WEST BENGAL STATE ELECTRICITY DISTRIBUTION COMPANY LIMITED
(A Govt. of West Bengal Enterprise)
JALPAIGURI REGIONAL OFFICE
SJDA Complex,Indira Colony,Dist- Jalpaiguri,Pin-735121

No. RM/JRO/IPDS/1193 dt. 11.11.2020

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NOTICE INVITING TENDER

NIT No. : RM/JRO/IPDS/E/20-21/ 06 **Dated: 11.11.2020**

The Regional Manager, Jalpaiguri Regional Office, WBSEDCL invites Tender from genuine bonafide, experienced & resourceful manufacturers / suppliers / Distributors for manufacture, testing, supply and delivery of the following *items who have successfully supply of the tendered items/ similar items to WBSEDCL / other Power Utilities / Govt / Semi Govt. Departments/ Govt. undertaking Organizations /Govt. Enterprises having value not less than 50% (fifty percent) of the estimated in a single contract cost during last 3 (three) years (Submission of Bid through online).

Sl. No.	Name of the Work	Estimated Amount (Rs)	Earnest Money (Rs)	Cost of Tender Documents (Rs) (Non-refundable)	Delivery Time	Name & address of the Concerned Office
01.	Supply and Delivery of 33 KV Polymer Composite 70 KN Disc Insulator(1000 nos) and 33 KV 900 mm CD Polymer Composite Pin Insulator(150 nos) under IPDS	429920.00 (Four lakh Twenty nine thousand nine hundred and fTwenty only without GST	8600.00 (Eight thousand six hundred only)	531.00 (Five hundred thirty one only) (Tender cost - 450+ GST 18%- 81.00)	30 (Thirty) days	Jalpaiguri Regional Office, SJDA Complex,Indira Colony,Dist- Jalpaiguri,Pin- 735121

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Tender documents can be had in person on application in duplicate with authentic copies of **Trade License, GST Registration No. along with any current challan (if any), PAN Card, and current challan along with professional Tax clearance certificate, and cost of Tender Paper in cash** on any working day from12.11.2020 to 26.11.2020 between 11.00 hours and 14.00 hours except Saturday & holidays. Tender will be received at this office upto 14.00 hours on 26.11.2020 and the same will be opened on the same day at 15.00 hours.No tender will be sent / received by Post. The WBSEDCL does not bind itself to accept the lowest tender and reserves the right to accept or reject any tender or all the tenders as well as to split up the work among the tender if necessary, without assigning any reason whatsoever.

Earnest Money Deposit amounting to 2 (Two percent) of the pro-rata Estimated Value of the offered quantity, as mentioned above, shall be submitted individually along with the offer. The Earnest Money Deposit shall be submitted by CTS 2010 compliant Demand Draft (DD)on any Scheduled Bank in favour of the "**West Bengal State Electricity Distribution Company Limited**" payable at Jalpaiguri. Earnest Deposit in any other form or amount will not be accepted. Tenderer shall not claim any interest on Earnest Money Deposit. **Earnest Money** of the unsuccessful bidder will be released after finalizationof tender against the prayer of the contactor.

Security Deposit: In respect of successful Bidder, the Earnest Money after acceptance of Tender shall be converted as a part of the Security Deposit. The successful Bidder who deposited Earnest Money @ 2% (Two Percent) of the amount put to the Tender, balance of necessary 10% (Ten percent) Security Deposit shall be realized by recovering from the progressive bill @ 8% (Eight Percent) of the amount of each such bill. In all cases the amount of recovery of the Final Bill will be so adjusted as to make the total amount of Security Deposit equivalent to 10% (Ten percent) to the value of work so executed.

Specification of materials: As Per Annexure

The Bidder,at his own responsibility and risk is encouraged to visit and examine the site of works and its surrounding and obtained all information that may be necessary for preparing Bid and entering into an agreement for the work / works as mentioned in the NIT, before submitting offer with full satisfaction. The costs for visiting the working site shall be at the bidder own expense.

The intending Bidders shall clearly understand that whatever may be the outcome of the present Invitation of the Bid, no cost of Bidding shall be reimbursable by the Tender Inviting Authority. The Tender Inviting Authority reserves the right to accept or reject any / all offer without assigning any reason whatsoever and is not liable for any cost that might have incurred by the Bidder at the stage of Bidding.

Prospective applicants are advised to note carefully the minimum qualification criteria as mentioned in'**Instruction to bidders**' stated in Section – 'A' before tendering the bids.

Payment of supply materials will be depended on availability of fund. Intending bidders may consider this criteria while submission of tender and quoting their rate through online.

No Conditional Bid / Incomplete Tender will be accepted under any circumstances.

The intending bidder(s) required to quote the rate in tender considering that no escalation and / or price adjustment will be allowed by the department under any circumstances.

At any stage during scrutiny, if it is found that the credential or any other papers which the Bidder submitted, found incorrect / manufactured / fabricated, that bid will be considered a nonresponsive and outright rejected with forfeiture of Earnest Money and action will be taken as per stipulation of IT Rules in force.

Before issuance of Letter of Acceptance / Supply order, the tender accepting authority may verify the credential & other documents of the lowest bidder so uploaded online if found necessary. If it is found document incorrect / manufactured / fabricated, Letter of Acceptance / Work order will not beissued in favor of the bidder under any circumstances and action will be taken accordingly.

The Tender Inviting Authority reserves the right to cancel the NIT due to unavoidable circumstances and no claim in this respect will be entertained.Any further information may be had from the website: www.wbsedcl.in and the Jalpaiguri Region office.Tender Inviting Authority (for WBSEDCL)

All other relevant information would be available at this office. "ENVELOPE" containing the tender shouldbe properly super scribed with "TENDER, NAME OF THE WORK", "TENDER NOTICE NO" along with full address of the tenderer at bottom side of the left hand corner using separate envelope for each tender.**Earnest Money as indicated above shal have to be deposited through Demand Draft payable on any Nationalized Bank in Jalpaiguri in favour of "WEST BENGAL STATE ELECTRICITY DISTRIBUTION COMPANY LIMITED" with the tender in a separate envelope by all the bidders.**

11/11/2020

Regional Manager
Jalpaiguri Region

Annexure-A

GENERAL CONDITIONS OF CONTRACT FOR SUPPLY AND DELIVERY OF EQUIPMENT/ MATERIALS

DEFINITATION OF TERMS:

EARNEST MONEY DEPOSIT:

Amount of earnest money shall be 2.0% (two percent) of the pro-rata estimated value of the Item wise offered quantity specified in the NIT. Earnest Money shall be in the form of Crossed Bank Draft of scheduled Bank drawn in favour of WBSEDCL payable at Jalpaiguri. Tenderer shall not claim any interest on Earnest Money Deposit.

1. **SECURITY DEPOSIT:**

The Successful tenderer within 7 (Seven) days of receipt of LOI / order, shall submit his unconditional acceptance in writing failing which the Department shall have the right to terminate the LOI / Order as per rule and earnest money submitted along with the tender will be forfeited. On receiving tenderer's acceptance for the supply the earnest money deposited with the tender will be automatically converted to form a part of security money deposited. An additional sum of security money, if required, shall be deposited by the tenderer to constitute initial security money of 2.0% (two percent) of ordered value. Further additional security money shall be deducted from the progressive bills at 8% (Eight percent) of each such bill so that the to tal deduction together with 2.0% (two percent) Security money already taken shall constitute not less than 10% (ten percent) of the total value of works as actually done. All security money shall be refunded after expiry of the period of maintenance which shall be 38(**Thirty Eight)** months after completion of supply. This period of maintenance shall be counted from the date of completion of job.

2. **REFUND OF EARNEST MONEY DEPOSIT (EMD):**

The earnest money shall be retained initially for all bidders. Refund of earnest money of the unsuccessful bidders shall be made immediately after finalization/placement of order. Bidders shall collect D.C.R. from the respective cash section for deposition of earnest money. The earnest money for the unsuccessful bidders shall be released on submission of original receipt duly pre- receipted along with an application.

