TECHNICAL SPECIFICATION

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TECHNICAL SPECIFICATION FOR 36 KV, 400 AMPS, ROCKING TYPE TPGO. ISOLATOR

1. SCOPE :

This specification covers Design, Manufacture, Testing at manufacturer's works, sup pl y and delivery of Three Post Rocking Type , Single Air Break 36 KV , 3 Phase , 400 Amps . Gang Operated, including Insulators and complete in all respect with Arcing Horns, bimetallic connectors, operating mechanism, indicating devices, fixing details etc. of Off- Load Isolator suitable for outdoor installation on DP/ Sub-Stn Structures with either Horizontal or Vertical mounting.

The supporting structure for the isolators are excluded from the scope of this specification. Drawings for the details of structures for different types of isolators shall be compatible with the standard Double Pole structures of 33 KV line of WBSEDCL.

2. APPLICABLE STANDARD :

The Isolator shall conform to prevailing specification: IS – 9921 (Part: I –IV) , with latest amendment in general & IEC publication no. 129 (as amended up to date) and to our specification in particular.

Porcelain Post Insulators for the Isolators shall confirm to IS: 2544 and/or IEC: 168 as amended up to date except to the extent of explicitly modified in this technical specification. Porcelain Post Insulators of Isolator shall be guided by relevant technical specifications of Post Insulator.

Unless otherwise specified, the rating as well as performance & testing of the isolator shall confirm to the latest Divisions of all the relevant standards.

Sr.No.	Standard No.	Title
1	IS:1818	Alternating current isolators (disconnectors) and earthing switches
2	IS:9921	-do-
3	IEC:129	-do-
4	IS:2544	Insulators
5	IS 2147	Degree of protection provided by enclosures
6	IS:4691	-do-
7	IS:4722	Rotating Electrical Machines
8	IS:2629	Rec
9	IS:4759	Hop dip galvanization coating on Structural Steel.

Sr.No.	Standard No.	Title
10	IS:2633	Method of testing weight thickness and uniformity of coating on fasteners
11	IS:1573	Electro plated coating of zinc on Iron & Steel.
12	IS:3033	Spring Washers
13	IS:2016	Plain washers
14	IE Rules 1956	Indian Electricity Rules
15	IEC:168	Tests on Indoor and Outdoor post Insulator
16	IS:3961	Recommended current rating for PVC Insulated and PVC Sheeted heavy Duty Cables.
17	IS: 5561	Power Connectors
18	IS:1554	PVC Cables
19	IS:5578	Guide for marking of Insulated conductors and arrangement for switchgear bus bar main connectors & Auxiliary wirings.
20	IS:11353	Guide for Uniform system of marking and identification of conductors and apparatus terminals.

3.0.0 TYPE:

3.0.1 The 33 KV isolator shall be outdoor type, three phase, single break, suitable for manual operation.

All isolators as given in the schedule of requirements shall be suitable for upright mounting on structure or P.C.C. pole structures. Each pole unit of the multipole Isolators shall be of identical construction and mechanically linked for gang operation.

3.0.2 The design shall be such that the operating mechanism with the linkages shall be suitable for mounting on any of the outer pole ends without much difficulty and with minimum shifting of parts.

3.0.3 Moving contacts of all isolators shall rotate for sufficient angular displacement from their "Fully Closed Position" to "fully open position" so that the break is distinct and clearly visible from ground level.

3.0.4 The isolators offered by the tenderers shall be designed for normal current rating of 400 Amps and suitable for continuous service at the system voltage specified herein.

The isolators shall be suitable to carry the rated current continuously and full short circuit current for three seconds at site condition without any appreciable rise in temperature. These shall also be suitable for operation at 110% rated (normal) voltage. The Isolators are not required to operate under load but they shall be suitable for isolating low capacitive/inductive current. The limits of magnitudes of the same shall be furnished by the tenderers in "Annexture E" of Guaranteed Technical Particulars.

3.0.5 The isolators are required to be used in electrically exposed installations and this should be taken into account while fixing the clearance between phases and between phase and earth.

4.0.0 RATING:

4.0.1 The isolator shall comply with the following technical requirements :-

i)	Nominal System Voltage	33 KV. (RMS)
ii)	Maximum System Voltage	36 KV(RMS)
iii)	System Frequency	50 Hz (± 3%)
iv)	Rated current	400 Amps
v)	Rated Short Time Current Rating for **1 sec**	**20 KA (rms)**
vi)	Rated Peak withstand Current(KA Peak)	72
vi)	No. of Poles	3
vii)	No. of Phases	3
viii)	Phase center for Isolator	1220 mm
ix)	Minimum clearance between Fixed and Moving Contacts	520 mm
x)	Height of the Post Insulators to be used in the Isolator	508 mm
xi)	Center to Center distance of Mounting Holes at the Base channel	770 mm
xii)	Impulse withstand Voltage (to Earth and between Poles)	170 KV peak
	Impulse withstand Voltage (Across the Isolating Distance)	195 KV Peak
xiii)	Power frequency withstand Voltage (to Earth and between Poles)	70 KV RMS
	Power frequency withstand Voltage (Across the Isolating Distance)	80 KV RMS
xiv)	Operating Mechanism	Manual
xv)	System Neutral Earthing	Non-effectively earthed
xvi)	Maximum Temperature Rise	As per provision in relevant IS

In "Closed" position, the Isolating switch must withstand the mechanical and thermal effects of Short Circuit Current for 3 sec.

