

Technical Specification for 33 KV Indoor Composite VCB Panel

SCOPE OF WORK :

This Specification covers the design and engineering, manufacture, testing at the manufacturer's factory, painting, packing for transport, insuring, transportation by road and delivery & unloading at site situated in any part of West Bengal under the jurisdiction of WBSEDCL of 33 KV, 1250 A, 25 KA, Multi panel, shunt trip, Indoor Type, motor operated, spring closing Vacuum Circuit Breaker having SCADA compatible facilities and complete with all accessories as specified hereinafter.

UNIT OF MEASUREMENT AND LANGUAGE :

In all correspondence, in all technical schedules and on all drawings prepared by the manufacturer, the metric units of measurement shall be used. On drawings or printed pamphlets where other units have been used, the equivalent metric measurements shall be added. All documents, correspondence, drawings, reports, operating and maintenance instructions/manuals and nameplate details of the equipment shall be in English language.

SERVICE CONDITIONS:-

From the geographical condition, the area where the switchgear panels shall be installed is categorized into the tropical climate zone. In choosing materials and their finishes, due regard shall be given to the humid tropical conditions under which the switchgear panels shall be called upon to work. The manufacturer of the switchgear panels shall submit details of his usual practice of tropicalization which have proven satisfactory for application to the switchgear panels and associated equipments to prevent rusting and ageing in the tropical climate zone. The applicable standards for tropicalization shall be listed.

The switchgear panels shall be installed in a room without air conditioning but with ventilation to allow natural cooling. Therefore all the protection and control devices employed shall be capable of operating in this environment without failure for their designed life time.

- a) Max. Ambient temperature : 50° C
- b) Reference Ambient Temperature for design : 40° C
- c) Min. Ambient temperature : 5° C
- d) Relative humidity : 10 % to 100 %
- e) Average number of rainy days : 100 / Annum
- f) Max. Annual rainfall : 1500 mm
- g) Max. Wind pressure : 150 Kg / sq. Meter
- h) max. Wind velocity : 50 Km / hour
- i) Max. Altitude : 1000 meter above MSL.
- j) Seismic level : 0.3 g (Horizontal acceleration)
- k) average thunder storm : 45 days per annum.
- l) Climatic condition : Moderately hot and humid tropical climate, conducive to rust and fungus growth. Pollution level is high. Some area with seashores having saline atmosphere.

System Parameters :

- a) System voltage : 33 KV
- b) Highest system voltage : 36 KV
- c) Number of phase : Three
- d) Power frequency : 50 Hz.
- e) System earthing : Impedance earth.
- f) Fault level : 25 KA
- g) BIL : 33 KV / 36 KV / 170 KV (P)

3.1 Tropicalization

(a) All equipment must be designed for operations in the severe tropic climate conditions and fully comply with climatic aging tests as per IEC 60932-class 2.

In choosing materials their finishes, due regard shall be given to the humid tropical conditions under which the switchgear will be called upon to work. The manufacturer shall submit details of his usual practice which have proven satisfactory for application to the parts of the Switchgear panels, which may be affected by tropical conditions.

(i) Metals:

Iron and Steel are generally to be painted or galvanized as appropriate. Indoor parts may alternatively have chromium or copper-nickel plates or other approved protective finish. Small iron and steel parts (other than rustless steel) of all instruments and electrical equipment, the cores of electromagnets and the metal parts of relays and mechanisms shall be treated in an appropriate manner to prevent rusting.

(ii) Screws, Nuts, Springs, e.t.c.:

The use of iron and steels shall be avoided in instruments and electrical relays wherever possible. Steel screws shall be zinc, cadmium or chromium plated or where plating is not possible owing to tolerance limitations, shall be of corrosion resisting steel. Instrument screws (except those forming part of a magnetic circuit) shall be of brass or bronze. Springs shall be of non-rusting material, e.g., phosphor-bronze or nickel silver, as far as possible.

(iii) Rubbers:

Neoprene and similar synthetic compounds, not subject to deterioration due to the climatic conditions, shall be used for gaskets, sealing rings, diaphragms, etc.

3.2 WORKING STRESS AND EQUIPMENT/APPARATUS DESIGN

3.2.1 General

a) The design, dimensions and materials of all parts shall be such that they will not suffer damage under the most adverse conditions nor result in deflections and vibrations, which might adversely affect the operation of the equipment. Mechanisms shall be constructed to avoid sticking due to rust or corrosion.

b) The equipment and apparatus shall be designed and manufactured in the best and most substantial and workmanlike manner with materials best suited to their respective purpose and generally in accordance with up-to-date recognized standards of good practice.

c) Whenever possible, all similar parts, including spare parts, shall be made interchangeable. Such parts shall be of the same materials and workmanship and shall be constructed to such tolerances as to enable substitution or replacement by spare parts easily and quickly.

d) All equipment shall be designed to minimise the risk of fire and consequential damage, to prevent ingress of vermin and dust and accidental contact with electrically energized or moving parts. The switchgear panels shall be capable of continuous operation with minimum attention and maintenance in the exceptionally severe conditions likely to be obtained in a tropical climate and where the switchgear is called upon to frequently interrupt fault currents on the system and also where the duty of operation is high.

e) Suitable lifting hooks needs to be provided for lifting of the equipment.