3. **FORFEITURE OF EARNEST MONEY DEPOSIT (EMD):**

Earnest money/Bid guarantee shall be forfeited in case of following:
if successful tenderers fail to accept Purchase Order / LOI issued within their offered validity period,
not below 30 days for failure to submit specified Security Deposit within time limit indicated in the P.O. / LOI
If any cartel is formed by the tenderer in their quotation In case of failure to supply material by the supplier as per delivery schedule, company may, at its discretion resort to Risk Purchase clause as provided in G.C.

4. **PAYMENT:**

100 % (hundred percent) payment against bills will be made after making deductions, if any. Bills shall be submitted along with Store Receipt Voucher, original receipted challan), Guarantee certificate ,test clearance Certificate by the Controlling Officer and other relevant documents reference to be indicated in the Bill. The Bills completed with all documents will have to be submitted by the successful bidder to the Paying Officer .

5. **GOODS & SERVICES TAX (GST):**

GST at prevailing rate will be paid extra.

6. **PAYING OFFICER:**

The AGM (F&A), Project-III, Vidyut Bhavan, will be the Paying Officer for this work.

7. **CONTROLLING OFFICER:**

The *Regional Manager, Regional Office,Jalpaiguri* shall be the Controlling Officer for the above mentioned work. *DE/A (Electrical), Regional /Division Office, Jalpaiguri* shall be the Technical Consignee Officer for the above mentioned work.

8. **NODAL OFFICER:**

The Divisional *Engineer (Electrical), Regional Office, Jalpaiguri* shall be the Nodal Officer for the above mentioned work.

9. TESTING:

a) CALIBRATION:

The instruments/equipment required for Inspection & Testing should have valid calibration as per following guideline:

1) Calibration Certificate issued by Laboratory accredited by NABL may be accepted unconditionally provided the certificat bears an Accreditation body Logo.

2) For Testing equipments, where NABL Accreditation is not available, Calibration Certificate from Educationa Institutions like IIT's, NIT's, J.U., C.U., BHU only can be accepted provided they can demonstrate traceability.

3) Necessary confirmation regarding above is to be given along with inspection offer failing which the inspectio offer will not be accepted. If during inspection & testing, the suppliers fail to produce Calibration Certificate a indicated above the offered lot may be rejected.

b) INSPECTION & TESTING

The successful bidder shall intimate the Controlling Officer for making necessary programme of testing. Please not that the schedule should be formulated in such a way so that the materials, after being tested successfully, should b delivered within the prescribed time period mentioned in NIT. According to the programmer, the successful bidde shall arrange for the testing of the materials at their own expense and in presence of the representative of WBSEDC not bellow the rank of A.E. (E). Any material is found broken/ damaged during testing, will be treated as rejected. Tes Certificate will be issued by the Technical Controlling Officer on the basis of test report by the respective SE (E) /A (E)/DE (E) who will actually conduct the testing or submission of testing report of approved Testing Laboratory.

10. SPECIFICATION OF MATERIIALS:

The materials should be as per GTP which is enclosed herewith

The WBSEDCL will have right to test any material(s) at any moment, if found necessary. In that case the contractor will b liable to take appropriate actions, which include the cost of testing and other incidentals. Authenticated document fo confirmation of quality of material, purchased by the contractor, shall have to be submitted on demand by the Engineer-in-charg

11. ADDRESS OF DIVISIONAL STORE:

Serial No	Divisional Store Name	Address
1	Jalpaiguri Divisional Store	Jalpaiguri Divisional Store, Mohitnagar, Jalpaiguri

12. GUARANTEE:

In the event of any defect in the equipment/materials arising out of faulty design, materials, workmanship within a perio of **(Thirty Six)** months of commissioning or **38 (Thirty Eight) months** from the date of last dispatch of any integral part of th equipment/materials whichever is earlier the supplier shall guarantee to replace or repair the same to the satisfaction of th purchaser. If the supplier fail to do so within a reasonable time, WBSEDCL reserves the right to effect repair or replacement b any other agency and recover charges for repair or replacement from the supplier.

12. DESPATCH:

The supplier after receiving dispatch clearance from the respective inspection Authority/Purchaser shall deliver th equipment/materials suitably packed to the Stores located in West Bengal as instructed. The materials are to be booked b Road only and the same should be suitably packed and fully insured against all risks and deliver the consignment as per dispatc instruction to be communicated in due course. Immediately after dispatch of materials/equipment by Road, the supplier sha notify the purchaser and consignee officer about value of consignment, weight and dimension of consignment by FAX and pos copy by Registered Post the relevant documents on the strength of which the consignment can be taken delivery a destination.

Materials/equipment as per dispatch clearance shall have to be dispatched within the stipulated period of the order an inspection of further lots against the said order will be arranged by the inspection authority.

In case the inspected materials/equipment are not delivered within one month after the stipulated period of order without any valid reasons, the dispatch clearance already issued against the said lot shall be considered to be withdraw

and materials/equipment shall have to be re-offered for inspection and testing and re- testing charges as per Clause- 8(C) wil be levied for such cases also.

13. PACKING:

The materials/equipment shall have to be securely packed in transportable lots as indicated in the technical specifications. If th materials/equipment are found acceptable after inspection and testing, the same shall be suitably sealed by our Inspectin Officer. Due care shall have to be ensured during transportation to keep the packing and seal intact for acceptance by consigne stores.

14. DELIVERY:

a) Commencement period with firm quantity in the delivery schedule shall have to be mentioned and thereafter monthly/quarterly delivery schedule within WBSEDCL delivery Period should be specifically mentioned in the "Schedule of Bids".

In the event of failure to supply the ordered quantity by the selected Vender as specified in the delivery schedule, the delegate authority of the Company will be empowered to reduce the ordered quantity of the selected Vendor after the expiry o the delivery date as specified in the schedule of delivery which corresponds to 1/3rd of the total ordered quantity. The tota ordered quantity will be reduced in proportion to the quantity undelivered assessed up to the period mentioned above. Th quantity so reduced will be allotted proportionately to the other selected Vendors to whom the orders have been placed in th same tender and who have adhered to the delivery schedule. Allotment so made shall under no circumstances exceed the offere quantity of the respective selected bidder and the limit as per the Vendor rating policy. In the event, the allotment is no possible for reasons due to above limitation, the said allotment may be considered to the non-selected bidders to th extent of limit as per Vendor rating policy and who had matched L1 evaluated rate and will consent to adhere the allotment

b)The date of receipt of offer for inspection of the materials/ equipment along with works test certificate will be treate as the date of delivery of that particular lot provided the materials pass in inspection and testing. Delay in offer beyond th delivery schedule to be incorporated in the order shall attract imposition of L.D. as per L.D. Clause. The materials shoul reach the destination store within.

a. 21 working days from the date of issue of the Dispatch Instruction for the manufacturer located outside state.

b. 10 working days from the date of issue of the Dispatch Instruction for the manufacturer located within Wes Bengal Otherwise L.D. will be levied as per L.D. Clause.
Delay beyond the date of delivery as per schedule of Purchase order shall attract imposition of L.D as per L.D. Clause.

15.CHECKING OF MATERIALS/EQUIPMENT AFTER DELIVERY:

The materials delivered to consignee stores will be subjected to re-inspection / re-testing in presence of authorize representative of suppliers for which due notice in advance will be furnished by the DM. If any discrepancy/ disput in quality arises in any sample selected from a lot , the supplier shall have to replace that specific lot at the Supplier's cos and WBSEDCL reserves the right to take any penal action whatsoever without any further reference.

16.MANNER OF EXECUTION OF CONTRACT:

The successful bidder has to submit acceptance of the LOI / Order within **7 (Seven) days** from the date of issue of the Letter o Intent / Order.

17. COMPLETION OF CONTRACT:

The above mentioned quantity shall be supplied to the respective Divisional Store after successfully completing th testing or submission of testing report of approved Testing Laboratory within the period mentioned in the NIT.