5.0.0 CLIMATIC CONDITION :

The atmosphere in the area is laden with industrial gases and smokes with dust in suspension during dry months and subject to long colder months. The temperature variation between the daily average and maximum is large. Humidity occasionally rises upto 100%. Heavy lightning is useful in this area during the month of May to November. The area is also subjected to heavy monsoon rains 80% to 90% of the annual precipitation being in the month of June to October.

5.0.1 DETAILED ATMOSPHERE CONDITIONIS STATED BELOW :

a) Maximum temperature of air : 50^0 C

b) Minimum temperature of air : 4^0C

c) Maximum temperature of the air in sun : 60^0C Maximum

d) daily average ambient temperature : 45^0C Maximum

e) yearly average ambient temperature : 30^0C

f) Maximum relative humidity : 100 %

g) Average No. of thunderstorm days per annum : 100

h) Average No. of dust storm days per annum : 5

i) Average No. of rainy days per annum : 80

j) Average No. of stormy rainfall days per annum (exceeding ½ " in 24 hours) : 10

k) Average rainfall per annum : 200 cm.

l) Maximum wind pressure : 150 kg / Sq. cm. m)

m) Average wind pressure : 71.3 kg / Sq. Cm.

n) Height above sea level : not exceeding 1000 metres.

o) Earthquake acceleration : 0.04 x 2 g.

p) Climate : Moderately hot & humid tropical climate, conductive to rust & fungus growth

6.0.0 MAIN CONTACTS :

6.0.1 All isolators shall have heavy duty, self aligning and high pressure, line type contacts made of high conductivity, corrosion resistant, hard-drawn electrolytic copper strips 50mmX3mm jaw type. Fixed contacts should be suitable for 400 Amps rating. The hard -drawn electrolytic copper strip should be silver plated of 20 micron thickness and fixed contacts should be backed by powerful Phosphor Bronze/Stainless Steel Springs of suitable numbers.

6.0.2 The isolator blades forming the moving contacts shall be made from rod of high conductivity hard-drawn electrolytic copper having 20 mm. dia and for wall thick- ness should be sufficient for 400 Amps. rating. Current density for other current carrying copper parts should not exceed 1.75Amp/ sq. mm.

6.0.3 These fixed and moving contacts shall be able to carry the rated current continuously and the maximum fault current of 28. 8KA at 33KV for 3 seconds without any appreciable rise in temperature. The isolator blades shall retain form and straightness under all conditions of operation including all mechanical stresses arising out of operation as well as under rated short circuit condition

6.0.4 Fixed guides shall be provided so that even when the blades are out of alignment by one inch (maximum) at the time of closing of switches, proper seating of the blades in between the contacts and adequate pressure to give enough contact surface are ensured, whenever possible, the blades shall be counter balanced by weights & springs at the end of the travel both on opening and closing of the isolator. The springs shall be made of durable and non-rusting type alloy.

6.0.5 The contacts shall be self cleaning by the wiping action created by the movements of the blades. The surface of the contacts shall be rendered smooth and silver-plated.

6.0.6 Isolator main switch shall be required to make or break the line charging current when no significant change in voltage occurs across the isolating distance on account of make or break.

6.0.7 Fixed contacts shall be mounted on a block or channel welded to 10 mm thick M.S. plate with holes for fixing on insulators. Slots shall be provided for marginal adjustment of height of contacts. The contacts shall rest on a brass block and with initial tension. Suitable device shall be provided to prevent dashing.

7.0.0 CONNECTORS :

7.0.1 The isolators shall be supplied complete with high conductivity bimetallic single grooved bolted type of terminal connectors made from Aluminium Alloy (LM - 6 grade) suitable for connecting 100 sq mm ACSR 'DOG' conductor. The support plate on which the conductor shall seat, shall be universal type i.e. rigid type connector for conductors shall have to be fitted on support plate without altering or modifying the support plate. The other Connector shall be fitted at the free end of the "Flexible Jumper". Current density for terminal connector (Aluminium) shall be 1A/Sqmm max. The entry of conductors to the isolators along with the phase centres of the isolators i.e. the centre line of the conductors and bushings of the isolators in a phase shall be in a straight line. Suitable precautions shall be taken to inhabit bimetallic action with the aluminium conductors.

8.0.0 OPERATING MECHANISM :

8.0.1 The operating mechanism shall be simple & ensure quick and effective operation. Manual operating mechanism for main isolator shall be through lever/hand on the operating shaft. The design shall be such as to enable one man to operate it with nominal effort. The operating mechanism shall be suitable to hold the main switch in closed or open position to prevent operation by gravity, wind, short circuit, seismic acceleration, vibration, shock, accidental touching.

