WBSEDCL

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TECHNICAL SPECIFICATION FOR 33KV 400 A C.R.TYPE ISOLATOR

1.0.0 SCOPE:

1.0.1 This specification covers for design manufacture, testing at manufacturer' works, supply and delivery of outdoor type 33 KV, 3-phase, triple pole, double break, gang operated, centre rotating type Isolator with / without gang operated Earth switches, including Insulators and complete in all respects with arcing horns , bimetallic connectors, operating mechanism, indicating devices, fixing details etc., as described herein and briefly listed in ' schedule of requirements and desired delivery'.

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 furnished to the successful tenderers to facilitate design of mounting arrangements etc.

1.0.2 The technical specifications contained in this section are for guidance of the tenderers. Deviations if any, from the purchaser's specification proposed by the tenderer will be considered provided these are necessary either to improve the utility, performance and efficiency of the equipment or to secure overall economy.

2.0.0 STANDARDS:

2.0.1 Isolators covered by this specification shall conform to latest edition of IS: 9921(Part-I to V) & IEC Publication No. 129 (as amended up to date) unless specifically stated otherwise in this specification.

2.0.2 For the purpose of this specification all technical terms used herein shall have the meaning as defined in latest edition of IS : 9921 (1) or IEC Publication No. 129 (as amended up to date).

2.0.3 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 revisions 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	Degree of protection provided by enclosures
7	IS:4722	Rotating Electrical Machines
8	IS:2629	Recommended practice for hot dip galvanising of iron and steel
9	IS:4759	Hop dip galvanization coating on Structural Steel.
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 busbar 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, double break, centre rotating type suitable for manual operation.**

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

Each pole of the Isolator shall be provided with two sets of contacts to be operated in series and the moving contacts blades shall rotate in horizontal plane.

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 through 90 degree 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 schedule "A" of Guaranteed Technical Particulars.

3.0.5 The isolators and earthing switches 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 :-

ITEM:

i)	System frequency with ± 3 % variation (Hz)	: 50
ii)	Nominal system voltage (KV r.m.s.)	: 33
iii)	Maximum system voltage (KV r.m.s.)/ Rating Voltage	: 36
iv)	Maximum continuous current rating (Amps.)	: 400
v)	Rated short time current for 3 seconds (KA r.m.s)	: 28.8

vi) Rated peak withstand current (KA peak) : 72

vii) 1.2/50 micro-sec lightning impulse withstand voltage (KV peak)
  a) To earth and between poles : 170
  b) Across the isolating distance : 195

viii) Rated one minute power frequency withstand voltage (KV r.m.s.)
  a) To earth and between poles : 70
  b) Across the isolating distance : 80

ix) No. of poles : 3

5.0.0 **CLIMATIC CONDITIONS:**

5.0.1 The atmosphere in the area is laden with industrial and town gases and smoke with dust in suspension during the dry months and subject to tough colder months. The temperature variation between the daily minimum and maximum is large. Humidity occasionally rises upto 100%. Heavy lightning is usually in the area during the months from May to November. The area is also subjected to heavy monsoon rain, 80 to 90 % of the annual precipitation being in the month of June to October.

The climatic and isoceraunic conditions at site are given below :

a) Maximum temperature of air : 50· C

b) Minimum temperature of air : - 4· C

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

d) Maximum daily average ambient temperature : 45· C

e) Maximum yearly average ambient temperature : 30· C

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) 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 of proper thickness and contact area. Fixed contacts should consist of loops of above copper strips suitable for 400 Amps. rating. **The hard -drawn electrolytic copper strips 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 tube of high conductivity hard- drawn electrolytic copper having 38 mm. Outer dia and for wall thickness 10 SWG for 400 Amps. rating**. Current density for other current carrying copper parts should not exceed 1.75 Amp/mm.sq.

6.0.3 **These fixed and moving contacts shall be able to carry the rated current continuously and the maximum fault current of 28.8 KA 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 EARTH SWITCH:

7.0.1 If necessary, line earth switches shall be provided.
Line earth switches shall consist of three earthing blades per Isolator which normally rest against the frame when the connected isolator is in closed position. The earthing blades for three phases shall be mechanically linked to a coupling shaft which shall be capable of being fitted on either side of the isolator. The earthing blades shall match and be similar to the main switch blades and shall

be provided at the hinge-ends with suitable flexible conductors with terminal lug for connecting to the station ground bus.