18. EXTENSION OF TIME:

An extension of time without imposition of liquidity damage, may be granted for delay in execution of work provided there no fault whatsoever on the part of the contractor. Such extension may only be granted on the basis of application to b submitted timely (within schedule time of completion) by the contractor who has to establish that the extension of tim required by him is not due to his fault

19. LIQUIDATED DAMAGE FOR DELAY IN DELIVARY:

The time of delivery (successful offer for inspection) of the equipment/materials are to be treated as an essence of the contra and the WBSEDCL reserves the right to repudiate the contract, if the equipment / materials are not offered for inspection with scheduled delivery period and physically delivered within stipulated period as per physical delivery clause. But The Region

Manage, Region Office may at his discretion waive this condition and accept the material with imposition of liquidated damage @ ½% **(half percent)** of the value of the materials of the particular lot offered for every week or part of a week which shall-elapse between the time prescribed or extended time as the case may be and the date of physically delivery of equipment / material subject to a maximum of **10 % (ten percent) of the particular lot and accept the goods beyond the stipulated period**. The Company may, without prejudice to any other method of recovery, deduct the amount of such damages from any money in their hand due or which may become due to the contractor and any other contract or source also. The payment for deduction of such damage shall not relieve the contractor from his obligation to delivery of equipment / materials or from any other his obligations and liabilities under the contract.

20. **ADDITIONAL LIABILITIES**:

The WBSEDCL shall not take any additional liability towards enhanced taxes, duties and price variation beyond the scheduled delivery period as incorporated in the purchase order, if the delay is due to any failure on the part of the supplier

21. **REPEAT ORDER:**

With due consent of the supplier the WBSEDCL may place repeat order within a period of six (6) months from the date of completion of delivery as per the order to cover approximately 50% of the ordered quantity on successful performance of the contract and on the need of the WBSEDCL, on the basis of existing rates, terms and conditions.

The repeat order may also be placed within one year from the date of issuance of original order subject to successful completion of delivery as per the order to the extent of at least 75% of the quantity ordered.

22. **RISK PURCHASE**:

The time of delivery (offer for inspection) or physical dispatch stipulated in the purchase order shall be deemed to be of the essence of the contract and if the supplier fails to deliver or dispatch any consignment within the period prescribed for such delivery or dispatch in the said purchase order/contract/letter of intent, the purchaser shall be entitled to purchase such consignment or if not available, the best and nearest available substitute elsewhere on the account and at the risk of the supplier or to cancel the contract and the supplier shall be liable to compensate for any loss or damage which the purchaser may sustain by reason of such failure on the part of the supplier. The Company at its discretion may not issue subsequent tender if earlier Purchase Order against earlier tender is not executed fully.

If there is a failure to execute the contract fully, WBSEDCL reserves the right forfeit Earnest Money deposit/cash security to the extent of loss so suffered by the WBSEDCL on risk purchase or otherwise, and may deduct the additional amount, if any, so incurred by the Company from other claim / bill lying with the WBSEDCL.

23. **LEGAL JURISDICTION:**

If any dispute or difference arises with respect to quality/quantity of the equipment/materials pertaining to this order or any other terms and conditions of the order including its execution, such dispute/difference shall be subject to settlement under the jurisdiction of Courts in Kolkata

24. **FORCE MAJEURE**:

The supplier shall be under no liability if he is prevented from carrying out any of his obligations by reason of war, invasion act of foreign country, hostilities (whether war declared or not), riots, civil commotion, mutiny, insurrection, rebellion, revolution accident, earthquake, fires, floods Govt. order and/or restrictions (except power supply restriction) delay or inability to obtain materials due to import or other statutory restriction and other cause beyond the reasonable control of the supplier. However, such force majeure circumstances are to be intimated immediately and to be established subsequently with proper documents/proofs to the entire satisfaction of the purchaser.

25. **CANCELLATION / TERMINATION OF ORDER (if placed):**

The time period for effecting complete supply and delivery of the above materials/equipment as indicated through the delivery schedule enclosed shall have to be treated as the essence of the contract. The Company reserves the right to repudiate the contract if the above period is not strictly adhered to. In the event of failure in effecting the desired supply and delivery of the above equipment/materials within above stipulated due date as incorporated through the schedule enclosed, the above order may be cancelled on submission of necessary notice in this regard and fresh order may be placed on the next higher bidder or on any other bidder, as a result of which the extra cost thus liable to be incurred shall be realized from the original supplier's pending bill which may be lying with the WBSEDCL.

----------End ----------

SPECIFICATION FOR POLYMER DISC INSULATOR

Scope : This specification cover the design, manufacturing, testing at manufacturers works, transport to site, insurance, unloading & storage of 11 KV & 33 KV Polymer Disc Insulator (B & S type) suitable for use in 11 KV & 33 KV Overhead Lines situated in any part of West Bengal under the jurisdiction of WBSEDCL.

General Requirements:

1. The Composite insulators will be used on lines on which the conductor will be ACSR of size up to 200 Sq.mm. The insulators should withstand the conductor tension, the reversible wind load as well as the high frequency vibrations due to wind.

2. Insulator shall be suitable for 3 Phase, 50 Hz effectively earthed 11KV Overhead Lines and 33 KV Impedance Grounded distribution system in a moderately/heavily polluted atmosphere.

3. Bidder must be an indigenous manufacturer, and supplier of composite insulators of rating 11KV or above or must have developed proven in house technology and manufacturing process for composite insulators of above rating. The Bidder shall furnish necessary evidence in support of the above along with the bid, which can be in the form of certification from the utilities concerned, or any other documents to the satisfaction of the owner.

4. Insulators shall be suitable for both Suspension & Strain type of load and shall be of B&S type.

5. Insulator shall be suitable for the long Rod Type. The diameter of Composite Insulator shall be as per technicalspecification.

6. Insulators shall have sheds with good self-cleaning properties. Insulator shed profile, spacing, projection etc. and selection in respect of polluted conditions shall be generally in accordance with the commendation of IEC- 60815/ IS:13134.

7. The tolerances on all dimensions e.g. diameter, length and creepage distance shall be allowed as follows in line with-IEC 61109:

$\pm (0.04d + 1.5)$ mm when $d \leq 300$ mm
$\pm (0.025d+6)$ mm when $d > 300$ mm

Where, d being the dimensions in millimeters for diameter, length or creepage distance as the case may be. However, no negative tolerance shall be applicable to creep age distance.

8. The composite insulators including the end fitting connection shall be standard design suitable for use with the hardware fittings of any make conforming to relevant IEC/IS standards.

9. All surfaces shall be clean, smooth, without cuts, abrasions or projections. No part shall be subjected to excessive localized pressure. The insulator and metal parts shall be so designed and manufactured that it shall avoid local corona formation and not generate any radio interference beyond specified limit under the operating conditions.

10. Inter- changeability: The composite insulator together with the B&S fittings shall be of standard design suitable for use with the hardware of any other indigenous make confirming to relevant standards referred herewith.

Service condition : The insulators to be supplied against this specification shall be suitable for satisfactory continuous operation under the following topical condition :

a) Max. ambient temperature : 50 ° C b
) Min. ambient temperature : -5 ° C
c) Relative humidity : 10 % to 100 % d)
Average number of rainy days : 100 / annum.
e) Max. Annual Rainfall : 1500 mm
f) Max. Wind Pressure : 150 Kg/ sq. Meter
g) Max. Wind Velocity : 50 Km/ hour h
) Max. Altitude above MSL : 1000 Meter.
i) Seismic level : 0.3 g (Horizontal acceleration) j)
Average Thunder storm : 45 Days per annum

k) Climatic condition : Moderately hot and humid tropical climate, conductive to rust and fungus growth. Pollution level is high. Some area with seashores having saline atmosphere.

System Parameters :

a) Nominal system voltage : 11 KV & 33 KV. b)
Highest system voltage : 12 KV & 36 KV. c
) Power frequency : 50 Hz.
d) Number of Phases : Three.
e) System earthling : 11 KV Solidly earthed,
33 KV Impedance earth.

Standard: The following Indian / International Standards with latest revisions and amendments shall be referred while accessing conformity of insulators with this specification.

