

Final doc

CONTENTS		Page
1.	Scope	2
2.	System Parameters	2
3.	Service Conditions	2
4.	Applicable Standards	2
5.	Technical Requirements	3
6.	Basic Features	3
7.	Quality Assurance	4
8.	Additional Requirements	5
9.	Information to be Supplied with the Offer	5
10.	Sample	6
11.	Inspection and Testing	6
12.	Annex.	6

SPECIFICATION FOR MEDIUM VOLTAGE

PIN INSULATORS AND HARDWARE (12kV & 36kV)

1.0 SCOPE

This Specification covers the general requirements of design, manufacture, testing, supply and delivery of Pin Insulators complete with hardware for 11kV and 33kV overhead distribution systems.

2.0 SYSTEM PARAMETERS

a)	Nominal Voltage	-	11kV	33kV
b)	System Highest Voltage	-	12kV	36kV
c)	System Frequency	-	50Hz	50Hz
d)	Type of earthing	-	Effective	Non effective
e)	System Fault Current (Sym.)	-	13.1 kA	13.1 kA

3.0 SERVICE CONDITIONS

a)	Annual average ambient temperature	-	30°C
b)	Maximum ambient temperature	-	40°C
c)	Maximum Relative Humidity	-	90%
d)	Environmental condition - Condition	-	Humid tropical climate with polluted atmosphere.
e)	Operational Altitude	-	From M.S.L. to 1900 M above M.S.L.
f)	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 60383 (1993) Part 1 & Part 2 BSEN 60383 (1998)	-	Insulator for Overhead Line with Voltage above 1000V.
b)	BS 137 Part 2 (1973)	-	Insulators of ceramic material or glass for overhead lines with a nominal voltage greater than 1kV.
c)	IEC 60437 (1997)	-	Radio interference test on high voltage insulators
d)	BSENISO 1461 (1999)	-	Hot dip galvanised coating on iron and steel articles.
e)	BS 3288 (1977)	-	Insulator and conductor fittings for overhead lines.

5.0 TECHNICAL REQUIREMENTS

1)	Insulator Type	-	Class B (IEC 383/ BS137)
2)	Radio Interference	-	IEC - 60437 - 1997 (30dB)

3)	Applicable Conductor Size (max.)	mm	-	20	20
4)	Size of channel iron cross arms for fixing insulators	mm	-	100x50 x 6	
5)	Rated Voltage	kV	-	12	36
6)	Minimum Failing Load	kN	-	10	10
7)	Insulation withstand Voltage				
	a) Dry Impulse(1.2/50 μ s) peak	kV	-	75	170
	b) Wet Power Frequency (1 min.) rms	kV	-	28	70
8)	Creepage Distance				
	a) Total	mm	-	276	825
	b) Protected	mm	-	96	290
	c) Overall creepage factor		-	<4	<4
	d) Local creepage factor		-	<5	<5
	e) Shed spacing/shed overhanging		-	>0.8	>0.8

6.0 BASIC FEATURE

6.1 Design

The insulators will be in service in a damp tropical climate where intense lightning storms at certain periods of the year are expected. The design shall take this into account as well as to minimise the effect of local corona formation and discharge likely to cause radio interference.

The design shall be such as to facilitate inspections, cleaning, repairs, and hot line maintenance. All corresponding parts to be made to gauge and be interchangeable.

The porcelain shall not engage directly with the hard metal and the pin insulator shall be provided with the thimble of suitable material to accommodate the steel pin.

6.2 Manufacture

6.2.1 Pin Insulators

Pin Insulators shall be "Type B" as per IEC 60383 (1993) and shall be made of good commercial grade wet-process porcelain and brown glazed. The design parameters of the Insulators shall be in accordance with the Drawing No. CEB/DS&S/2000/94 A.

The insulator head shall be as indicated in the Fig 3/4 of BS 137 part 2 1973. Threaded lead thimbles shall be cemented to the insulators to fix the insulator pins with large steel heads and the internal thread of pin insulator shall comply with the Clause 7.2 of BS 137.

The Insulator shall be suitable for attaching Conductors as stipulated in the Clause 5 - Technical Requirements.