8.0.2 The isolator blade shall be in positive continuous control throughout the entire cycles of operation. The operating rods and pipes shall be rigid enough to maintain positive control under most adverse conditions and to withstand all torsion and bending stresses arising from operation. Operation of the switches at any speed should not result in improper functioning, in displacement of parts / mechanism after final adjustment has been made. All holes in cranks, linkages etc. having moving pins shall be drilled and fitted accurately so as to prevent slackness and least motion.

9.0.0 GENERAL ARRANGEMENT & CONSTRUCTION :

9.0.1 The Isolator shall be of Outdoor & Channel-mounted type for Single Break Operation with Two Fixed Posts and one Rocking Post per Phase.

9.0.2 The Isolator shall be provided with Connectors at both ends.

9.0.3 Operating Mechanism with Padlocking Arrangement at "OFF" and "ON " Position. The Operating Mechanism shall be fabricated from M.S. Flats / Rods. The hinged socket which will take the vertical pipe should be made from 30 mm. x 5 mm. flat and the hinge arrangement should be perfect, so that the vertical up and down operation takes place without any obstruction.

The crank lever is to be made from 30mm.x 30mm. x 5mm. M.S. Angle, duly pressed at one end and to be bolted at the vertical pipe end and the other end to the square shaft by a clamp. The clamp of crank lever (Lever Angle) should also be made from 30mm. x 5mm. M.S. Flat with sufficient room to take the square shaft. The G.I. bolts should not be less than 12mm. dia for clamping the square bar. Eye type intermediate guide should be of 12mm. dia, 325mm. long or as necessary in length provided with nut, locknut and 2 nos. flat washers. ID of the eye shall be minimum 55mm to give free play of the pipe during operation.

i) Single piece 38mm/40mm square M.S. Galved „Phase Coupling Shaft" shall be length 2600 mm.

ii) Vertical operating G.I. Pipe 40 mm. nominal bore with 10 SWG (3.2mm) wall thickness, 6mtr. In length, in not more than two equal lengths, with coupler shall have to be supplied.

iii) The handle for „Operating Pipe" should be suitable for gripping by two hands of the operator on wearing 33 KV hand gloves and the same should be covered with corrugated polythene / rubber sleeve. "ON" and "OFF" indicating name plate shall be weatherproof & corrosion proof riveted /pasted with resin based adhesive securely on the body of the Isolator operating handle.

iv) Counter Balancing Spring :

The Roller assembly shall be provided with Balancing Spring and spring holding lever. During the „Make & Break" operation, when the roller assembly moves „Back" & „Forth", the spring holding lever also will move in the same direction freely through the spring , compressing and expanding the spring .

10.0.0 **FIXEDCONTACTS :**

i) The Fixed Contacts shall be made from Electrolytic Copper strip 50mm. x 3 mm. jaw type , to be electro silver plated with 20 micron deposit

ii) The Fixed Contact Guards" shall also to be made from M.S. Strip 38 mm. x 1.5mm (16 SWG) shaped properly and galvanized.

iii) Two nos. Stainless compression Steel Springs made from 16 SWG wire shall be used at both side of the „Fixed Contact" through 6mm. dia. 90mm. long stainless steel threaded at both ends and provided with stainless steel nuts, check nuts and flat washers . The contact pressure of not less than 50 Kg. has to be achieved. The Spring Mechanism shall have to be provided so as to ensure that the speed of opening of Contact is independent of the speed of manual operation.

11.0.0 **MOVING CONTACTS :**

The "Moving Contacts" shall be made from 20 mm. dia. Hard-Drawn Electrolytic Copper Rod. One end of the Rod shall be flattened upto 150 mm. in length by "Drop Forging" arrangement and provided with holes so that the same is bolted on the moving insulator. The other end is to be bent suitably for making contact into the „Fixed Contact jaw„ (forming Line-Contact) . The palmed portion of the copper rod should have minimum 28mm. / 30mm. width x 8mm. thickness. The bolts used for fixing the „Moving Contact" with the „Insulator– Cap" shall be stainless steel. The round portion of the moving contact shall be silver electro-plated with20 micron deposit (minimum).

12.0.0 **TERMINAL ARRANGEMENT :**

Terminal plate shall be made from Hard-Drawn Electrolytic Copper Flat 38mm x 8mm.x150mm. length, so that, the Arcing Horn and the Connector may be clamped. Terminal at the outgoing side (back-plate) shall also be made from electrolytic copper 38mm x 8mm x 165mm. A pantograph holder made of C.I. Galved. 38mm x 6mm having an eye at the center to take one end of the pantograph assembly shall be fitted with the terminal pad on the Insulator top.