Sl. No.	Indian Standard	Title	International Standard
1.		Definition, test methods and acceptance criteria for composite insulators for a.c. overhead lines above 1000V	IEC : 61109
2.	IS : 731	Porcelain insulators for overhead power lines with a nominal voltage greater than 1000V	IEC : 60383
3.	IS : 2071	Methods of High Voltage Testing	IEC : 60060-1
4.	IS : 2486	Specification for insulator fittings for overhead power lines with a nominal voltage greater than 1000V General Requirements and Tests Dimensional Requirements Locking Devices	IEC : 60120 IEC : 60372
5.		Thermal Mechanical Performance test and mechanical performance test on string insulator units	IEC : 60575
6.	IS : 13134	Guide for the selection of insulators in respect of polluted conditions	IEC : 60815
7.		Characteristics of string insulator units of the long rod type	IEC : 60433
8.		Hydrophobicity classification guide	STRI guide 1.92/1
9.		Radio interference characteristics of overhead power lines and high-voltage equipment	CISPR:18-2 part 2
10.	IS : 8263	Methods of RI Test of HV Insulators	IEC : 60437
11.		Standard for insulators – Composite-Distribution Dead-end type	ANSI C29 13-2000
12.	IS : 4759	Hot dip zinc coatings on structural steel & other allied products	ISO : 1459 ISO : 1461
13.	IS : 2629	Recommended Practice for Hot, Dip Galvanization for iron and steel	ISO-1461 (E)

14.	IS : 6745	Determination of weight of zinc coating on zinc coated iron and steel articles	ISO : 1460
15.	IS : 3203	Methods of testing of local thickness of electroplated coatings	ISO : 2178
16.	IS : 2633	Testing of Uniformity of coating of zinc coated articles	
17		Standard specification for glass fiber strands	ASTMD 578-05
18		Standard test method for compositional analysis by Thermo-gravimetric	ASTM E 1131-03
19	IS : 4699	Specification for refined secondary zinc	

Technical Requirement:

1. Composite Insulators shall be designed to meet the light quality, safety and reliability and are capable of withstanding a wide range of environmental conditions.

(a) Core : The internal insulating part

(b) Housing : The external insulating part.

(c) Metal and fittings: For attaching to hardware to support conductor.

Core: It shall be a glass-fibber reinforced epoxy resin rod of high strength (FRP rod). Glass fibbers and resin shall be optimized in the FRP rod. Glass fibbers shall be Boron free electrically corrosion resistant (ECR) glass fibber or Boron free E-Glass and shall exhibit both high electrical integrity and high resistance to acid corrosion. The matrix of the FRP rod shall be Hydrolysis resistant. The FRP shall be manufactured through Pultrusion process. The FRP rod shall be void free.

Housing (Sheath):

The FRP rod shall be covered by a seamless sheath of a silicone elastometric compound or silicone alloy compound of a thickness of 3 mm minimum. It shall be one-piece housing using injection Moulding Principle to cover the core. The elastomer housing shall be designed to provide the necessary creepage distance and protection against environmental influences, external pollution and humidity. Housing shall conform to the requirement of IEC 61109/92-93 with latest amendments.

It shall be extruded or directly moulded on core and shall have chemical bonding with the FRP rod. The strength of the bond shall be greater than the tearing strength of the polymer. Sheath material in the bulk as well as in the sealing / bonding area shall be free from voids.

Manufacturer should furnish a description of its quality assurance programme including fabrication; testing and inspection for any material (i.e rubber) Components (i.e. rod) or hardware (i.e. end filings). The manufacturer has had fabricated by others should also be included. Manufacturing methods and material composition documentation will be a part of Technical Bid to be submitted along with offer.

WEATHERSHEDS:

The composite polymer Weather sheds made of silicone elastomeric compound or silicon alloy shall be firmly bonded to the sheath, vulcanized to the sheath or moulded as part of the sheath and shall be free from imperfections. The Weather sheds should have silicon content of minimum 30% by weight. The strength of the Weather sheds to sheath interface shall be greater than the tearing strength of the polymer. The interface, if any, between sheds and sheath (housing) shall be free from voids.

METAL END FITTINGS:

End fittings transmit the mechanical load to the core. They shall be made of Malleable Cast Iron or Spherical Graphite Cast Iron. Hardware of respective specified mechanical load and shall be hot dip galvanized with Zinc coated with minimum 99.95% purity of electrolytic high grade Zinc in accordance with IS 2629. The material used in fittings shall be corrosion resistant.

Metal end fittings shall be uniform and without sharp edges or corners and shall be free of cracks, flakes, silvers, slag, blow-holes shrinkages defects and localized porosity.

They shall be connected to the rod by means of a controlled compression technique. As the main duty of the end fittings is the transfer of mechanical loads to the core the fittings should be property attached to the core by a coaxial or hexagonal compression process and should not damage the individual fibbers or crack the core.

The gap between fittings and sheath shall be sealed by flexible silicone elastometric compound or silicone alloy compound sealant, system of attached of end fitting to the rod shall provide superior sealing performance between housing, i.e. seamless sheath and metal connection. The sealing must be moisture proof.

The dimensions of end fittings of insulators shall be in accordance with the standard dimensions stated in IEC: 60120/IS:2486 Part-II/1989.

The finished surface shall be smooth and shall have a good performance. The surface shall not crack or get chipped due to ageing effect under normal and abnormal service conditions or while handling during transit or erection.

The design of the fittings and the insulators shall be such that there is no local corona formation or discharges likely to cause the interference to either should or vision transmission.

Workmanship:

a) All the materials shall be of latest design and conform to the best engineering practices adopted in the high voltage filed. Bidders shall offer only such insulators as are guaranteed by them to be satisfactory and suitable for continued good service in power transmission lines.

b) The design, manufacturing process and material control at various stages shall be such as to give maximum working load, highest mobility, best resistance to corrosion, good finish and elimination of sharp edges and corners.

c) The design of the insulators shall be such that stresses due to expansion and contraction in any part of the insulator shall not lead to deterioration.

d) The core shall be sound and free of cracks and voids that may adversely affect the insulators.

e) Weather sheds shall be uniform in quality. They shall be clean, sound and smooth and shall be free from defects and excessive flashing at parting lines.

f) End fittings shall be free from cracks, seams, shrinks, air holes and rough edges. End fittings should be effectively sealed to prevent moisture ingress. Effectiveness of sealing system must be supported by test documents. All surfaces of the metal parts shall be perfectly smooth without projecting points or irregularities, which may cause corona. All load bearing surfaces shall be smooth and uniform so as to distribute the loading stresses uniformly.

g) All ferrous parts shall be hot dip galvanized to give a minimum average coating of zinc equivalent to 610 gm/sq.m. or 87µm thickness and shall be in accordance with the requirement of IS:4579. The zinc used for galvanizing shall be of purity 99.5% as per IS : 4699. The zinc coating shall be uniform, adherent, smooth, reasonably bright continuous and free from imperfections such as flux, ash rust stains, bulky white deposits and blisters. The galvanized metal parts shall be guaranteed to withstand at least four successive dips each lasting for one (1) minute duration under the standard preece test. The galvanizing shall be carried out only after any machining.

Drawing:

The bidder shall furnish along with the bid the outline drawing of each insulator unit including a cross sectional view of the long rod insulator unit. The drawing shall include but not be limited to the following information:

(a) Long rod diameter with manufacturing tolerances
(b) Minimum Creepage distance with positive tolerance
(c) Protected creepage distance
(d) Eccentricity of the long rod unit
    (i) Axial run out
    (ii) Radial run out
(e) Unit mechanical and electrical characteristics
(f) Weight of composite long rod units
(g) Identification mark
(h) Manufacturer's catalogue number

Marking: Each insulator shall be legibly and indelibly marked

(embossing/engraved) to show the following : a)
Name & Trade mark of the manufacturer
b) Month & Year of manufacturing c)
Voltage & Type
d) Minimum Failing Load (in KN) e)
"WBSEDCL" marking

N.B. Marking with sticker/written by Ink is not acceptable.

Type Test: The following Type Test shall have to be conducted as per reference IEC mentioned above on insulator unit, components, materials or complete strings:

a) Sudden Load Release Test
b) Thermal Mechanical Pre-stress Test
c) Dry Positive & Negative Lightning Impulse voltage withstand test d) Dry Positive & Negative Lightning Impulse Flashover voltage test e) Dry & Wet Power Frequency Voltage withstand test
f) Dry & Wet Power Frequency Voltage Flashover test g)
Radio Interference test
h) Recovery of Hydrophobicity test i)
Dye Penetration Test
j) Water Diffusion Test
k) Chemical composition test for Silicon content l)
Brittle facture resistance test
m) Damage Limit proof & Mechanical Withstand Test.