The earthing blades shall be operated by a separate mechanism but shall be mechanically interlocked with the main switch so that the earthing blades can be closed only when the main switches are in open position . The earthing blades shall be gang operated and all the three blades will operate simultaneously.

Material of the earthing blades and contacts shall be same as those of main switch. **The earthing blades shall have the same short time current rating (thermal & dynamic) as that of main switch. Earthing blades shall be capable to discharge the trapped charge of the line.**

7.0.2 **Earth switch wherever provided shall be electrically interlocked so that earth switch can be operated only when the main isolator is open or vice-versa.**

8.0.0 **FIXED AND MOVING ARCING HORNS:**

8.0.1 Suitable **Phosphor Bronze Arcing Horns** made from 6 mm. dia rod of smooth and even surface required for guiding main contacts shall be provided on the fixed and moving contacts of the isolator.

Feature of the Arcing Horns should be to "Make before and Break after" main contacts.

9.0.0 **CONNECTORS:**

9.0.1 The isolators shall be supplied complete **with high conductivity bimetallic clamping type of terminal** connectors to be made of Extruded Aluminium sheet of minimum thickness of 10 MM, suitable for connecting 200 sq mm ACSR 'PANTHER'. 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. Terminal Connectors to be fixed by 4 bolts with fixed contact with bimetallic strip. Current density for terminal connector (Aluminium) shall be 1 A/Sq mm max. The entry of conductors to the isolators along with the phase centers 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.

10.0.0 **OPERATING MECHANISM:**

10.0.1 The operating mechanism shall be simple & ensure quick and effective operation. Manual operating mechanism for main isolator as well as earth switch 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 or earth switch in closed or open position to prevent operation by gravity, wind, short circuit, seismic acceleration, vibration, shock, accidental touching.

10.0.2 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 torsional 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.

10.0.3 Centre line of the operating mechanism and **operating handle shall be mounted at 1.187 meters height from the ground level**. The operating rod shall conform to IS:1239 Part - I and II (1979 / 1982). The nominal bore of the pipes shall be 40mm. (class - B medium). **The outer diameter will be 48.8mm Maxm. /47.9 mm Minm. and wall thickness of 3.25 mm**. Guide bearing shall be provided

wherever necessary, all brackets, clamps, angles or other attachments for fixing the operating mechanism to the isolating switch supporting structures , shall be supplied by the successful tenderer.

10.0.4 Provision shall be made for padlocking the operating mechanism of disconnecting and ground switches, in both open and close positions.

11.0.0 **I N S U L A T O R (IS: 2544-1973):**

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.

11.0.2 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.

SPECIFIC TECHNICAL PARAMETERS OF 33 KV (2x22 KV) KV POST INSULATORS :

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 b) Negative	: :	170 KVp 180 KVp
8	P.F. Minimum flash over voltage		

Sl No.	Description		Rating
			33 KV (2x22 KV)
	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

12.0.0 **BEARINGS:**

12.0.1 Bearing shall be ball or roller type and shall be protected from weather by means of covers and grease retainers. Bearing pressures shall be kept low to ensure long life and ease of operation . Bearing housing shall be made of die cast metal with smooth surface and suitably machined for seating the bearings. **Two nos. of bearings with adequate shaft diameter and distance between the bearings shall be provided to avoid wobbling during operations. Complete details of bearing bushes, housing, greasing etc. shall be furnished with the tender.**

12.0.2 All hinges / movable joints in current carrying parts shall be shunted with flexible copper conductor having adequate length and size to prevent breaking due to repeated bending.

13.0.0 **SYSTEM EARTHING:**

13.0.1 33 KV system will be treated as non-effectively earthed. Flexible conductor of at least 50 sq.mm and shall be tinned or suitably treated against corrosion shall be provided at the lower end of the vertical operating shaft for connection to the Station Ground Bus.