Strength and quality

a) All steel castings and welding shall be stress-relieved by heat treatment before machining, and castings shall be stress-relieved again after repair by welding.

b) Liberal factors of safety shall be used throughout, especially in the design of all parts subject to alternating stresses or shocks.

3.2.3 Designed data for low voltage equipment

Low voltage equipment and installation shall be designed in accordance with EMC (Electromagnetic Compatibility, IEC 61000) directives. The rating and design criteria for low voltage equipment shall be as follows:

AC Supply Rating system

- i. Rated voltage between phase 415 V AC
- ii. Connection type 3ph 4wire
- iii. Rated voltage between phase to earth 240 V AC
- iv. Grounding system PME
- v. Frequency 50 HZ
- vi. Voltage variation $\pm 10 \%$
- vii. Frequency variation $\pm 5 \%$
- viii. Power frequency 1 min, Test Voltage 3 kV
- ix. Thermal rating of conductors 120 % of load

The AC supply shall be used for power circuit and for lighting, indication, motor controls and similar small power circuits. Unless otherwise specified, the equipment provided under this tender is to be capable of reliable operation at voltages as low as 85% of the rated voltage, and to withstand continuously up to 110% supply voltage above the rated value of 240V or 415V AC.

DC Auxiliary Supply Rating

Equipment/Device Rated voltage 30V DC

Connection type 2 wire.

Voltage variation 24 to 40 V DC

The auxiliary dc supply shall be used for controls, indication, alarm and circuit breaker tripping and closing circuit, etc. All equipment and apparatus including the circuit breakers, control devices and accessories, measuring and indicating instruments and

electronic equipment shall be capable of satisfactory operation at 80% to 130% of the rated dc supply voltage. However, in case of VCB, for tripping the range should be 70% to 110% and for closing that should be 85% to 110%.

3.2.4 Electrical controls, auxiliaries and power supplies

a) Responsibility for electrical control and auxiliaries.

The manufacturer shall provide all control, indication and alarm and all auxiliary equipment with wiring and interconnecting cable which are integral parts of or are directly associated with or mounted on the switchgear panels to be supplied under this tender. The design of protection and control schemes for the switchgear panels shall be subject to approval of WBSIEDCL.

b) Operation and control.

Interlocking devices shall be incorporated in the control circuit to ensure safety, and proper sequence and correct operation of the equipment. The scheme will be finalised during detailed engineering and drawing approval.

3.2.5 Corona and radio interference

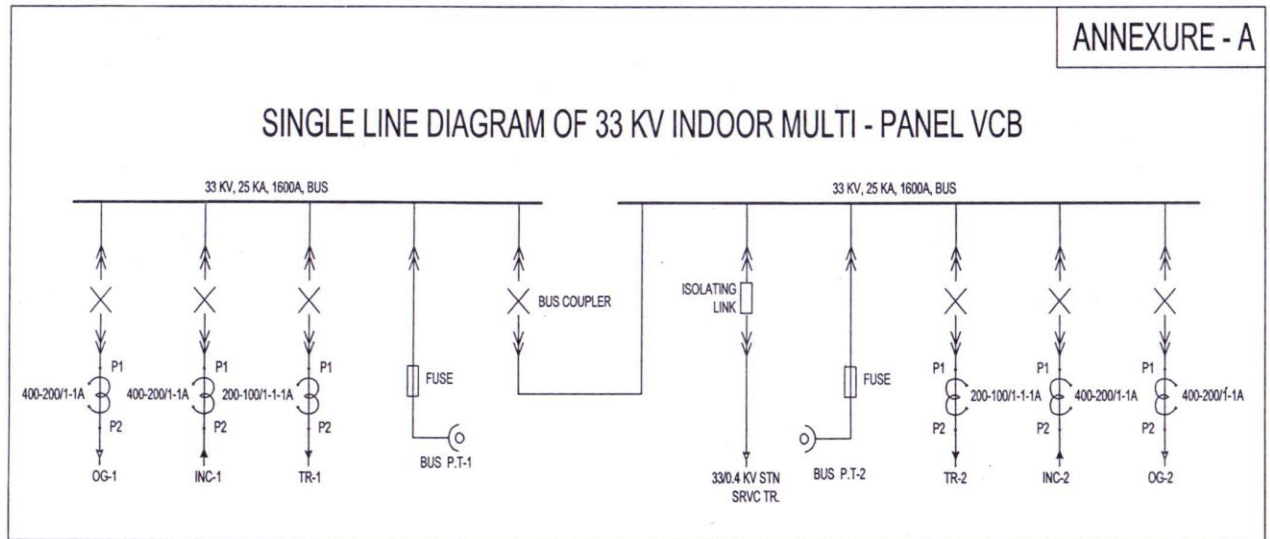
- a) Switchgear shall electrically be designed to avoid local corona formation and discharge likely to cause radio interference.
- b) The design of jointing of adjacent metal parts and surfaces shall be such as to prevent corrosion of the contact surfaces and to maintain good electrical contact under service conditions.
- c) Particular care shall be taken during manufacture of bus bar and fittings and during subsequent handling to ensure smooth surface free from abrasion. All joints on the bus bar and the circuit within the switchgear board shall be silver or tin-plated to ensure good electrical connection.