Following Design test and type test report needs to be submitted with the technical bid:- Design Test:-

1. Pre-stressing test:-
(a) Sudden load release test
(b) Thermal-mechanical pre-stressing test
(c) Water immersion pre-stressing test
(d) Verification test
(e) Visual examination test
(f) Steep front impulse voltage test
(i) Dry power frequency voltage withstand test (after steep front test)
(ii) Dry power frequency voltage flashover test (after steep front test)

2. Testing on shed and housing material:-
(a) Hardness test
(b) Accelerated weathering test
(c) Tracking and erosion test
(d) Flammability test
(e) Chemical composition test
3. Test on core materials
(a) Dye penetration test
(b) Water diffusion test
4. Assembled core load-time test
(a) Determination of the average failing load of the core of the assembled insulator
(b) Verification of 96 hour withstand load test Type

Test:-

1. Lightning impulse withstand voltage test
2. Lightning impulse flashover voltage test
3. Wet power frequency voltage withstand test
4. Wet power frequency voltage flashover test
5. Damage limit proof test and test of the tightness of the interface between fittings and insulator housing
6. Recovery of hydrophobicity test
7. Radio interference test

8. Brittle fracture resistance test

Routine Test :

a) Identification of marking b)
Visual inspection
c) Mechanical routine test

Acceptance Test : The following test will be carried out at manufacturers works during inspection of the offered insulators before delivery :

a) Verification of dimensions
b) Verification of the locking system
c) Verification of the tightness of the interface between end fittings and insulator housing d)
Verification of the specified mechanical load, SML
e) Galvanizing test

Testing Facilities:

The tenderer must clearly indicate what testing facilities are available in the works of the manufacturer and whether facilities are adequate to carry out all Routine & Acceptance Test.

These facilities should be available to WBSEDCL's Engineers if deputed or carry out or witness the tests in the manufacturer works. If any test cannot be carried out at the manufacturer's work, the reasons should be clearly stated in the tender. The insulators shall be tested in accordance with the procedure detailed in IEC 61109/92-93 with latest amendments.

Inspection:

All Acceptance tests shall be carried out at manufacturer's works in presence of the WBSEDCL's and manufacturers representatives. In addition to above, all routine tests are also to be carried on the insulator as per relevant IS / IEC. The entire cost of acceptance and routine test that to be carried out as per relevant IS / IEC shall be treated as included in the quoted price of Insulator.

The manufacturer shall give at least 21(twenty one) days advance notice intimating the actual date of inspection and details of all tests that are to be carried out from the date when the tests will be carried out.

Routine tests on all insulators shall be carried out as per IEC / IS and test reports shall be submitted along with respective inspection offer to CE, P&CD, WBSEDCL.

Sampling & Rejection during inspection:

The sampling and rejection procedure for Acceptance Test shall be as per IEC 61109.

Packing:

a) All insulators shall be packed in strong corrugated box of min. 7 ply duly palette or wooden crates. The gross weight of the crates along with the material shall not normally exceed 100 Kg to avoid handling problem. The crates shall be suitable for outdoor storage under wet climate during rainy season.

b) The packing shall be of sufficient strength to withstand rough handling during transit, storage at site and subsequent handling in the field.

c) Suitable cushioning, protective padding or dunn age or spacers shall be provided to prevent damage or deformation during transit and handling.

d) Each wooden case / crate / corrugated box shall have all the markings stenciled on it in indelible ink.

e) The bidder shall provide instructions regarding handling and storage precautions to be taken at site.

Guarantee:

In the event of any defect in the equipment / materials arising out of faulty design, materials, workmanship within a period of 12 (twelve) months of commissioning or 18 (eighteen) months from the date of last dispatch of any integral part of the equipment / materials whichever is earlier the supplier shall guarantee to replace or repair the same to the satisfaction of the purchaser.

If the supplier fail to do so within a reasonable time, WBSEDCL reserves the right to effect repair or replacement by any other agency and recover charges for repair or replacement from the supplier.

Quality Assurance Plan:

1. The successful bidder shall submit following information along with the bid.
2. Test certificates of the raw materials and bought out accessories.
3. Statement giving list of important raw material, their grades along with names of sub- suppliers for raw materials, list of standards according to which the raw materials are tested. List of tests normally carried out on raw materials in presence of bidder's representative.
4. List of manufacturing facilities available.
5. Level of automation achieved and lists of areas where manual processing exists.
6. List of areas in manufacturing process, where stage inspections are normally carried out for quality control and details of such tests and inspections.
7. List of testing equipments available with the bidder for final testing equipment along with valid calibration reports.
8. The manufacturer shall submit Manufacturing Quality Assurance Plan (QAP) for approval & the same shall be followed during manufacture and testing.
9. The successful bidder shall submit the routine test certificates of bought out raw materials/accessories and central excise passes for raw material at the time ofinspection.
10. The Owner's representative shall at all times be entitled to have access to the works and all places of manufacture, where insulator, and its component parts shall be manufactured andthe representatives shall have full facilities for unrestricted inspection of the Supplier's and sub- Supplier's works, raw materials, manufacture of the material and for conducting necessary test as detailed herein.
11. The material for final inspection shall be offered by the Supplier only under packed condition. The owner shall select samples at random from the packed lot for carrying out acceptance tests. The lot offered for inspection shall be homogeneous and shall contain insulators manufactured in 3-4 consecutive weeks.
12. The Supplier shall keep the Owner informed in advance of the time of starting and the progress of manufacture of material i/n their various stages so that arrangements could be made for inspection.
13. No material shall be dispatched from its point of manufacture before it has been satisfactorily inspected and tested unless the owner in writing waives off the inspection. In the later case also the material shall be dispatched only after satisfactory testing specified herein has been completed.
14. The acceptance of any quantity of material shall in no way relieve the Supplier of his responsibility for meeting all the requirements of the specification and shall not prevent subsequent rejection, if such material are later found to be defective.

ANNEXURE: A

Test on Insulator units :

1. RIV Test (Dry): The insulator string along with complete hardware fittings shall have a radio interference voltage level below 100 micro volts at one MHz when subjected to 50 Hz voltage of 10 kV & 30 kV for 11 kV & 33 kV class insulators respectively under dry condition. The test procedure shall be in accordance with IS: 8263/IEC: 437/CISPR 18- 2.

2. Brittle Fracture Resistance Test : Brittle fracture test shall be carried out on naked rod along with end fittings by applying "1n HNO3 acid" (63 g conc. HNO3 added to 937 g water) to the rod. The rod should be held at 80% of SML for the duration of the test. The rod should not fail within the 96 Hour test duration. Test arrangement should ensure continuous wetting of the rod with Nitric acid.

3. Recovery of Hydrophobicity & Corona Test:

i) The surface of selected samples shall be cleaned with isopropyl alchohol. Allow the surface to dry and spray with water. Record the Hydrophobicity classification in line with STRI guide for Hydrophobicity classification (Extract enclosed at Annexure-D) Dry the sample surface.

(ii) The sample shall be subjected to mechanical stress by bending the Sample over a ground electrode. Corona is continuously generated by applying 12 kV to a needle like electrode

placed 1 mm above the sample surface. Tentative arrangement shall be as shown in Annexure-E. The test shall be done for 100 hrs.

(iii) Immediately after the corona treatment, spray the surface with Water and record the HC classification. Dry the surface and repeat The corona treatment as at Clause-2 above. Note HC classification. Repeat the cycle for 1000 Hrs. or until an HC of 6 or 7 is obtained. Dry the sample surface.

(iv) Allow the sample to recover and repeat Hydrophobicity Measurement at several time intervals. Silicone rubber should recover to HC 1 – HC 2 within 24 to 48 hours, depending on the Material and the intensity of the corona treatment.

4. Chemical composition test for Silicon content:

The content of silicon in the composite polymer shall be evaluated by EDX (Energy Dispersion X-ray) Analysis or Thermo-gravimetric analysis. The test may be carried out at CPRI or any other NABL accredited laboratory.