13.0.2 The frame of the isolator and earthing switch shall be provided with two reliable earthing terminals for connection to station earth bus so also clamping screw suitable for carrying specified short time current. **The diameter of clamping screw shall be at least 12 mm.** The connecting point shall be marked with earth symbol.

14.0.0 **CLEARANCES:**

14.0.1 The centre to centre distance between the insulators of adjacent phases in assembled position of the **33 KV isolator with arcing horns shall be 1370 mm.** The centre to centre distance between the insulators of adjacent poles of the same phase in the **assembled position of the 33 KV isolator shall be 457 mm.**

14.0.2 The clearance between live parts and grounded structures shall not be less than those specified in the relevant Indian standards. The length of break in full open position shall be at least 10 % in excess of the dry arcing distances of the insulators of relevant voltage class specified in relevant standards.

14.0.3 Clearance of Isolator mounting structure top/Bus height from ground level:

Sl. No	Description	Clearance from G.L	Operating Rod	Remark's
a)	Isolator suitable for mounting on P.C.C Pole Structure	Height of the top of isolator mounting channel from G.L	Length of the Rod	Bus height from G.L
	For High Level Arrangement			
b)	i) With Earth Switch	6500.0 mm.	5313 mm	Not applicable
	ii) Without Earth Switch	6387.5 mm.	5200. 5 mm	6200 mm.
c)	For Low Level Arrangement :			
	i) Without Earth Switch	5387. 5 mm.	4200. 5 mm	4500 mm.

15.0.0 **SUPPORTING STRUCTURES:**

15.0.1 The isolators shall be provided with rigid, self supporting galvanised supporting structure. Bases shall be suitable for mounting on P.C.C. Pole Structures as given above.

15.0.2 Bolt holes on the bases for fixing on the structures together with **requisite numbers of mounting bolts and nuts plus 5% spares shall be provided by the suppliers.**

16.0.0 **DESIGN, MATERIALS & WORKMANSHIP:**

16.0.1 The live parts shall be designed to eliminate sharp points, edges and similar corona producing surfaces. Where this is impracticable, adequate shields are to be provided.

16.0.2 All metal parts shall be of such material or treated in such a way so as to avoid rust corrosion and deterioration due to continuous exposure to atmosphere and rain, **all current carrying parts shall be non ferrous metals or alloys.**

16.0.3 Bolts screws and pins shall be provided with standard locking devices viz. locknuts, spring washers, keys etc. and when used with **current carrying parts, they shall be made of stainless steel or other high conductivity and wear resistant alloys**.

16.0.4 The switches should not need lubrication of any parts except at very long interval of one year minimum.

16.0.5 Each phase of isolator shall be provided with rigid base fabricated from steel sections. The base shall be suitable for mounting on support structures.

16.0.6 Down pipe :- **50 mm ID Class B pipe shall be provided for operating the isolator**. The pipe shall be terminated into a suitable swivel or universal type joint between the insulator bottom bearing and the operating mechanism.

16.0.7 **Tandom pipes shall be of at least 25 mm ID and Class B**. One pipe shall be used for phase coupling of double break isolators. Base plate of insulators for connection of tandom **pipe shall be made out of one piece of at least 10mm thick M.S. Plate. Bolt and shackle device shall be used to connect tandom pipe to the base plate**.

16.0.8 Full particulars of the following items shall be furnished with drawings and descriptions along with the tender:-

i. Contacts- material , current density etc.
ii. Design of contact pressure
iii. Contact support and fixing arrangement on insulators
iv. Bearing, housing of bearing, bushes etc.
v. Balancing of height
vi. Coupling pipes, joints, connection adjustments
vii. Base plate
viii. Down pipe , guide joints
ix. Brass bushes and bearing at various joints
x. Nuts, Bolts and fasteners
xi. Interlocking device
xii. Operating mechanism, type of gear, auxiliary switch, size and thickness of box, degree of protection, gland plate gland etc.

Offers without the above information or with incomplete information shall not be acceptable.