Configuration of Multi Panel VCB : -

For this instant case, the 33 KV Multi-panel VCB will be consisting of two incoming VCB, two Outgoing VCB, two Transformer HV Control VCB, one Bus – Coupler VCB with Bus Section Panel , Two Bus PT Panel at both side of Bus – Coupler VCB & One 33 KV Isolator Panel for tapping 33 KV Power Cable from the main Bus to Station Service Transformer installed in the Switch yard.

Single Line Diagram of Composite Panels

As per Annexure: A



Panel construction

Enclosure type	Dead front, floor- standing, rigid welded/bolted/rebated steel frames fully compartmentalized, Metal clad, Vermin Proof, suitable for indoor installation and provision for bolting to the floor.
Degree of protection of enclosure	IP 4X for HV Compartment & IP-5X for LV Compartment
Material of enclosure	CRCA Steel/Alu-Zinc
Metal sheet thickness	Load bearing member : 2.5 mm Doors & covers : 2.0 mm Gland plate : 3.0 mm
Dimension of panel (max)	Height : 2600 mm Depth : 3200 mm Width : 1200 mm
Compartment	Bus-bar, VCB, Power cable, PT, LV Instrument
VCB Compartment door	Separate with lockable handle.
Breaker to bus compartment	Through seal off bushing
Breaker to cable compartment	Through seal off bushing
Pressure relief device	To be provided for each HV Compartment. Each compartment shall be separated from adjacent one by sheet steel barrier.
Bus support insulator	Non hygroscopic, track-resistant, high strength, epoxy insulators (calculation for validating dynamic force withstand capability to be submitted during detailed engineering)

Power cable termination	Cable entry from rear bottom side for Incomer and Outgoing feeders, suitable for 3 Core XLPE, 33 KV grade , Aluminium,300mm ² .The cable termination height shall be at least 750 mm in the cable compartment. Double cable termination arrangement to be provided with two sets of nut and bolts. Copper terminator strip of adequate size shall be provided for termination of cables and shall have adequate height inside to accommodate the heat shrinkable type indoor cable termination.
Isolator panel	Draw out type Isolator trolley will be required for tapping 33 KV Power cable for 100 KVA, 33/0.4 KV Station Service Transformer. Necessary phase to phase & phase to earth clearance will have to be maintained as per VCB particulars. The isolating contact should have inductive current breaking capacity of the Station Service Transformer. The said Trolley will have link instead of Vacuum Bottle and will be without tripping and closing mechanism. Only drawout facility will be required.
Bus Section Panel	Bus Section Panel to be provided beside the Bus Coupler Panel for front bus connection purpose.
Prevention of internal arc	Shall be type tested against internal arc as per provision in IEC 62271-200. The Circuit Breaker, bus bars and cable compartments shall be provided with arc venting outlet. The doors for the compartment shall be capable of withstanding the effects of maximum internal arcing fault without being blown off and causing danger to personnel and other equipment. This should be proven by successful testing for 25 KA with duration 0.1 second as per relevant IEC standard.
Multi way terminal block and low voltage wiring	<p>Delinking type, Rail/Channel mounted, Terminal Connector to be used in CT Circuit & Screw type for other Circuit. The Terminal Blocks should be suitable for 2.5 sq.mm wire and covered with insulated transparent cover. Pitch should be minimum 8mm & 10mm for Screw type & Delinking type connectors respectively.</p> <p>The low voltage cable shall be enclosed in grounded metal conduit when routed through a high voltage compartment. Control wiring shall be neatly bundled and tie wrapped where applicable. Wiring shall be protected from rubbing against door flanges or other parts of the enclosure.</p> <p>Minimum 100 mm clearance to be maintained between two rows of TB. 20% spare terminal block to be provided in each row.</p>
Cable tray	Netted Metal cable Tray of suitable size at the rear side of Switchgear, preferably running at the top

	along the panel for carrying the signal cables for SCADA interface to be provided.
Space heater	Thermostat control space heater with switch for isolation to be provided in Breaker, HT Cable & Instrument compartments.
Illuminating lamp	15 Watt, CFL type.
Power Switch & Socket	5Amp rated Power Socket & Switch to be provided in Instrument compartment.
Surface cleaning	Seven tank process or Sand blasting
Painting	Powder coating with texture finish
Paint shed	RAL 7032