13.0.0 **FLEXIBLE BREADEDTAPE :**

A flexible link made from fine tinned copper breaded tape of minimum size 40mm. (width) x 6mm. thickness having minimum weight of 0.900Kg/meter length shall connect the Moving Contact with the Terminal Pad" through the Pantograph . The flexible tape will be treated as a part of the Isolator and the temperature rise should be within the allowable limit as per ISS when full load current is passed through the Isolator. The length of the breaded tape will be 1000mm. in each phase. Both ends of the tape shall be suitably terminated by Tinned Copper Sockets, securely fixed to the t erminal Pad of the Rocking Insulator with nuts, bolts and washers etc. at one end and the other end at the outgoing Terminal Pad. The Connector shall be such as to facilitate easy replacement during future maintenance.

14.0.0 PANTOGRAPH ASSEMBLY :

The Pantograph shall be fabricated from 30mm. x 3mm. M.S. Flat duly galvanized and fitted with hinge for folding and unfolding the pantograph during "Back & Forth" movement of the insulator assembly. It shall have sufficient width to accommodate the flexible tape. Twisted M.S. Flat (25mm x 3mm) pieces shall be used to hinge the Pantograph ends with Rocking & Fixed Insulators.

15.0.0 FIXED AND MOVING ARCING HORN :

Phosphor Bronze Arcing Horns are to be made from 8mm.dia rod for smooth and even surface. The two parallel limbs of the "Fixed Arching Horn" shall be spaced strictly so that, the spring action remains unaltered and permanent. The moving Arching Horn will have 'Eye' at one end for bolting with the Moving Contact at its flat space and in addition, a clamp made of non-ferrous strip 16mm. wide x 20 SWG thick to be provided for tightening the Arcing Horn with the Moving Contact at round portion. Feature of the Arching Horns should be to Make Before & Break After main contacts so that, they can break magnetizing / charging current to avoid any damage to the contacts.

16.0.0 ROCKINGBASE :

The Moving Post Insulator shall have to be fitted on a Rocker for 'Back' and 'Forth' movement. A Cast Iron Galvanized Roller Body shall be supported on M.. S. Fulcrums fitted at both Side of the Base Channel with bolts & nuts. The side supports shall have Brass Bush/Glass-Nylon bush bearing for easy swivel movement of the Roller Body upon which the Insulator column is fitted. The design of the roller body (swivel) shall be such as to make it capable of withstanding mechanical endurance test as per relevant I S.

17.0.0 BASECHANNEL :

The Base Channel shall be of size 100mmx 50mmx 5mm of suitable length without any sharp edge. The M.S. Galvd. Channel should be of Hot- Rolled quality .Mounting Holes at the Base Channel shall be 770 mm. apart center to center. One of the Holes shall be slotted 20x40mm. and the other 20mm dia. Six nos. 18 mm. dia M.S. Bolts of suitable length completed with nuts and washers may be supplied. Length of Base Channel shall be 1100 mm (approx).

18.0.0 EARTHING :

i) The 33KV system neutral is non-effectively Earthed. The Isolator shall be provided with Earthing terminals, fixed with bolts and nuts, the diameter of the bolts being 12mm in at least one of the three Base Channels provided in each set of Isolator.

ii) Each Operating Handle shall be provided with Earthing terminal along with Bolt and Nut of above mentioned sizes.

iii) All the Earthing Terminals shall be made and marked invariably with Earthing symbol.

19.00 PAINTING GALVANISING AND CLIMATEPROOFING :

All interiors and exteriors of enclosures, cabinet and other metal parts shall be thoroughly cleaned to remove all rust, scales, corrosion, grease and other adhering foreign matterand the surfaces treated by recognised phosphating (seven tank process). After such preparation of surfaces, two coat of zinc oxide primer shall be given by suitable storing and air drying etc. before final painting. Colour of the final paint shall be of shade no. 631 of IS:5i.e epoxy light gray. The final painted equipment shall present esthetically pleasing appearance free from any dent or uneven surface.

Paint inside the metallic housing shall be of anti condensation type and the paint on outside surfaces shall be suitable for outdoor installation.

All ferrous parts not suitable for painting such as structural steel, pipes rods, levers, linkages, nuts and bolts used in other than current path etc. shall be hot dip galvanised. Galvanisation shall be done after completion of fabrication which shall be capable to prevent corrosion in view of the

severe climatic conditions. Thickness of zinc coating shall not be less than 610 gm of zinc per sq. meter of surface. Zinc coating shall be smooth clean and of uniform thickness and free from defect. Preparation of galvanising and the galvanising itself shall not adversely affect the mechanical properties of the coated material. The quality shall be established by tests as per IS 2633. Galvanising of nuts and bolts shall be carried out by centrifugal or suitable process so that the bolts will easily fit into the tapped holes/nuts.

All components shall be given adequate treatment of climate proofing so as to withstand corrosion and severe service conditions.

Complete details of painting, galvanising and climate proofing of the equipments shall be furnished in the tender.

20.0.0 *MARKING :*

Name Plate" shall have to be provided in each channel of Isolator with the information as specified in clause no. 10.1 of IS 1818-1972. The Name Plate should be weather proof & corrosion proof.

Manufacture"s serial number and customer"s order reference shall be indicated in the Name Plate .

21.0.0 TOLERANCE :

±5% tolerance shall be allowed in the measurement of dimensions for acceptance.