17.0.0 **CONTROL CABINET :**

17.0.1 The control cabinet of each operating mechanism shall be made out of 12 SWG sheet steel in the form of plate or casting. Control cabinet shall be provided with hinged doors along with padlocking

arrangement. Sloping rain hood shall be provided to cover all sides. 15 mm thick neoprene or better type of gaskets shall be provided to ensure degree of protection of at least IP55 as per IS: 2147. The cabinet shall be suitable for fixing on support structure. Details shall be provided with the offer.

18.0.0 **GLAND PLATES AND GLANDS:**

18.0.1 A removable gland plate with double compression type brass cable glands shall be provided with each operating mechanism for terminating all cables.

19.0.0 **AUXILLIARY SWITCH:**

19.0.1 Main switch operating mechanism shall be equipped with reliable auxiliary switch(4NO and 4 NC contacts) exclusively for purchaser's interlocking and protection purpose. Auxilliary switch and contacts shall be capable of carrying atleast 10 Amp. Continuously. Quick make and break (QMB) type auxiliary switch shall have snap action built in within the switch. The auxiliary switch shall be actuated by a cam or similar arrangement directly mounted on the Isolator shaft without any intermediate levers, linkages etc. to ensure fool-proof operation.

20.0.0 **TERMINAL BLOCK AND WIRING:**

20.0.1 Main switch operating mechanism shall be provided with 1100 V grade stud type terminal block. Auxilliary switch shall be wired upto the terminal block with 20% extra. All wiring shall be carried out with 1100V grade PVC insulated 2.5 sq. mm copper conductor. Maximum conductor temperature shall be as per IS 3961.

21.0.0 **PROTECTIVE COATINGS:**

21.0.1 All ferrous parts including bolt , nuts and washers of the switch assemblies shall be galvanised to withstand at least four nos. of one minute dips in copper sulphate solution of requisite strength as per IS : 2633.

21.0.2 **PAINTING, GALVANISING AND CLIMATE PROOFING:**

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 matter and 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:5 i.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 perIS 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.

22.0.0 **GURANTEED TECHNICAL PARTICULARS AND OTHER DATA:**

22.0.1 Guaranteed technical particulars and other data of the isolators and earthing switches should be given in the form in 'Schedule - A '. Any other particulars considered necessary by the supplier may also be given in addition to those listed in the schedule.

22.0.2 **NAME PLATES:**

Isolator, Earth switches shall be provided with a name plate which shall contain information as per Table -I of latest version of IS : 9921 (Part-V).

23.0.0 **S P A R E S :**

23.0.1 The tenderer shall submit lists of spares recommended by him for five years' efficient operation of one isolator of each type , with their item wise price separately . Spares shall be interchangeable with identical parts of the disconnecting switches and shall be of the same materials, identical workmanship and having same characteristics. The cost of following spares shall be quoted separately.

a. Contacts
b. Moving
Blades
c. Springs
d. Bearings

In addition, list of optional spares may be enclosed.

TESTCERTIFICATES/INSPECTIONANDTESTING

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 – On main switch as well as earth switch of each type.
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 **PEDESTAL INSULATOR :**

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 (KV r.m.s)	
	Across Isolating Distance	To Earth and Between poles	Across Isolating Distance	To Earth & Between Poles
36KV	195 KV	170 KV	80KV	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.

24.0.0 DRAWINGSDATA ANDMANUALS:

24.0.1 The following drawings & details in respect of the isolating and earth switches shall be furnished in triplicate with the tender :

i) G.A. drawings describing dimension, Constructional feature & technical arrangement with list of parts .
ii) Drawing showing details of main contacts (fixed and moving), arcing horns,post isolators, terminal pads & connectors.
iii) Drawings showing the mechanical interlock between earth and isolating switches. iv) Drawings showing the manual operation device.
v) Manual for installation, operation and maintenance procedure.
vi) Technical leaflets of individual component describing design and constructional features. vii) Test Reports, literatures, phamplets of the bought out items and raw material.
viii) Schematic Drawing

24.0.2 The tenderer shall submit the following information alongwith 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.

24.0.3 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.

24.0.4 In addition to above, each crate containing mentioned equipment shall also accompany, in water proof folder, a set of approved drawings ,data and manuals as mentioned above.25.0.5 Before starting manufacture of the equipment , the supplier shall have to take approval of the design drawings from the purchaser.

