the string insulator with the cross-arm and the preformed dead end termination with the strain insulator. For accessories hot-dip galvanized the coating thickness shall not be less than 85 µm.

This specification covers accessories for a polymer strain insulator (excluding insulators) such as: extension link, anchor shackle, clevis thimble, eye link, socket clevis, etc.

8.1 Design and Construction

All of accessories are made of steel with exception of clevis thimble for using with preformed dead end termination that is made of aluminum.

All parts of accessories for a polymer strain insulator offered shall comply with the mechanical characteristics and performance set down in the table below:

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Mechanical characteristic	Requirement
- Breaking load	100 kN minimum for 35 kV strain insulators
	70 kN minimum for 22 kV strain insulators

Corrosion Protection: All steel parts shall be hot dip galvanized.

8.2 Dimensions

The supplier shall guarantee that dimension and tolerances of accessories offered are in accordance with his detailed drawing that shall accompany his quotation.

All components shall comply with the relevant standards.

8.3 Markings

Each one of parts of accessories for strain insulator shall be marked with the name and trademark of the manufacturer and the year of manufacture. In addition each unit shall be marked with the mechanical load and size. These markings shall be legible and indelible.

9 Technical Particulars

9.1 35 kV Polymer Strain insulators

No	Description	Unit	Requirements	Supplier's Offer
	35 kV Polymer Strain insulators			
1	Country		to be specified	
2	Manufacturer		to be specified	
3	Manufacturer's Reference		to be specified	
4	Applicable standards		to be specified	
5	Impulse withstand Voltage (1.2/50µs) Dry Wet	 kV kV	 ≥170 ≥130	
6	50 Hz withstand voltage (1 min)	kV	≥70	
7	Wet, Power Frequency withstand Voltage	kV	To be specified	
8	Dry, Power frequency withstand Voltage	kV	to be specified	
9	Negative Impulse withstand voltage	kV	to be specified	
10	Positive Impulse withstand voltage	kV	to be specified	
11	Mechanical failing load	kN	100	
12	Diameter of insulator	mm	to be specified	
13	Length of insulator	mm	to be specified	
14.a	Creepage distance (20 mm/kV)	mm	≥ 760	
14.b	Creepage distance (25 mm/kV)	mm	≥ 950	
15	Maximum radio influence voltage	µV	to be specified	
16	Type of material: Rod Housing Ends fitting		 to be specified and described	
17	Number of fins (disks)	mm	≤8	
18	Insulating distance	mm	to be specified	
19	Identification markings		to be specified	

10	Color of insulator		To be specified	
21	Accessories for each string insulator		to be specified and described	
22	Weight of insulator	kg	to be specified	
23	Weight of accessories	kg	to be specified	

Supplier's offer column must be properly filled with the right figures. "Compliant, Yes, ", V , etc..." are not accepted

Deviation from the technical specification:

The bidder shall list point after point and explain here in after all deviation from the requested technical specification.

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Full technical information shall be supplied within the bid.

Bidder signature:

9.2 22 kV Polymer Strain insulators

No	Description	Unit	Requirements	Supplier's Offer
	22 kV Polymer Strain insulators			
1	Country		to be specified	
2	Manufacturer		to be specified	
3	Manufacturer's Reference		to be specified	
4	Applicable standards		to be specified	
5	Impulse withstand Voltage (1.2/50µs) Dry Wet	 kV kV	 ≥145 ≥115	
6	50 Hz withstand voltage (1 min)	kV	50	
7	Wet, Power Frequency withstand Voltage	kV	To be specified	
8	Dry, Power frequency withstand Voltage	kV	to be specified	
9	Negative Impulse withstand voltage	kV	to be specified	
10	Positive Impulse withstand voltage	kV	to be specified	
11	Mechanical failing load	kN	70	
12	Diameter of insulator	mm	to be specified	
13	Length of insulator	mm	to be specified	
14.a	Creepage distance 20 mm/kV	mm	≥480	
14.b	Creepage distance25 mm/kV	mm	≥600	
15	Maximum radio influence voltage	µV	to be specified	
16	Type of material: Rod Housing Ends fitting		 to be specified and described	
17	Number of fins (disks)	mm	≤6	
18	Insulating distance	mm	to be specified	
19	Identification markings		to be specified	
10	Color of insulator		To be specified	
21	Accessories for each string insulator		to be specified and described	

22	Weight of insulator	kg	to be specified	
23	Weight of accessories	kg	to be specified	
Supplier's offer column must be properly filled with the right figures. "Compliant, Yes, ", V , etc..." are not accepted				

Deviation from the technical specification:

The bidder shall list point after point and explain here in after all deviation from the requested technical specification.

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