6.2.2 Steel Pins

The Pin Insulator shall be supplied complete with hot dip galvanized steel pin, nut, spring washer and two numbers of circular flat washers of suitable size in accordance with Drawing No. CEB/DS&S/2000/94 B

The Insulator Pins shall be suitable for fixing the insulators on 100x50x6mm. Channel Iron Cross-arms. The shank length of the Pin shall be 140 mm. with screwed length of 135 mm as indicated in the Drawing.

6.3 Galvanizing

All iron and steel parts shall be galvanised after subjecting to the processes such as sawing, shearing, drilling, punching, filing, bending and machining. Galvanizing shall be applied by hot dip process to comply with the BSEN ISO 1461 (1999) specified.

The thickness of zinc coating shall not be less than 85µm in plain surface. All hardware items shall be treated with sodium dichromate after galvanizing and stored under well ventilated conditions to prevent the formation of white rust.

6.4 Finish

The insulator surface shall be smooth, uniform, and the glazed area shall be free surface irregularities such as sharp edges, cavities, dents and unglazed spots etc. The galvanized hardware fittings shall have a smooth and uniform thickness of zinc coating without any sharp edges.

7.0 QUALITY ASSURANCE

The manufacturer shall possess ISO 9002 Quality Assurance Certification for the manufacture of Porcelain Insulators and the hardware for the plants where the manufacture of Porcelain Insulators and the hardware 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 ADDITIONAL REQUIREMENTS

8.1 Marking

Identification details as indicated below shall be permanently marked on the insulator and shall be weatherproof. The hardware fitting shall also be marked with the same except for year of manufacture. and shall be corrosion-proof.

- a) Manufacturer's identification
- b) Minimum failing load kN.
- c) Year of manufacture.

8.2 Routine Tests

The following routine tests as per BSEN 60383-1:1998 shall be carried out on all the units and the routine test reports shall be made available for the observation of the CEB Inspector at the time of inspection.

- a) Routine Visual Inspection
- b) Routine electrical test

8.3 Packing

The pin Insulators and Hardware Fittings & Accessories shall be packed separately in non returnable palletised boxes suitable for overseas shipment to a tropical country. The packing shall also be suitable to withstand rough handling without sustaining damages. In packing cases where timber is used for reinforcement, the thickness of such timber parts shall not be less than 25mm.

The following details shall be marked clearly on the outside of all packages:-

- a) Name of Item and Voltage rating
- b) Quantity
- c) Weight

8.4 Manufacturing Experience

The manufacturer shall have at least 20 years of experience of manufacturing medium voltage insulators to IEC/ BS Standards. He shall furnish sufficient documentary evidence in the Bid to prove his manufacturing experience

9.0 INFORMATION TO BE SUPPLIED WITH THE OFFER

9.1 The following shall be furnished with the Offer.

- a) Catalogues describing the item and indicating Model No.
- b) Constructional features, materials used for components.
- c) Complete dimensional drawings.
- d) Quality Assurance Certification (ISO9002) as per the clause 7.0
- e) Manufacturing experience and list of purchasers
- f) Duly completed schedule of guaranteed technical particulars

9.2 Type Test Certificate

The following Type test Certificate as per BSEN / IEC 60383 -1 from a recognized

independent testing authority acceptable to CEB, shall be furnished.

- a) Verification of the dimensions
- b) Wet- power frequency withstand voltage test
- c) Dry Lightning impulse withstand voltage test
- d) Mechanical failing load test

The Type Test Certificates shall clearly indicate the name of manufacturer, catalogue number and the technical parameters of the insulator and hardware components of the insulator set tested.

Offers of Bidders who failed to furnish above particulars and the sample shall be rejected.

10.0 SAMPLE

One sample of the make and model of the item quoted complete with specified hardware shall be furnished with the offer by the Bidder to facilitate analysis and evaluation of tender.

11.0 INSPECTION AND TESTING

11.1 Inspection

The selected Bidder shall make necessary arrangements for inspection by the Engineer of the CEB and also to carryout in his presence necessary acceptance tests of the item offered. The report of routine tests performed on the item shall be made available for the observation of the Inspector

11.2 Acceptance/Sample Tests

The following acceptance/sample test as per BSEN 60383-1:1998 shall be witnessed by the Engineer nominated by the CEB. Extra copies of these test certificates shall also be supplied with the equipment.