Circuit Breaker

Mounting	On withdrawable truck or trolley, horizontally draw out & horizontal isolation with locking facility in service position. Switchgear truck/trolley should be floor mounted. Racking-in and Racking-out should be such that one person can do it easily.
Arc quenching medium	Vacuum
Switching duty	Oil filled transformer and UG Cable up to 20 Km.
Breaker operation	<p>Three separate identical single pole units operated through the common shaft and shall be fully interchangeable both electrically and mechanically. Circuit breaker poles between the interrupters and primary plug-in contacts shall be fully insulated with durable material. Each breaker shall be provided with Mechanical 'ON' and 'OFF' facility by operating suitable closing and opening devices. Each breaker shall be provided with Mechanical 'ON' and 'OFF' indicators. Each breaker shall have three positions - service, test and isolated/withdrawal marked. Mechanical safety interlocks shall be provided so that it is not possible for a circuit breaker</p> <ol style="list-style-type: none"> To be put into the cubicle unless the truck is secured in position. To be either draw out or draw in from and to the service position unless its contacts are safely open. To be withdrawn or inserted in the fixed housing unless it is at the withdrawable position. To be operated in service position unless its primary and secondary isolating contacts are fully engaged. The circuit breaker racking equipment can be padlocked in closed position. Electrical close/trip operation should be dependent on Local/Remote switch. However, protection trip and emergency trip circuit should be independent of Local/Remote Switch.

Inter changeability	The Circuit Breakers of Incomer, Bus Coupler & Feeder Panels should be interchangeable both for electrically & mechanically.
Operating mechanism	<p>a) Re-strike free, trip free both electrically and mechanically, with electrical anti-pumping feature.</p> <p>b) One O-C-O operation possible after failure of power supply to the spring charging motor.</p> <p>c) Motor wound, spring, charged, stored energy type with manual charging facility. One no. Breaker Truck operating handle for every three panels needs to supply.</p>
Tripping & Closing coil	To be rated for substation DC voltage. Suitable for operation at minimum operating voltage of 70% for tripping and 85% for closing operation. Burden shall be about 200 watt for each coil.
L/R Switch	To be provided for breaker operation from Local & Remote
Provision of Push Button on breaker panel front	<p>a) Manual close & Open operation</p> <p>b) Emergency electrical Trip operation</p>
Mechanical indication	CB ON, CB OFF, Spring Charged / Discharged.
Electrical indication	<p>CB ON, CB OFF, Spring Charged, CB in Test / Service Position, Flush mounted type high intensity, clustered LED lamps to be used.</p> <p>Colour of the lamps will be as follows :</p> <p>a) Breaker ON : Red</p> <p>b) Breaker OFF : Green</p> <p>c) Spring charged : Blue</p> <p>d) Auto trip : Amber</p> <p>e) Test / Service position : White.</p>
TNC Switch with pistol grip	To be provided for electrical ON / OFF operation and other purpose. It should be lockable and spring return to normal position.
Operating handle	Breaker shall be provided with handles for easy handling, rack in-out operation and manual spring charging as applicable.
Safety shutter	Automatic safety shutter to be provided cover contacts fully when breaker is withdrawn to test. Independent operating mechanism for bus bar & cable side shutters, separately padlock able in closed position.
Interlocking arrangements	<p>a) Breaker compartment door cannot be opened unless breaker is OFF and racked out to TEST / ISOLATED position.</p> <p>b) Breaker compartment door cannot be closed unless breaker is in ISOLATED position.</p> <p>c) Racking in or out of breaker inhibited when the breaker is CLOSED.</p> <p>d) Racking in the circuit breaker inhibited unless the control plug is gully engaged.</p> <p>e) Disconnection of control plug inhibited as long as the breaker is in service position.</p>

	f) Other interlocks as per Standard.
Breaker operation	<p>a) Local closing : Only when L/R switch in Local position and CB in either Service or Test position.</p> <p>b) Local tripping : Only when L/R switch in Local position and CB in either Service or Test position.</p> <p>c) Remote closing : Only when L/R switch in Remote position and CB in Service position.</p> <p>d) Remote tripping : Only when L/R switch in Remote position and CB in either Service or Test position.</p> <p>e) Protection tripping : Irrespective of L/R switch position and CB in Service condition.</p>
Trip coil supervision	To be given for CB close & open condition.
Anti pumping	Anti Pumping Relay (94) to be provided in the Breaker panel. PLA type relay / Contactor is not acceptable.
Aux. AC & DC control supply in all panels	Fed by single AC & DC incoming source in Bus Coupler Panel as well as Incomer Panels for entire Switch Board.
Spring charge limit switch	<p>The circuit breaker shall be provided with motor operated spring charged closing. Spring charging by motor should be smooth and hassle free and there should be nominal sound during spring charging.</p> <p>Motor should be 230 Volt AC operated, Tripping of the circuit breakers shall be through "Shunt trip" coils rated for 30V DC auxiliary supply. It shall be possible to trip the breaker manually in case of necessity.</p> <p>2 NC : For Motor circuit</p> <p>1 NO : For Breaker Closing Circuit</p> <p>1 NO : For Breaker Closing permissive to be used in IED/Relay.</p> <p>1 NO : For panel spring charged indication</p> <p>AC operated contactor may be used for contact multiplication of Limit Switch, if required, for indication and spare contacts.</p>
Local Remote Switch	Switch should be 4 Pole 2 Ways lockable and stay put type.
Operation counter	Suitable mechanical operation counter to be provided in the breaker trolley with count range 0 to 9999.
Current Transformer	<p>Shall be cast resin type with insulation class of E or better. Contact tips on primary side shall be silver plated. Correct polarity shall be invariably marked on each primary and secondary terminal.</p> <p>Primary shall be wound or bar type, rigid, high conductivity grade copper conductor. Unavoidable joints on the primary conductor shall be welded type, preferably lap type. Current density at any point shall not exceed 1.6 A/sq.mm. Suitable insulated copper wire of electrolytic grade shall be used for CT secondary winding. Multi ratio in CT shall be</p>