SPECIFIC TECHNICAL PARTICULARS FOR 11 KV & 33 KV DISC INSULAT

	11 KV Disc	33 KV Disc
Type of insulator	Polymeric composite Disc Insulator	Polymeric composite Disc Insulator
Reference Standard	IEC 61109	IEC 61109
Material of FRP Rod	Boron free ECR	Boron free ECR
Material of sheds	Silicon Rubber	Silicon Rubber
Type of metal end fittings	Ball & Socket	Ball & Socket
Nominal Ball Pin Diameter	16 mm	16 mm
Material of end fittings	SGCI / MCI	SGCI / MCI
Material of sealing compound	RTV Silicon	RTV Silicon
Colour of sheds	Grey	Grey
Rated voltage	11 KV	33 KV
Highest voltage	12 KV	36 KV
Dry Power Frequency Withstand voltage	60 KV	95 KV
Wet Power Frequency Withstand voltage	35 KV	75 KV
Dry Power Frequency Flashover Voltage	75 KV	130 KV
Visible Discharge Voltage (PF)	9 KV	27 KV
Wet Power Frequency Flashover Voltage	45 KV	90 KV
Dry Lightning Impulse withstand voltage	Positive : 75 KV Negative :80 KV	Positive : 170 KV Negative : 180 KV
Dry Lightning Impulse Flashover voltage	Positive : 95 KV Negative : 100 KV	Positive : 210 KV Negative : 230 KV
RIV at 1 MHz when energised at 10 KV / 30 KV (rms) under dry condition	< 50 microvolt	< 100 microvolt
Creepage distance (min)	320 mm	900 mm
Specified mechanical load	45 KN	70 KN
Diameter of FRP Rod	16 mm	16 mm
Length of FRP Rod (min)	200 mm	425 mm
Diameter of weather sheds	100 mm	110 mm
Thickness of housing	3 mm	3 mm
Dry arc distance	170 mm	380 mm
Method of fixing sheds to housing	Injection moulding	Injection moulding
No of weather sheds (min)	Three	Eight
Type of sheds	Aerodynamic	Aerodynamic
Type of packing	Wooden/Corrugated box	Wooden/Corrugated box
No of insulator in each pack	Thirty	Twenty
Guarantee	12 months from commissioning or 18 months from the date of last despatch.	12 months from commissioning or 18 months from the date of last despatch.

SPECIFICATION FOR POLYMER PIN INSULATOR

Scope : This specification cover the design, manufacturing, testing at manufacturers works, transport to site, insurance, unloading & storage of 11 KV & 33 KV Polymer Pin Insulator suitable for use in 11 KV & 33 KV Overhead Lines situated in any part of West Bengal under the jurisdiction of WBSEDCL.

General Requirements:

1. The Composite insulators will be used on lines on which the conductor will be ACSR of size up to 200 Sq.mm. The insulators should withstand the conductor tension, the reversible wind load as well as the high frequency vibrations due to wind.

2. Insulator shall be suitable for 3 Phase, 50 Hz effectively earthed 11KV Overhead Lines and 33 KV Impedance Grounded distribution systems in a moderately/heavily polluted atmosphere.

3. Bidder must be an indigenous manufacturer and supplier of composite insulators of rating 11KV or above or must have developed proven in house technology and manufacturing process for composite insulators of above rating. The Bidder shall furnish necessary evidence in support of the above along with the bid, which can be in the form of certification from the utilities concerned, or any other documents to the satisfaction of the owner.

4. Insulator shall be suitable for the long Rod Type.

5. Insulators shall have sheds with good self-cleaning properties. Insulator shed profile, spacing, projection etc. and selection in respect of polluted conditions shall be generally in accordance with the commendation of IEC- 60815/ IS: 13134.

6. The tolerances on all dimensions e.g. diameter, length and creepage distance shall be allowed as follows in line with-IEC 61109:

$\pm (0.04d + 1.5)$ mm when $d \leq 300$ mm
$\pm (0.025d+6)$ mm when $d > 300$ mm

Where, d being the dimensions in millimeters for diameter, length or creepage distance as the case may be. However, no negative tolerance shall be applicable to creepage distance.

7. The composite insulators including the end fitting connection shall be standard design suitable for use with the hardware fittings of any make conforming to relevant IEC/IS standards.

8. All surfaces shall be clean, smooth, without cuts, abrasions or projections. No part shall be subjected to excessive localized pressure. The insulator and metal parts shall be so designed and manufactured that it shall avoid local corona formation and not generate any radio interference beyond specified limit under the operating conditions.

Service condition : The insulators to be supplied against this specification shall be suitable for satisfactory continuous operation under the following topical condition :

a) Max. ambient temperature : 50 ° C b
) Min. ambient temperature : -5 ° C
c) Relative humidity : 10 % to 100 % d)
Avarage number of rainy days : 100 / annum.
e) Max. Anual Rainfall : 1500 mm
f) Max. Wind Pressure : 150 Kg/ sq. Meter
g) Max. Wind Velocity : 50 Km/ hour h
) Max. Altitude above MSL : 1000 Meter.
i) Seismic level : 0.3 g (Horizontal acceleration) j)
Avarage Thunder storm : 45 Days per annum.
k) Climatic condition : Moderately hot and humid tropical climate, conductive to rust and fungus groth. Polution level is high. Some area with seashores having saline atmosphere.

System Parameters:

a) Nominal system voltage : 11 KV & 33 KV. b)
Highest system voltage : 12 KV & 36 KV. c
) Power frequency : 50 Hz.

d) Number of Phases : Three.
e) System earthing : 11 KV Solidly earthed,
33 KV Impedence earth.

Standard : The following Indian / International Standards with latest revisions and amendments shall be referred while accessing conformity of insulators with this specification.

Sl. No.	Indian Standard	Title	International Standard
1.		Definition, test methods and acceptance criteria for composite insulators for a.c. overhead lines above 1000V	IEC : 61109
2.	IS : 731	Porcelain insulators for overhead power lines with a nominal voltage greater than 1000V	IEC : 60383
3.	IS : 2071	Methods of High Voltage Testing	IEC : 60060-1
4.	IS : 2486	Specification for insulator fittings for overhead power lines with a nominal voltage greater than 1000V General Requirements and Tests Dimensional Requirements Locking Devices	IEC : 60120 IEC : 60372
5.		Thermal Mechanical Performance test and mechanical performance test on string insulator units	IEC : 60575
6.	IS : 13134	Guide for the selection of insulators in respect of polluted conditions	IEC : 60815
7.		Characteristics of string insulator units of the long rod type	IEC : 60433
8.		Hydrophobicity classification guide	STRI guide 1.92/1
9.		Radio interference characteristics of overhead power lines and high-voltage equipment	CISPR:18-2 part2
10.	IS : 8263	Methods of RI Test of HV Insulators	IEC : 60437
11.		Standard for insulators – Composite-Distribution Dead-end type	ANSI C29 13-2000
12.	IS : 4759	Hot dip zinc coatings on structural steel & other allied products	ISO : 1459 ISO : 1461
13.	IS : 2629	Recommended Practice for Hot, Dip Galvanization for iron and steel	ISO-1461 (E)
14.	IS : 6745	Determination of weight of zinc coating on zinc coated iron and steel articles	ISO : 1460
15.	IS : 3203	Methods of testing of local thickness of electroplated coatings	ISO : 2178
16.	IS : 2633	Testing of Uniformity of coating of zinc coated articles	
17		Standard specification for glass fiber strands	ASTMD 578-05
18		Standard test method for compositional analysis by Thermo-gravimetric	ASTM E 1131-03
19	IS : 4699	Specification for refined secondary zinc	

Technical Requirement:

1. Composite Insulators shall be designed to meet the light quality, safety and reliability and are capable of withstanding a wide range of environmental conditions.

(a) Core : The internal insulating part
(b) Housing : The external insulating part.
(c) Metal end fittings: For attaching to hardware to support conductor.

Core: It shall be a glass-fibber reinforced epoxy resin rod of high strength (FRP rod). Glass fibbers and resin shall be optimized in the FRP rod. Glass fibbers shall be Boron free electrically corrosion resistant (ECR) glass fibber or Boron free E-Glass and shall exhibit both high electrical integrity and high resistance to acid corrosion. The matrix of the FRP rod shall be Hydrolysis resistant. The FRP shall be manufactured through Pultrusion process. The FRP rod shall be void free.

Housing (Sheath):

The FRP rod shall be covered by a seamless sheath of a silicone elastometric compound or silicone alloy compound of a thickness of 3 mm minimum. It shall be one-piece housing using injection Moulding Principle to cover the core. The elastomer housing shall be designed to provide the necessary creepage distance and protection against environmental influences, external pollution and humidity. Housing shall conform to the requirement of IEC 61109/92-93 with latest amendments.