22.0.0 PACKING :

Materials shall be packed by wooden crates of suitable thickness to protect against damage in transit and in way that individual unit can be dispatched at a time complete in all respects so that erection is not held up for want of any components .

23.0.0 DRAWINGS,DATAANDMANUALS :

1) Following Drawings shall have to be furnished by the Tenderer at the time of submission of the Tender in triplicate:

i) G.A. Drawing showing dimensions, design features and technical arrangements including Bill of Materials.
ii) Part drawing for Fixed & Moving Contacts with details of fixtures.
iii) Part drawing for Operating Mechanism and lever assembly with details of fixtures.
iv) Part drawing for Rocking Base and Pantograph assembly with details of fixtures.
v) Part drawing for Terminal Pad, Connectors, Flexible copper braided tape, Fixed & Moving Arcing Horns with details of fixtures.

Six copies of the Drawings of the offered Isolators shall have to be submitted for Approval of the Design Drawings from the Purchaser before starting manufacturing of the Equipment.

Before starting manufacture of the equipment, the supplier shall have to take approval of the design drawings from the purchaser.

23.0.1 Technical leaflets of individual component describing design and construction features are to be submitted in triplicate with the Tender.

23.0.2 Manuals for installation, operation and maintenance procedure are to be submitted in triplicate with the Tender.

23.0.3 Six copies of above mentioned drawings, data and manuals of offered equipment shall have to be submitted for approval and final distribution afterwards along with soft copies of documents in MS OFFICE and drawings in AUTO CAD format only.

23.0.4 The tenderer shall submit the following information along with offer:

a. List of raw material and bought out item and the name of sub- supplier.
b. Type test report of the raw material and bought out items.
c. Quality Assurancce Plan with hold points for purchaser's inspection.
d. The successful tenderer shall submit routine test certificates of bought out items at the time of routine testing of the fully assembled Isolator.

24.0 PERFORMANCE CERTIFICATES :

Copies of performance certificates of similar equipment supplied to various organization shall have to be furnished in triplicate along with the tender as Pre-requisites.

25.0 CREDENTIALS :

Tenderer shall furnish document in support of supply & delivery of similar equipment to WBSEDCL/Other Power Utilities/Other Govt. Deptt. in earlier occasions indicating thereon names of the organization, quantity ordered , quantity supplied along with the tender as Pre-requisites. Copies of Purchase Orders and copies of Inspection Offer Letter, Copies of Despatch Instruction, copies of signed challan in support of execution of order(s) are to be submitted in support of Credential.

26.0. PRICE :

The price (quoted price) should include the price of equipment including all accessories as per schedule of requirement .

27.0. GUARANTEEDTECHNICALPARTICULARS :

Tenderer shall furnish Guaranteed Technical Particulars & other informations of offered equipment as per proforma given in Part – E & F of this Technical Specification.

28.0. DEVIATION :

All deviations from the specification shad be recorded in the "Deviation Sheet" with reference to respective-clauses of the specification by drawing specification for the same. Unless deviations are recorded in the deviation sheet and submitted with the offer, it will be taken for granted that the offer is made in conformity with the specification.

29.0. VALIDITY PERIOD :

Validity Period of the offer shall be reckoned from the next date of opening of the tender provided of receipt of complete information and will be valid for a minimum period of 120 days from thereon. However, WBSEDCL may ,on the merit of the case, request extension of validity of offer for a further suitable period without any change in terms & conditions of the offer.

30.0. COMPLETENESS OF SUPPLY

Any fittings, Accessories or Apparatus which may have not been mentioned in this specification but which are necessary for Isolators" efficient operation, performance and satisfactory maintenance shall be deemed to be included in the Contract and shall be supplied by the Contractor without any extra charges . All Isolators shall be complete in all respects whether the details are mentioned in the specification or not .

Nuts which may work loose in operation must be provided with spring washers / split pins Deviation if any , from the Purchaser"s specification proposed by the Tenderer may be considered provided these are necessary either to improve the Utility , Performance and Efficiency of the Equipment or to secure overall economy . Tender Drawings shall have to be submitted by the Tenderer showing details of equipment.

The complete Isolator shall be manufactured and supplied against this specification except that for supporting structures which are excluded from the scope of this specification.

The supplying structures for the Isolators are excluded from the Scope of this specification.

Drawings for the details of structure for mounting of the Isolators shall be furnished by the Purchaser to facilitate design of mounting arrangement etc. to the concerned controlling officer / ate executor prior to actual execution.

Pedestal Insulators shall be supplied as per specific requirements laid down in the Technical Specification. Test certificates for the offered Isolators shall be furnished as per Guide lines laid down in the Technical Specification.

G.T.P. and other t e c h n i c a l p a r t i c u l a r s of the offered Isolators shall be furnished as per proforma given in Annexture – E & F of this Technical Specification.

ENCL: Proforma of schedule of G.T.P.

31.0.0 The quantity mentioned in this schedule are provisional and are subject to change by ± 5% at the time of ordering.