	<p>achieved by reconnection of secondary winding tapping. The secondary terminals shall have screw type terminals. The screw should have sufficient length for connection of at least two nos wires with plain and spring washers and minimum 10 mm clearance between the adjacent screws.</p>
C T Mounting	<p>To facilitate easy replacement of 33 KV CT afterwards, fixing of CT in hanging condition/CT base plate fixed at the upper covering of the CT Chamber may not be acceptable.</p> <p>Fixing in horizontal upright condition over a base channel is preferable. CT Secondary connection terminals should be clearly visible and accessible from the back side of the breaker assembly just after opening the rear cover plate.</p> <p>P1 side of CT will be at Bus side for both Line & Transformer panel.</p>
Potential Transformer	<p>Potential Transformer should be three no Single Phase PT housed in a withdrawable carriage, Shall be cast resin type with insulation class of E or better. Service position locking mechanism shall be provided and indicated by bidder in relevant drawing. Rigidity of primary stud point with earth bus in service position shall be confirmed.</p> <p>Contact tips of primary/secondary contacts shall be silver plated. Correct polarity shall be distinctly marked on primary and secondary terminal.</p> <p>Secondary terminal studs shall be provided with at least three nuts, two plain and two spring washers for fixing leads. The stud, nuts and washers shall be of brass, duly nickel plated. The minimum outside diameter of the studs shall be 6 mm. the length of at least 15 mm shall be available on the studs for inserting the leads. The space clearance between nuts on adjacent studs when fitted shall be at least 10 mm.</p> <p>Trolley mounted and connected on bus side. It can be plugged into and withdraw from service by pulling or pushing the PT by the handle provided on the PT. This action traverses the PT shall automatically operate the spout shutters. The shutter drive also forms a latch which holds the PT in the service position and this latch shall be required to be released before PT can be isolated.</p>
Earth bus	<p>A ground bus rated to carry maximum fault current shall be furnished along the full length of the panel board. Each stationary unit shall be grounded directly to ground bus. All bolted joints in the bus will be effected by connection of two bolts.</p>

	<p>The earth bus shall be of copper and shall have adequate cross sectional area. Earthing conductors shall be of annealed high conductivity stranded Copper</p>
Internal wiring	<p>a) 750 V grade PVC insulated stranded flexible copper wire to be used.</p> <p>b) Size of wire will be as follows :</p> <p style="padding-left: 40px;">CT & PT circuit : 2.5 sq. mm</p> <p style="padding-left: 40px;">Main AC & DC circuit : 4.0 sq. mm</p> <p style="padding-left: 40px;">Other circuit : 1.5 sq. mm.</p> <p>c) A suitable wiring duct system firmly fixed on the panel and having covers shall be installed for front to rear and inter panel wiring to provide easy access for inspection and replacement of the wires.</p> <p>d) Wiring between terminals of the various devices shall be point to point. Splices or tee connection will not be acceptable.</p> <p>e) Wires shall be suitably bunched adequately supported to prevent sagging and it shall have sufficient clearance from High voltage system.</p> <p>f) Colour of wires will be as follows :</p> <p style="padding-left: 40px;">For CT & PT circuit:</p> <p style="padding-left: 80px;">R Phase : Red, Y Phase : Yellow,</p> <p style="padding-left: 80px;">B Phase : Blue, Neutral : Black</p> <p style="padding-left: 40px;">For DC circuit : Grey</p> <p style="padding-left: 40px;">For AC circuit : Black</p> <p style="padding-left: 40px;">For Earth circuit : Green.</p>
Ferrules	<p>a) Plastic ferrules conforming to IS to be used. Same marking to be used at both ends of wires.</p> <p>b) Ferrule markings will be as follows :</p> <p style="padding-left: 40px;">AC Circuit : H1,H2,H3 - - - -</p> <p style="padding-left: 40px;">Metering circuit : D11, D31, D51 - -</p> <p style="padding-left: 40px;">Protn. Circuit : C11, C31, C51 - -</p> <p style="padding-left: 40px;">REF Circuit : A11, A31, A51 - -</p> <p style="padding-left: 40px;">Main DC Ckt : J1, J2, J3 - - - - -</p> <p style="padding-left: 40px;">DC Control ckt : K1, K2, K3 - - - -</p> <p style="padding-left: 40px;">Indication ckt : L1, L2,L3 - - - - -</p> <p style="padding-left: 40px;">Motor ckt : M1,M2,M3 - - - -</p> <p style="padding-left: 40px;">PT Circuit : E11,E31,E51 - - -</p> <p style="padding-left: 40px;">Spare circuit : U1,U2,U3 - - - - -</p> <p>c) Plastic channels, inter panel wiring through PVC sleeves or suitable grommets</p>
Guarantee of the complete equipment	<p>5 (five) years from the date of last despatch of any integral part of the equipment as per Clause No. 5(b) of GCC.</p>