- a) Verification of dimensions
- b) Temperature cycle test
- c) Mechanical failing load test
- d) Puncture withstand test- as per IEC 61211
- e) Porosity test
- f) Galvanizing Test
- g) Visual examination

12.0 ANNEX

- A - 1 - Drawing No. CEB/DS&S/2000/94 A - Design parameters for pin type insulators for MV Lines.
- A - 2 - Drawing No. CEB/DS&S/2000/94 B Insulator Pin (12 kV&36kV)
- B - 1 - Schedule of Particulars - Properties of material used for Insulators
- B - 2 - Schedule of Guaranteed Technical particulars (12 kV and 36 kV).

ANNEX B – 1

SCHEDULE OF GUARANTEED TECHNICAL PARTICULARS

(To be filled by the Bidder)

Properties of Material used for Insulators

- | | | |
|----|---|------------------------------------|
| a) | Type | : |
| b) | Chemical Composition | : |
| c) | Porosity Volume % | : |
| d) | Bulk density | g/cm ³ : |
| e) | Fatigue strength | N/mm ² : |
| f) | Tensile strength | N/mm ² : |
| g) | Impact strength | N/mm ² : |
| h) | Modules of elasticity | Gpa : |
| i) | Mean Coefficient of linear
thermal expansion | 10 ⁻⁶ K ⁻¹ : |
| j) | Resistance to thermal shock | K : |
| k) | Breakdown voltage | kV/mm : |
| l) | Dielectric constant | tan δ : |
| m) | Resistivity | Ωm : |

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

SEAL AND SIGNATURE OF THE MANUFACTURER/ DATE

ANNEX B - 2**SCHEDULE OF GUARANTEED TECHNICAL PARTICULARS**

(This schedule shall be duly filled by the Manufacturer for each voltage rating offered)

	12KV	36KV
1. Name of manufacturer & country of origin :		
2. Insulator type designation and catalogue No. :		
3. Type of insulator material :		
4. Type of thimble material :		
5. Complete insulator		
i) Rated Voltage	kV	:
ii) Rated Frequency	Hz	:
iii) Rated withstand Voltages		
a) Lightning Impulse		
1) Positive Peak	kV	:
2) Negative Peak	kV	:
b) 1 Minute Power Frequency		
1) Wet	kV	:
2) Dry	kV	:
iv) Power frequency flash-over voltages		
a) Wet	kV	:
b) Dry	kV	:
v) Total Creepage Distance	mm.	:
vi) Protected Creeping distance	mm.	:
vii) Minimum Failing load	kN	:
6. Applicable Size of conductors (indicate the range of sizes of conductors)	mm	:
7. Radio Interference noise level at Standard test voltage	db	:
8. Dry Arcing Distance of the Complete Units	mm	:
9. Overall height of the complete Unit	mm	:
10. Overall creepage factor		:
11. Local creepage factor		:
12. Minimum ratio of shed spacing to shed overhang		:

13. Type of galvanising & thickness of coating :
14. Colour of glazing :
15. Whether the dimensional drawings of the item offered furnished Yes/No :
16. Total weight kg :
17. Whether the following type test certificates as per BS EN / IEC 60383 are furnished
- a) Verification of the dimensions Yes/No :
 - b) Dry lightning impulse withstand voltage test Yes/No :
 - c) Wet- power frequency withstand voltage test Yes/No :
 - d) Mechanical failing load test Yes/No :
18. Whether the ISO 9002 Quality assurance certificates for the following are furnished
- a) Insulator Yes/No :
 - b) Insulator hardware Fitting Yes/No :
19. Whether the following acceptance test as per Clause 10 will be carried out at the Bidder's cost during the inspection and whether the place of testing is indicated :
- a) Verification of dimensions Yes/No :
Place of testing :
 - b) Temperature cycle test Yes/No :
Place of testing :
 - c) Mechanical failing load test Yes/No :
Place o testing :
 - d) Puncture withstand test Yes/No :
Place of Testing :
 - e) Porosity test Yes/No :
Place of testing :
 - f) Galvanizing Test Yes/No :
Place of testing :

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

SEAL AND SIGNATURE OF THE MANUFACTURER / DATE

20INSU2