SPECIFIC REQUIREMENT OF PEDESTAL INSULATOR (36KV.400AMPSTYPE)

1.00 Each set of 36 KV. TPGO Isolator shall be provided with 9 Stacks (2 unit 22 KV Post insulator per stack) of Pedestal insulators duly fitted .

2.00 The Post Insulator shall in general conform to the latest issue of ISS – 2544 / 1973 with all amendments thereof .

3.0 The porcelain shall be sound , free from defects thoroughly verified and smoothly glazed. The post insulator shall be Brown in colour as per general practice. The glaze shall cover all the porcelain parts of the insulator except those areas which serve as support during firing or left unglazed, for the purpose of assembly.

4.0 Cement used in the construction of insulators shall not cause fracture by expansion or loosening by contraction and proper care must be taken in 'curing' cement shall not give rise to chemical reaction with the metal fittings and it"s thickness shall be as uniform as possible.

5.00 The design of the insulators shall be such that stress due to expansion or contraction of any part of insulators shall not lead to deterioration . The porcelain shall not engage directly with hard metal.

6.00 The post insulators shall be cemented only ciby the manufactured insulator. Suitability of cementing shall be ensured by required tests specified in the relevant IS

7.00 At the time of inspection one or more insulator(s) may be dismantled by the Purchaser's Representative from the isolators offered for inspection and the contractor shall arrange at his own cost for both Mechanical and Electrical Tests at the insulator manufacturers laboratory within reasonable time as per latest ISS failing which entire lot may be rejected.

8.00 The isolator supplier shall collect a certificate from the manufacturer of insulators that cementing has been done by them.

9.00 The disconnecting switch shall be provided with six nos. 22 KV post Insulators of 2×22 KV Stack type per pole i.e. total 18 nos. insulators per Isolator.

10.0.0 Pertinent particulars of the insulators will be as follows:

Sl.No.	P a r t I c u l a r s	Quantity / Dimension
1	No. of Units	2 Unit of 22KV Stack type
2	Height	508 mm.
3	Cap pitch circle diameter	76 mm.
4	Base Pitch circle diameter	76 mm.
5	Diameter of Cap and Base	108 mm.

10.0.1 SPECIFICTECHNICALPARAMETERSOF33KV(2x22KV)KVPOSTINSULATORS :

Sl. No.	Description		Rating
			33 KV (2x22 KV)
1	Nominal system voltage/Working voltage	:	33 KV
2	Highest system voltage	:	36 KV
3	No. of units per Stack	:	2
4	Minimum specific Creepage distance	:	25 mm per KV
5	P.F Visible Discharge Voltage	:	27 KV rms
6	P.F. Withstand Voltage		
	a) Dry	:	95 KV rms
	b) Wet	:	75 KV rms
7	Impulse withstand voltage **1.2/50 micro second wave :**		
	a) Positive	:	170 KVp
	b) Negative	:	180 KVp
8	P.F. Minimum flash over voltage		
	a) Dry	:	130 KV rms
	b) Wet	:	90 KV rms
9	Impulse flashover voltage **1.2/50 micro second wave :**		
	a) Positive	:	210 KVp
	b) Negative	:	230 KVp
10	Power Frequency puncture withstand voltage on single unit	:	150 KV rms
11	Cantilever strength on stack		
	a) Upright	:	4.5 KN
	b) Inverted	:	3.4 KN

12	Tensile Strength	:	30 KN
13	Torsional Strength	:	680 Nm
14	Compression Strength	:	40 KN
15	Height	:	508 mm
16	Insulation Part Diameter	:	210 mm
17	Pitch Circle Diameter		
	a) Top	:	76 mm
	b) Bottom	:	76 mm
18	Conforming standard	:	As per IS

TESTCERTIFICATES/ INSPECTION AND TESTING

1. I S O L A T O R :

The bidder shall submit following copies of complete type test certificates of similar Isolator of identical rating & design as well as on 33 KV (2x22 KV) Post insulators already conducted in CPRI/NABL accredited/Govt. approved test house or laboratory containg NABL logo. Type test report shall be carried out within five years from the due date of submission of tender. The bidder shall have to submit the type test report along with the tender, otherwise the offer will be rejected.

Following type test report shall have to be submitted:

a) Short Time Withstand & Peak Withstand Current Test.
b) Lightning Impulse Voltage Withstand Test.
c) PF Withstand Voltage Test (Dry & Wet)
d) Mechanical Endurance Test
e) Temperature Rise Test

In addition to that, the bidder have to submit Type Test Report on on 33 KV (2x22 KV) Post insulators as per relevant IS/IEC and technical specification of the Tender along with the Tender document.

The dimensions of the Fixed & Moving Contacts of the sample Isolators, tested successfully for Type Tests in an approved Laboratory, should at least conform to the dimensions as specified in Part – A of this specification. The type of Fixed Contact should be of Reverse Loop Type.