Mandatory particulars of Panel

Type	Metal clad, air insulated with VCB type indoor circuit breaker
Reference Standard	IEC : 62271-100 & 200, IS 13118, IS 3427
Rated voltage	33 KV
Rated current	1600 Amps
Highest system voltage	36 KV
Insulation level	36 KV/70 KV/170 KV(P)
Frequency	50 Hz.
Enclosure degree of protection	HV compartment : IP 4X LV compartment : IP 5X
Aux. voltage	AC : 230 V, DC : 30 V
Thickness of metal sheet (min)	Load bearing : 2.5 mm Doors & covers : 2 mm
Bus bar current	1600 Amps
Bus bar & Earth bus material	Electrolytic Copper with Tin / Silver plated
Current density	1.6 Amps / sq. mm (max)
Shape of Bus bar	Rectangular/Tubular
Cross sectional area	Main bus : 1000 Sq. mm Riser : 800 Sq. mm Earth bus : 300 sq. mm
Bus identification	Colour coded (R-Y-B)
Bus clearance	Phase to phase : As per type test report Phase to ground : As per type test report
Power cable termination height	750 mm
Power cable entry	From Rear Bottom
Control cable entry	From Backside
Position of Mechanical & Electrical Emergency Trip Arrangement	Front side of the Panel
Separate Bus Section Panel at the side of Bus Coupler	To be provided
Dimension of panel	Height : 2600 mm Depth : 3200 mm Width : 1200 mm
Paint type	Powder coated
Paint shade	RAL 7032 (both external & internal)
Paint thickness	50 microns (min)

Mandatory particulars of Current Transformer

Type	Cast resin, Bar primary, Indoor type . Marking on primary and secondary terminal as per requirement of IEC 60044-1, IS 2705 and shall be indelibly marked. The secondary terminals shall have screw type terminals.
Reference Standard	IEC : 60044-1, IS : 2705

Make	OEM or Plastofab/BMC/Pragati/ECS/Kappa	
Rated voltage	33 KV	
Highest system voltage	36 KV	
Insulation level	36 KV/70 KV/170 KV(P)	
STC	25 KA for 3 Sec	
Class of insulation	E or better	
Continuous over load capacity	120 % of rated primary current	
	Incomer & Feeder	Transformer
Ratio	400-200/1-1 A	200-100/1-1-1 A
No of secondary	Two	Three
Core identification	Core 1 : Metering, Core 2 : Protection Core 3 : Protection Special	
Accuracy class	0.5 / 5P15	0.5/5P15/PS
Burden	15 VA for both core	15 VA for both core
ISF for metering core	≤ 5 at lower ratio	
Vk & Ie of PS core	> 125 Volt at $V_k/2$ at lower ratio	
CT installation	P1 in Bus side.	
CT Secondary terminals	At P2 side (Easy accessible)	

Mandatory particulars of Potential Transformer

Type	Resin cast, draw out, single phase unit
Reference Standard	IEC : 60044-2, IS : 3156
Make	OEM or Plastofab/BMC/Pragati/ECS/Audio Vision
Rated voltage	33 KV
Highest system voltage	36 KV
Insulation level	36 KV/70 KV/170 KV(P)
Frequency	50 Hz.
Class of insulation	E or better
Ratio	$33000/\sqrt{3}:110/\sqrt{3}-110/\sqrt{3}$
No of secondary	Two
Core identification	Core 1 : Metering, Core 2 : Protection
Accuracy class	0.5 / 3P
Burden	50 VA for both core
Rated voltage factor	1.2 Continuous, 1.9 for 30 sec.