25.0.0 **QUALITY ASSURANCE PLAN:**

25.0.1 The tenderer shall invariably furnish following information for each type of Isolator alongwith his offer, failing which his offer shall be liable for rejection:-

i. Statement giving list of important raw material, including but not limited to

a. Copper
b. Steel
c. Spring
d. Bearings
e. Nuts and Bolts
f. Operating Mechanism and its components

ii. Name of sub-suppliers for raw materials, list of standards according to which raw materials are tested, copies of test certificates.

iii. List of manufacturing facilities available.

iv. Level of automation available.

v. List of areas in manufacturing process where stage inspection are normally carried out.

vi. Special features provided in the equipment to make it maintenance free.

vii. List of testing equipment available.

26.0.0 **PACKING AND DESPATCH :**

26.0.1 The materials shall be packed by wooden planks of suitable thickness to protect against damage in transit and in such a way that individual units can be despatched at a time complete in all respect so that erection is not held up for want of any equipment.

27.0.0 **PRICES:**

27.0.1 The tenderer shall furnish the prices for the equipment in price schedule of this specification . Price should be firm.

28.0.0 **PERFORMANCE CERTIFICATES:**

28.0.1 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.

28.02 **CREDENTIALS :**

Tenderer shall furnish document in support of supply & delivery of similar equipment to WBSEB/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.

29.0.0 **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.

30.0.0 **DEVIATIONS FROM SPECIFICATION :**

Normally the offer should be as per Technical Specification without any deviation. But any deviation felt necessary to improve performance, efficiency and utility of equipment must be mentioned in the Deviation Schedule with reasons duly supported by documentary evidence. Such deviations suggested may or may not be accepted by the WBSEDCL. Deviations not mentioned in Deviation schedule will not be considered.

31.0.0 **SCHEDULE OF REQUIREMENTS AND DESIRED DELIVERY:**

31.0.1 The quantity mentioned in this schedule are provisional and are subject to change by ± 25% at the time of ordering.

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.

32.0.0 **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 : Schedule "A"

SCHEDULE- A

(To be filled in and signed by the tenderer)

SCHEDULE OF GUARANTEED DATA AND OTHER TECHNICAL PARAMETERS FOR 33 KV CR TYPE ISOLATOR

1. Maker's Name and address :

2. Type :

3. Model :

4. Rated Voltage :

5. Maximum permissible continuous s :
6. Maximum continuous current rating :

7. No. of Poles :

8.a)Short time current rating:
i. For 1 second :
ii. For 3 second :

b) Short circuit making current :
for earth switch, if any

9. Current density at the minimum
cross section of switch blade :

10. Temperature rise corresponding to:
a) Maximum continuous current rating :
at 40 degree C ambient temperature

b) Derating factor for higher ambient temperature

c) Short time current rating:
i. For one second :
ii. For three second :

11.a) Maximum charging current that can
be safely interrupted by the switch :
b) Maximum capacitive current that can
be safely interrupted by the switch :
c) Maximum Transformer off load
breaking capacity :
d) Maximum line charging breaking capacity :

12.Torque required to open the switch :

13. Clearance (Minimum) :
a) Between live parts and ground :
b) Between phase/poles :
c) Between fixed contact and blade in open position :

14. Particulars of switch contacts:-
a)Material :
b)Type :

c)Contact area :
d) Contact pressure :
e) Whether silver plated or not? :
15. Location and type of bearing :

16. Millivolt drop of Isolator with 100A.(DC):- a) Before operation of Isolators:
i. Across terminal :
ii. Across contact :
b) After carrying out mutually agreed No. of operations :
i. Across Terminal :
ii. Across contact :

17. Size of connecting bolts and nuts :

18. Whether connector provided & if so indicate the type and materials used . :

19. Type of interlocking to be provided for Isolator with earth switch :

20. No. of operations that switch can withstand without deterioration of contact :

21. No. of times the switch can be operated without any need for inspection :

22. Type of mounting :

23. Net weight of one complete 3 pole Isolating switch :

24. Actual dimension of the Isolating switch per phase :

25. Shipping dimension of the largest packages :
26. Support Insulator :

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	FLASH OVER 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 WITH STAND 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