Following Acceptance Tests shall be carried out at the works of the Manufacturer as per relevant ISS before delivery of each lot in presence of our Engineers. The contractors shall furnish 'Routine Test' reports of each unit comprising 'Millivolt Drop Test , 'Operation Test' and ' One Minute Power Frequency Voltage Withstand Test ' in six copies along with each lot offered :-

a) Temperature Rise Test
b) Millivolt Drop Test
c) One minute power frequency voltage withstand test
d) **Operation Test** : The tenderer shall make arrangement for operation test for the total height of the Isolators on selected samples.
e) Uniformity of silver coating on the copper contacts

f) Dimensional Check-up as per drawing and specification on selected samples.

g) **Mechanical Test for Insulator as per IS-2544**

f) Uniformity of zinc coating on ferrous parts (galvanization test)

This test shall be carried out at the Laboratories undertaking tests for Govt. Deptts. And in such case, reports incorporating Test Results from the respective Laboratories should be submitted in support of the contractor's Test Certificates .

Samples at random will be selected from the lot offered for above testing and if any one of the test piece fails, the lot will be rejected.

Contact pressure, Material Quality, Dimensions of the Isolator Contacts and other components shall also be verified /measured (with the approved Drawing). Quoted price should include charges for above stated Acceptance Tests and Type Tests.

Testing of materials: The purchaser reserves the right to get the metal/raw materials/silver coating/galvanizing of any component, tested at any approved laboratory at the cost of manufacturer, in case of any doubt over their quality of such metal / raw material especially for Copper and Aluminium components.

2.00 <u>PEDESTAL INSULATOR :</u>

2.01) The Pedestal Insulator to be fixed and supplied along with the Isolators will be tested both for Mechanical and Electrical characteristics as per late issue of ISS - 2544. Complete Type Test Certificates from the Manufacturer shall also to be furnished, for both Electrical and Mechanical Tests.

2.02) One or more Insulator(s) may be dismantled by the Purchaser's Representative, from Isolators offered for inspection and the Contractor shall arrange at his own cost for both Mechanical and Electrical Tests at the insulator manufacturer's Laboratory within reasonable time as per latest ISS.

2.03) The Test values in respect of ' Impulse Voltage Test ' and ' Power Frequency Voltage Withstand Test'on the complete isolators without grounding connectors, should not be less than those specified in ISS and as detailed below :

System Voltage	Impulse Withstand Voltage Positive & Negative Polarity		One Minute Power Frequency Withstand Voltage (RMS)	
	Across Isolating Distance	To Earth and Between	Across Isolating Distance	To Earth & Between Poles
36 KV	195 KV	170 KV	80 KV	70 KV

Rated Short time Current Rating is 28.8 KA (r.m.s) for 3 Sec.

3. The equipment shall be subjected to routine & acceptance tests in accordance with provisions of relevant standards.

Routine & Acceptance tests shall have to be performed in presence of purchaser without any extra cost. The supplier/ manufacturer shall give at least 15(Fifteen) days" advance notice for conducting such tests.

Purchaser shall have the right to select any number on random sampling basis for testing from the equipment ordered for inspection and in the event of failure in such test, the purchaser shall have the right to reject the whole lot.

Six (6) copies of routine & acceptance reports shall have to be furnished to the purchaser for approval before dispatch of the offered equipment.

4. **TYPE TEST AFTER ISSUANCE OF ORDER:**

Besides submission of Type Test Report, carried out within five years as per Tender Specification, Type Test at the discretion of Ordering authority, shall have to be arranged by the successful contractor or WBSEDCL on his own may conduct the same from any lot delivered to site, as per the relevant ISS from any NABL accredited/Government recognized Test House or Laboratory in presence of WBSEDCL'S representative. In case of failure of the materials after type test, the WBSEDCL will have the right to reject the total supplied lot of the said materials and the party have to replace the complete lot of materials at his own cost including transportation of materials at site.

GUARANTEE:

In the event of any defect in the equipment arising out of faulty design, materials, workmanship within a period of **5 (five) years from the date of last despatch** of any integral part of the equipment/cable, the supplier shall guarantee to replace or repair the same to the satisfaction of the purchaser.

If the supplier fails to do so within one month of receipt of intimation, WBSEDCL reserves the right to effect repair or replacement by any other agency and recover charges for repair or replacement from the supplier.

DOCUMENTS TO BE SUBMITTED AT THE TIME OF PHYSICAL DELIVERY TO THE CONSIGNEE STORES

The following documents to be submitted by the Vendors to the Consignee Stores at the time of physical delivery :-

a) Copy of Purchase Order.
b) Copy of Despatch Instruction. c)
Inspection Test Certificate.
d) Guarantee Certificate.
e) Proforma Invoice.
f) Seal list and packing list.
g) Challan in triplicate.
h) Way bill, if applicable.