Mandatory particulars of Vacuum Circuit Breaker

Type	Metal clad, air insulated with VCB type indoor circuit breaker
Reference Standard	IEC : 62271-100, IS : 13118
Make	Panel Manufacturer should be the VCB Manufacturer
Rated voltage	33 KV
Rated current	1250 Amps
Highest system voltage	36 KV

Insulation level	36 KV/70 KV/170 KV(P)
Frequency	50 Hz.
STC	25 KA for 3 sec.
Duty cycle	O -0.3 Sec-CO-3 Min-CO
Sym. Breaking current	25 KA
Short circuit making current	62.5 KA (P)
Closing time	< 100 ms
Opening time	< 60 ms
Aux. voltage	AC : 230 V, DC : 30 V

Mandatory particulars of Vacuum Bottle

Make	CGL / BEL / SCHNEIDER / ABB / SIEMENS
Rated voltage	33 KV
Highest system voltage	36 KV
Rated current	1600 Amps
Insulation level	36 KV/ 70 KV / 170 KV(P)
Frequency	50 Hz
STC	25 KA for 3 Sec
Short circuit breaking capacity	25 KA
Making capacity	62.5 KA (P)
Mechanical Endurance capacity	30000 operation
Electrical Endurance capacity	20000 operation
Minimum electrical life	100 no at rated short circuit current

Type Test : - Following Type Test reports are to be furnished along with the offer.

Switchgear panel (with circuit breaker installed)	a) Lightning Impulse Voltage withstand test b) H.V. dry power frequency voltage withstand test c) Short time and peak withstand current test d) Short circuit test with basic duties e) Single phase breaking capacity test. f) Cable charging breaking current test g) Temperature Rise test h) IP Test i) Internal Arc Test as per IEC 62271-200 j) Horizontal Acceleration due to seismic force (if available)
Circuit Breaker	a) Mechanical Endurance Test as per M2 Class of IEC
Current Transformer	a) Short Time Current Test b) H.V. dry power frequency voltage withstand test c) Impulse Voltage Withstand Test d) Temperature Rise Test

Potential Transformer	a) Impulse Voltage Withstand Test b) H.V. dry power frequency voltage withstand test c) Temperature Rise Test
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Copies of test certificates in respect of following bought out items:-

- a. Vacuum Interrupter.
- b. Insulators
- c. Bus Bar Material
- d. Terminal connectors

Note: All the type test report on Switchgear Panel & Circuit Breaker to be conducted with offered Vacuum Interrupter.

Submission of drawings & documents :

Bidder shall submit following drawing/documents along with the bid:-

- a) GA of indoor composite panel Switchgear showing constructional features and space required in the front for withdrawal of breaker truck and in back, other accessories, power and control cable entry with plan elevation and views.
- b) Sectional view of incomer, bus coupler & transformer panels with parts list.
- c) GA of Circuit Breaker truck.
- d) GA of Current Transformer
- e) GA of Potential Transformer.
- f) Technical particulars of Switchgears and brochures for technical data sheet of vacuum interrupter.

Four copies of drawing, data and manuals containing above shall be submitted for approval and afterwards for final distribution.

Two sets of manual, leaflet and drawing for multi panel board shall be submitted separately to the C.E(Testing), Distribution Testing Deptt., WBSDEL.

Successful tenderer shall furnish all above drawings and following additional drawings for approval before commencement of supply:-

- i. Foundation details for Panel Switchgear.
- ii. Equipment door layout for incomer, bus coupler & transformer panels.
- iii. Schematic Diagram for incomer bus coupler & transformer section of Switchgear
- iv. CT Circuit, PT circuit & DC control circuit for incomer bus coupler & transformer section of Switchgear
- v. Name Plate CT & PT.
- vi. Rating Plate details of the Panel
- vii. Manual for installation, operation and maintenance procedure.

Routine & Acceptance test :

All the switchgear panels shall be tested in accordance with the requirement of IEC 62271-200. Tests shall be carried out on the circuit breakers as per the requirement of IEC 62271-100.

Current transformers and Voltage transformers shall be tested in accordance with the requirement of IEC 60044-1, IS 2705 and IEC 60044-2, IS 3156 respectively.

All routine tests at manufacturer's works shall be carried out and Test Reports are to be submitted to CE, P&C, WBSDEL.

All Acceptance tests shall be carried out at manufacturer's works on every lot offered for inspection as per relevant IS & IEC in presence of the WBSEDCL's representatives. The entire cost of acceptance and routine test that to be carried out shall be treated as included in the quoted price of tendered items.

Six copies of test reports duly signed by the inspecting officers, shall be submitted to the Chief Engineer, P&C Department , Bidyut Bhavan (4th floor) Salt Lake, Kol -91.