It shall be extruded or directly moulded on core and shall have chemical bonding with the FRP rod. The strength of the bond shall be greater than the tearing strength of the polymer.
Sheath material in the bulk as well as in the sealing / bonding area shall be free from voids.

Manufacturer should furnish a description of its quality assurance programme including fabrication; testing and inspection for any material (i.e rubber) Components (i.e rod) or hardware (i.e. end filings). The manufacturer has had fabricated by others should also be included. Manufacturing methods and material composition documentation will be a part of Technical Bid to be submitted along with offer.

WEATHERSHEDS:

The composite polymer Weathersheds made of silicone elastometric compound or silicon alloy shall be firmly bonded to the sheath, vulcanized to the sheath or moulded as part of the sheath and shall be free from imperfections. The weathersheds should have silicon content of minimum 30% by weight. The strength of the weathershed to sheath interface shall be greater than the tearing strength of the polymer. The interface, if any, between sheds and sheath (housing) shall be free from voids.

METAL END FITTINGS:

End fittings transmit the mechanical load to the core. Hardware of respective specified mechanical load and shall be hot dip galvanized in Zinc coated with minimum 99.95 % purity of electrolytic high grade Zinc in accordance with IS 2629. The material used in fittings shall be corrosion resistant.

Metal end fittings shall be uniform and without sharp edges or corners and shall be free of cracks, flakes, silvers, slag, blow-holes shrinkages defects and localized porosity.

They shall be connected to the rod by means of a controlled compression technique. As the main duty of the end fittings is the transfer of mechanical loads to the core the fittings should be property attached to the core by a coaxial or hexagonal compression process and should not damage the individual fibers or crack the core.

The gap between fittings and sheath shall be sealed by flexible silicone elastometric compound or silicone alloy compound sealant, system of attached of end fitting to the rod shall provide superior sealing performance between housing, i.e. seamless sheath and metal connection. The sealing must be moisture proof.

The dimensions of end fittings of insulators shall be in accordance with the standard dimensions stated in IEC: 60120/IS:2486 Part-II/1989.

Nominal dimensions of the pin insulator shall be in accordance with the Specific Technical Particulars. No joints in pin will be allowed. Outer portion of Pin should be Zinc coated with minimum 99.95% purity of electrolytic high grade Zinc.

The finished surface shall be smooth and shall have a good performance. The surface shall not crack or get chipped due to ageing effect under normal and abnormal service conditions or while handling during transit or erection.

The design of the fittings and the insulators shall be such that there is no local corona formation or discharges likely to cause the interference to either should or visiontransmission.

Bottom end metal fitting (Shank) of Pin Insulator should be as per IS: 2486. Length of thread on shank should be minimum 110 mm for 11 KV Pin and 130 mm for 33 KV Pin insulator. Shank diameter is 20 mm for 11 KV Pin Insulator & 24 mm for 33 KV Pin Insulator. Minimum

Collar diameter should be 40 mm & 4 8 mm for 11 KV & 33 KV Pin insulators and its minimum thickness should be of 5 mm. Two number nuts as per IS 1363 (P-III) and 4 mm thick Spring Washer shall be as per IS 3063 with latest amendments if any, Nuts and spring washer shall be hot dip galvanized.

Workmanship :

a) All the materials shall be of latest design and conform to the best engineering practices adopted in the high voltage filed. Bidders shall offer only such insulators as are guaranteed by them to be satisfactory and suitable for continued good service in power transmission lines.

b) The design, manufacturing process and material control at various stages shall be such as to give maximum working load, highest mobility, best resistance to corrosion, good finish and elimination of sharp edges and corners.

c) The design of the insulators shall be such that stresses due to expansion and contraction in any part of the insulator shall not lead to deterioration.

d) The core shall be sound and free of cracks and voids that may adversely affect the insulators. e) Weather sheds shall be uniform in quality. They shall be clean, sound and smooth and shall be free from defects and excessive flashing at parting lines.

f) End fittings shall be free from cracks, seams, shrinks, air holes and rough edges. End fittings should be effectively sealed to prevent moisture ingress. Effectiveness of sealing system must be supported by test documents. All surfaces of the metal parts shall be perfectly smooth without projecting points or irregularities, which may cause corona. All load bearing surfaces shall be smooth and uniform so as to distribute the loading stresses uniformly.

g) All ferrous parts shall be hot dip galvanized to give a minimum average coating of zinc equivalent to 610 gm/sq.m. or 87μm thickness and shall be in accordance with the requirement of IS:4579. The zinc used for galvanizing shall be of purity 99.5% as per IS : 4699. The zinc coating shall be uniform, adherent, smooth, reasonably bright continuous and free from imperfections such as flux, ash rust stains, bulky white deposits and blisters. The galvanized metal parts shall be guaranteed to withstand at least four successive dips each lasting for one (1) minute duration under the standard preece test. The galvanizing shall be carried out only after any machining.

Drawing :

The bidder shall furnish along with the bid the outline drawing of each insulator unit including a cross sectional view of the long rod insulator unit. The drawing shall include but not be limited to the following information :

(a) Long rod diameter with manufacturing tolerances
(b) Minimum Creepage distance with positive tolerance
(c) Protected creepage distance
(d) Eccentricity of the long rod unit
  (i) Axial run out
  (ii) Radial run out
(e) Unit mechanical and electrical characteristics
(f) Weight of composite long rod units
(g) Identification mark
(h) Manufacturer's catalogue number

Marking: Each insulator shall be legibly and indelibly marked (embossing/engraved) to show the following:

a) Name & Trade mark of the manufacturer b) Month & Year of manufacturing
c) Voltage & Type
d) Minimum Failling Load (in KN) e) "WBSEDCL" marking

N.B. Marking with sticker/written by Ink is not acceptable.

Design/Type Test:

Following Design test and type test report needs to be submitted with the technical bid:-

Design Test:-

1. Testing on shed and housing material:-
(a) Hardness test
(b) Accelerated weathering test
(c) Tracking and erosion test

(d) Flammability test
(e) Chemical composition test
2. Test on core materials
(a) Dye penetration test
(b) Water diffusion test

Type Test:-

1. Lightning impulse withstand voltage test
2. Lightning impulse flashover voltage test
3. Wet power frequency voltage withstand test
4. Wet power frequency voltage flashover test
5. Bending load test
6. Recovery of hydrophobicity test
7. Radio interference test

Routine Test :

a) Identification of marking b)
Visual inspection
c) Mechanical routine test

Acceptance Test : The following test will be carried out at manufacturers works during inspection of the offered insulators before delivery :

a) Visual examination
b) Verification of dimension c
) Galvanizing test
d) Mechanical performance test e)
Mechanical Failing Load test

Testing Facilities :

The tenderer must clearly indicate what testing facilities are available in the works of the manufacturer and whether facilities are adequate to carry out all Routine & Acceptance Tests. These facilities should be available to WBSEDCL's Engineers if deputed or carry out or witness the tests in the manufacturer works. If any test cannot be carried out at the manufacturer's work, the reasons should be clearly stated in the tender. The insulators shall be tested in accordance with the procedure detailed in IEC 61109/92-93 with latest amendments.

Inspection :

All Acceptance tests shall be carried out at manufacturer's works in presence of the WBSEDCL's and manufacturers representatives. In addition to above, all routine tests are also to be carried on the insulator as per relevant IS / IEC. The entire cost of acceptance and routine test that to be carried out as per relevant IS / IEC shall be treated as included in the quoted price of Insulator.

The manufacturer shall give at least 21(twenty one) days advance notice intimating the actual date of inspection and details of all tests that are to be carried out from the date when the tests will be carried out.

Routine tests on all insulators shall be carried out as per IEC / IS and test reports shall be submitted along with respective inspection offer to CE, P&CD, WBSEDCL.

Sampling & Rejection during inspection:

The sampling and rejection procedure for Acceptance Test shall be as per IEC 61109.