ENCLO: ANNEXURE

ANNEXUREE

SCHEDULEOFGUARANTEEDTECHNICALPARTICULARSFOR36KV,400AMPSROCKING TYPETRIPLE POLEGANGOPERATEDAIRBREAKISOLATINGSWITCHES

(TOBEFILLEDBYTHETENDERER)

1.	Maker' Name	
2.	Particulars of Isolating Switches:	
a)	Type	
b)	Model	
c)	Number of Poles	
d)	Voltage rating	
e)	Maximum permissible continuous service voltage	
f)	Current rating in Amps :-	
	i. Normal(Continuous rating)	
	ii. Maximum & Short time current rating for 1 Sec.	
	iii. Maximum & Short time current rating for 3 Sec.	
g)	Current Density at Minimum Cross section of switch blade	
h)	Type, Material and contact pressure (in kg.) of Cu.contacts and stainless steel spring :-	
	i. Moving Contact	
	ii. Fixed Contact	
	iii.Compression Spring	
k)	Whether contacts are silver faced or tin plated (the thickness may be indicated)	
l)	Temperature rise obtained during type test as per clause No.11.1.7 of IS:1818 of the following at the full rated current in degree centigrade over an ambient temperature of 50 ^{O}C	
	i. Contacts	
	ii. Terminals	
	iii. Compression Springs	
m)	Rerating factor for higher ambient temperature	
n)	Measurement of the resistance of the main circuits(in milli volt drop) which was obtained during type test as specified in relevant Clause of IS :1818 and IS 9921	
	i. Contacts(fixed and Moving)	
	ii. Terminals	
o)	Frequency	
p)	Type and material of the terminal connector provided	
q)	Diameter, wall thickness and length of G.I.Operating pipe	
r)	Size and length of base mounting M.S. Galvanised channel provided for the three phase :	
s)	a) Clearance between live parts of Phase in mm.	

	b)Clearance between live parts of Phase in mm	
	c) centre distance between the Insulators of the adjacent phases in mm. in the assembled position of the switch :	
t)	Mounting /Fixing Hole Centre Distance in the Base Channel and Sizes	
u)	i) Maximum charging current that can be safely interrupted by the switch	
	ii)Maximum capacitative current that can be safely interrupted by the switch	
	iii) Maximum transformer off load breaking capacity current that can be safely interrupted by the switch	
	iv)Maximum line charging breaking capacity	
v	Torque required to open the switch	
x)	Clearance between fixed contact & blade in open condition	
y)	Particulars of switch contacts:	
	i) Material	
	ii) Type	
	iii) Contact Area	
	iv) Contact Pressure	
	v) Whether silver plated or not?	
z)	Millivolt drop of isolator with 100A (D.C):	
	i) Before operation of Isolator	
	ii) Across Terminal	
	iii) Across Contact	
	iv) After carrying out mutually agreed no. of operations	
	v) Across terminal	
	vi) Across contact	
aa)	Size of connecting Bolts & Nuts	
ab)	Whether connector is provided & if so indicate the type & materials used	
ac)	No. of operations that the switch withstand without deterioration of contact	
ad)	No. of times the switch can be operated without any need for inspection	
ae)	Type of Mounting	
af)	Net weight of one complete 3 pole isolating switch	
ag)	Actual dimension of the isolating switch per phase	
ah)	Shipping dimension of the largest packages	
ai)	Support Insulator	As per Annexture 'F'

Signature with seal

ANNEXURE

SCHEDULE OF TECHNICAL PARTICULARS FOR 36KV 400A PEDESTAL INSULATORS

(TO BE FILLED BY TENDERS)

SL.NO.

1. **Particulars of Insulators:**

a) Type of Insulators :
b) Name of Manufacturer of Insulators:
c) Height of the Insulators:
d)Diameter of the largest Shed:
e)No of units per stack:

2 ELECTRICAL CHARACTERISTICS (FOR ONE INSULATOR)

2.1 FLASHOVER VOLTAGE

i) Dry Power frequency voltage(KVrms):
ii) Wet Power frequency voltage(KVrms):
iii) Impulse voltage of 1.2/50 micro sec.(+ve)(KVpeak):
iv) Impulse voltage of 1.2/50 micro sec.(-ve) (KVpeak) :

2.2 WITHSTAND VOLTAGE

i) Dry Power frequency voltage(KVrms):
ii) Wet Power frequency voltage(KVrms):
iii) Impulse voltage of 1.2/50 micro sec.(+ve)(KVpeak):
iv) Impulse voltage of 1.2/50 micro sec.(-ve)(KVpeak):

2.3 VISIBLE DISCHARGE VOLTAGE (KVrms):

2.4 POWER FREQUENCY PUNCTURE WITHSTAND VOLTAGE OF UNIT :

2.5 MECHANICAL CHARACTERISTICS

a) Cantilever strength upright(KN) :
b) Cantilever strength under hung (Inverted)(KN) :
c) Torsional strength(Nm) :
d) Tensile strength(KN) :
e) Compression strength(KN) :

2.6 GENERAL CHARACTERISTICS

a) Minimum Creepage distance(mm):
b) Weight of complete unit(kg) :
c) Weight of nonferrous Parts(total)(kg) :
d) Weight of ferrous Parts(total)(Kg) :

2.7 STANDARD TO WHICH INSULATOR CONFORMS:

Signature with seal