Annexure-B

GURANTEED TECHNICAL PARTICULARS (To be submitted by the Bidder)

1.	General :	
	Name of the Company	
	Office address	
	Factory address	
	Fax No.	
	Telephone No.	
2.	Panel	
	Type & Designation	
	Application Standard	
	Rated Voltage (KV)	
	Highest Voltage (KV)	
	Normal Current (Amps.)	
	Frequency (Hz)	
	STC for 3 Sec. (KA/ 3 Sec)	
	Breaking Capacity (KA)	
	Making Capacity (KAp)	
	Power frequency withstand voltage (KV rms)	
	Impulse withstand voltage (KVp)	
	Degree of protection	

	Material of enclosure			
	Sheet thickness of load bearing members			
	Sheet thickness of doors & covers			
	Position of Mechanical & Electrical Emergency Trip Arrangement			
	Power cable termination height			
	Position of Power Cable Entry			
	Position of Control Cable Entry			
	Separate Bus Section Panel at the side of Bus Coupler			
	Separate Panel for both Bus PT as per Drawing			
	Degree of protection of HV compartment			
	Degree of protection of LV compartment			
	Dimension in mm (H x W x D)	Height	Width	Depth
3.	Bus Bar			
	Material			
	Shape			
	Size			
	a) Main Bus			
	b) Earth Bus			
	Cross sectional area (Sq. mm)			
	Type of plating			
	Normal Current currying capacity (Amps)			
	STC for 3 Sec. (KA/3 Sec)			
	Temp. Rise over ambient at normal current			

	Current density (Amps/ sq. mm)	
	Phase to Phase clearance (mm)	
	Phase to ground clearance (mm)	
	Type of insulation	
4.	Bus support insulator	
	Material	
	Dry Power frequency Withstand Voltage for one minute	
	Wet Power frequency Withstand Voltage for one minute	
	Impulse Withstand voltage	
	Creepage distance	

5.	Vacuum Circuit Breaker	
	Make	
	Type	
	Reference Standard	
	Arc quenching medium	
	Number of break per phase	
	Rated voltage	
	Highest voltage	
	Frequency	
	Normal Current	
	Breaking capacity	
	Making capacity	
	STC for 3 Sec.	
	Insulation level	

	Temp. Rise over ambient at normal current	
	Operating duty cycle	
	Single Phase Capacitor Breaking capacity	
	Three Phase Capacitor Breaking capacity	
	Line Charging Breaking capacity	
	Cable Charging Breaking capacity	
	Minimum phase to phase clearance	
	Minimum phase to ground clearance	
	Type of operating mechanism	
	Closing time	
	Opening time	
	Mechanical Endurance capacity	
	Electrical Endurance capacity	
	Operating mechanism	
	Type of isolation	
	Details of mechanical interlock provided	
	Interchangeability between I/C, Feeder & B/C (Yes/No)	
	No. contacts in Aux. Switch (NO &NC)	
	No. contacts in Limit Switch (NO &NC)	
6.	Vacuum Bottle	
	Make	
	Rated voltage	
	Type and model no.	
	Normal current	
	Breaking capacity	

	Making capacity	
	STC for 3 Sec.	
	Maximum contact separation length	
	Minimum Mechanical life in no. of operation	
	Minimum Electrical Life in no. of operation at rated normal current	
	Minimum Electrical Life in no. of operation at rated full short circuit current	
	Power frequency withstand voltage (dry)	
	Impulse withstand voltage	
	Contact material	
	Type of plating	
	Contact pressure	
7.	Current Transformer	
	Make	
	Reference Standard	
	Type	
	Rated voltage	
	Rated frequency	
	Insulation level	
	Continuous over load in %	
	Class of insulation	
	Ratio	Incomer : Transformer : Outgoing :
	Class of accuracy	Incomer : Transformer : Outgoing :
	Burden	Incomer : Transformer : Outgoing :
	STC for 1 Sec.	

	ALF of Protection core	
	ISF of Metering Core at lower ratio	
	Core identification	
8.	Potential Transformer	
	Make	
	Reference Standard	
	Whether withdrawable Type (Yes/No)	
	Insulation level	
	Type of insulation	
	Winding connection	
	Rated voltage	
	Class of insulation	
	Ratio	
	Class of accuracy	
	Burden per Phase	
	Core identification	
	Over Voltage Factor	
	Installation Position	
	Primary Fuse rating	
9.	Terminal connector	
	Make	
	Type	
	Size	
10.	Trip & Close coils	
	Voltage & Wattage of Closing coil	

	Voltage & Wattage of Tripping coil			
11	Control wire			
	Make			
	Voltage Grade			
	Size			
	i) CT Circuit			
	ii) PT Circuit			
	iii) Other Circuit			
	Colour			
12.	Earth Bus			
	Material			
	Shape			
	Size			
	Current rating			
	Current density			
	Type of plating			
13.	Adaptor cable box arrangement for 33 KV Power Cable to Station Service Transformer.			
14.	Painting Details			
	Surface cleaning process			
	Paint thickness			
	Paint shed			
15.	Shipping dimension of equipment (mm)	Height	Width	Depth
16.	Lifting Hooks provided (Yes/No)			

17.	Accessories	
	Spring Charging Handle (no.)	
	VCB Operating Handle (no.)	
18.	Guarantee of the complete equipment (in years)	

Date :

Signature :

Place :

Name :

Company stamp :

Designation :