Packing :

a) All insulators shall be packed in strong corrugated box of min. 7 ply duly palette or wooden crates. The gross weight of the crates along with the material shall not normally exceed 100 Kg to avoid handling problem. The crates shall be suitable for outdoor storage under wet climate during rainy season.

b) The packing shall be of sufficient strength to withstand rough handling during transit, storage at site and subsequent handling in the field.

c) Suitable cushioning, protective padding or dun age or spacers shall be provided to prevent damage or deformation during transit and handling.

d) Each wooden case / crate / corrugated box shall have all the markings stenciled on it in indelible ink.

e) The bidder shall provide instructions regarding handling and storage precautions to be taken at site.

Guarantee :

In the event of any defect in the equipment / materials arising out of faulty design, materials, workmanship within a period of 12 (twelve) months of commissioning or 18 (eighteen) months from the date of last despatch of any integral part of the equipment / materials whichever is earlier the supplier shall guarantee to replace or repair the same to the satisfaction of the purchaser.

If the supplier fail to do so within a reasonable time, WBSEDCL reserves the right to effect repair or replacement by any other agency and recover charges for repair or replacement from the supplier.

Quality Assurance Plan:

1. The successful bidder shall submit following information along with the bid.
2. Test certificates of the raw materials and bought out accessories.
3. Statement giving list of important raw material, their grades along with names of sub-suppliers for raw materials, list of standards according to which the raw materials are tested. List of tests normally carried out on raw materials in presence of bidder's representative.
4. List of manufacturing facilities available.
5. Level of automation achieved and lists of areas where manual processing exists.
6. List of areas in manufacturing process, where stage inspections are normally carried out for quality control and details of such tests and inspections.
7. List of testing equipments available with the bidder for final testing equipment along with valid calibration reports.
8. The manufacturer shall submit Manufacturing Quality Assurance Plan (QAP) for approval & the same shall be followed during manufacture and testing.
9. The successful bidder shall submit the routine test certificates of bought out raw materials/accessories and central excise passes for raw material at the time ofinspection.
10. The Owner's representative shall at all times be entitled to have access to the works and all places of manufacture, where insulator, and its component parts shall be manufactured and the representatives shall have full facilities for unrestricted inspection of the Supplier's and sub-Supplier's works, raw materials, manufacture of the material and for conducting necessary test as detailedherein.
11. The material for final inspection shall be offered by the Supplier only under packed condition. The owner shall select samples at random from the packed lot for carrying out acceptance tests. The lot offered for inspection shall be homogeneous and shall contain insulators manufactured in 3-4 consecutive weeks.
12. The Supplier shall keep the Owner informed in advance of the time of starting and the progress of manufacture of material i/n their various stages so that arrangements could be made forinspection.
13. No material shall be dispatched from its point of manufacture before it has been satisfactorily inspected and tested unless the owner in writing waives off the inspection. In the later case also the material shall be dispatched only after satisfactory testing specified herein has beencompleted.
14. The acceptance of any quantity of material shall in no way relieve the Supplier of his responsibility for meeting all the requirements of the specification and shall not prevent subsequent rejection, if such materials are later found to be defective.

ANNEXURE: A

Test on Insulator units

1. RIV Test (Dry): The insulator string along with complete hardware fittings shall have a radio interference voltage level below 100 micro volts at one MHz when subjected to 50 Hz voltage of 10 kV & 30 kV for 11 kV & 33 kV class insulators respectively under dry condition. Thetest procedure shall be in accordance with IS : 8263/IEC: 437/CISPR 18-2.

2. Brittle Fracture Resistance Test: Brittle fracture test shall be carried out on naked rod along with end fittings by applying "1n HNO3 acid" (63 g conc. HNO3 added to 937 g water) to the rod. The rod should be held at 80% of SML for the duration of the test. The rod should not fail within the 96 Hour test duration. Test arrangement should ensure continuous wetting of the rod with Nitric acid.

3. Recovery of Hydrophobicity & Corona Test:

i) The surface of selected samples shall be cleaned with isopropyl alcohol. Allow the surface to dry and spray with water. Record the Hydrophobicity classification in line with STRI guide for Hydrophobicity classification (Extract enclosed at Annexure-D) Dry the sample surface.

(ii) The sample shall be subjected to mechanical stress by bending the Sample over a ground electrode. Corona is continuously generated by applying 12 kV to a needle like electrode placed 1 mm above the sample surface. Tentative arrangement shall be as shown in Annexure-E. The test shall be done for 100 hrs.

(iii) Immediately after the corona treatment, spray the surface with Water and record the HC classification. Dry the surface and repeat the corona treatment as at Clause-2 above. Note HC classification. Repeat the cycle for 1000 Hrs. or until an HC of 6 or 7 is obtained. Dry the sample surface.

(iv) Allow the sample to recover and repeat hydrophobicity Measurement at several time intervals. Silicone rubber should recover to HC 1 – HC 2 within 24 to 48 hours, depending on the Material and the intensity of the corona treatment.

4. Chemical composition test for Silicon content:

The content of silicon in the composite polymer shall be evaluated by EDX (Energy Dispersion X- ray) Analysis or Thermo-gravimetric analysis. The test may be carried out at CPRI or any other NABL accredited laboratory.

MANDATORY PARTICULARS FOR 11 KV & 33 KV PIN INSULATOR

Sl. No.	Description	11 KV Pin	33 KV Pin
1.	Type of insulator	Polymeric composite Pin Insulator	Polymeric composite Pin Insulator
2.	Reference Standard	IEC 61109	IEC 61109
3.	Material of FRP Rod	Borron free ECR	Borron free ECR
4.	Material of sheds	Silicon Rubber	Silicon Rubber
5.	Minimum silicon content in weather sheds	30% by weight	30% by weight
6.	Method of fixing of metal end fittings to rod	controlled compression technique	controlled compression technique
7.	Material of Top End Fittings	SGCI /MCI/FORGED STEEL	SGCI /MCI/FORGED STEEL
8.	Material of Bottom End Fittings	SGCI /MCI/FORGED STEEL	SGCI /MCI/FORGED STEEL
9.	Material of sealing compound	RTV Silicon	RTV Silicon
10.	Colour of sheds	Grey	Grey
11.	Rated voltage	11 KV	33 KV
12.	Highest voltage	12 KV	36 KV
13.	Dry Power Frequency Withstand voltage	60 KV	95 KV
14.	Wet Power Frequency Withstand voltage	35 KV	75 KV
15.	Dry Power Frequency Flashover Voltage	75 KV	130 KV
16.	Wet Power Frequency Flashover Voltage	45 KV	90 KV
17.	Dry Lightning Impulse withstand voltage	Positive : 75 KV Negative : 80 KV	Positive : 170 KV Negative : 180 KV
18.	Dry Lightning Impulse Flashover voltage	Positive : 95 KV Negative : 100 KV	Positive : 210 KV Negative : 230 KV
19.	RIV at 1 MHz when energised at 10 KV / 30 KV (rms) under dry condition	< 100 microvolt	< 100 microvolt
20.	Creepage distance (min)	320 mm	900 mm
21.	Minimum bending load	5 KN	10 KN
22.	Diameter of FRP Rod	24 mm	33.5 mm
23.	Length of FRP Rod (min)	165 mm	300 mm
24.	Diameter of weather sheds	90 mm	100 mm
25.	Minimum thickness of housing	3 mm	3 mm
26.	Minimum dry arc distance	150 mm	300 mm
27.	Method of fixing sheds to housing	Injection moulding	Injection moulding
28.	Visible Discharge Voltage (PF)	9 KV	27 KV
29.	No of weather sheds (min)	Three	Eight
30.	Type of sheds	Aerodynamic	Aerodynamic

31.	Diameter of bottom end fitting	20 mm	24 mm
32.	Minimum thread length of bottom end fitting	110 mm	130 mm (min)
33.	Minimum shank diameter	20 mm	24 mm
34.	Minimum collar diameter	40 mm	48 mm
35.	Minimum collar thickness	5 mm	5 mm
36.	No. of 1 inch stainless steel nuts	2 nos	2 nos
37.	Thickness of spring washer	4 mm	4 mm
38.	Type of packing	Wooden / Corrugated box	Wooden / Corrugated box
39.	No of insulators in each pack	Twenty	Ten
40.	Marking		
41.	Guarantee	12 months from commissioning or 18 months from the date of last despatch.	12 months from commissioning or 18 months from the date of last despatch.

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