

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.

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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.

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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.

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

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

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Voltage variation 24 to 40 V DC

3.2.4 Electrical controls, auxiliaries and power supplies

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 WBS&EDCL.

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.

- 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.

(a) 8 Panel Switchboard with VCB :

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

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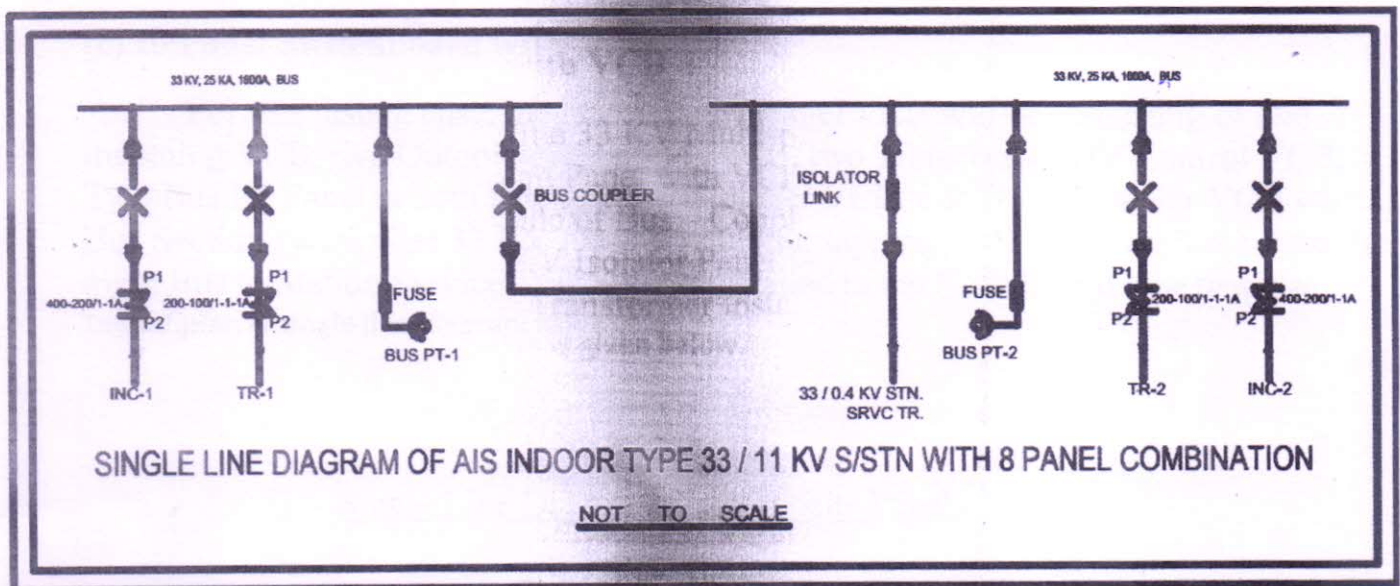
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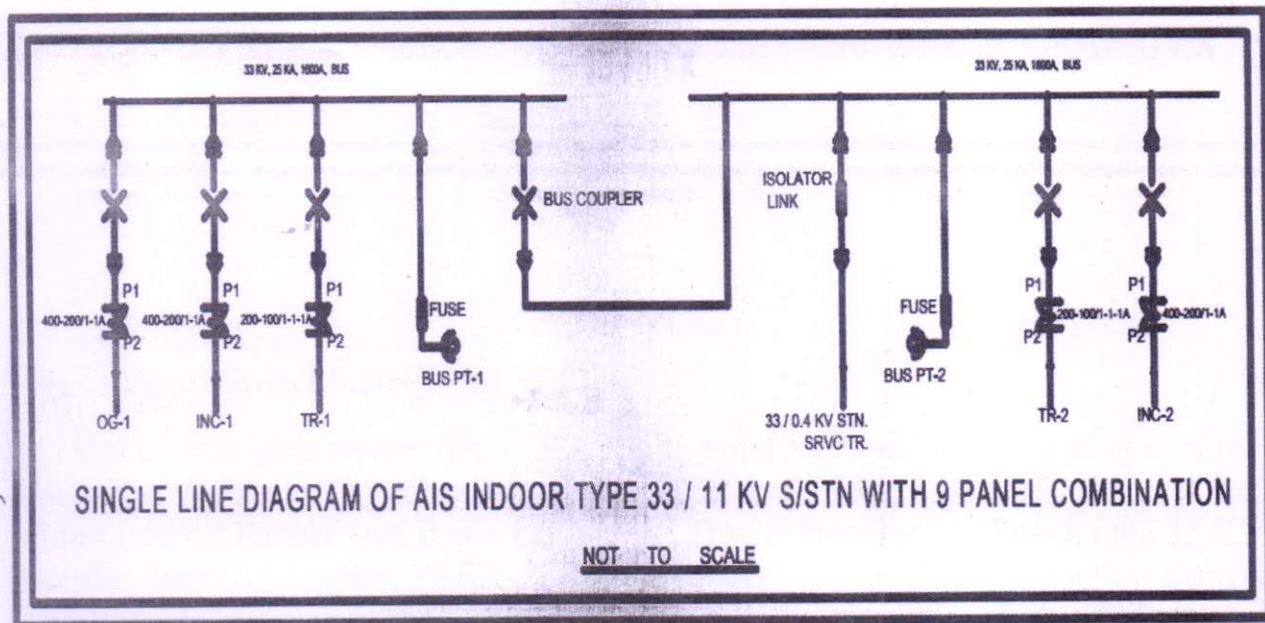
Single Line Diagram of Composite Panels



(b) 9 Panel Switchboard with VCB :

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

Single Line Diagram of Composite Panels



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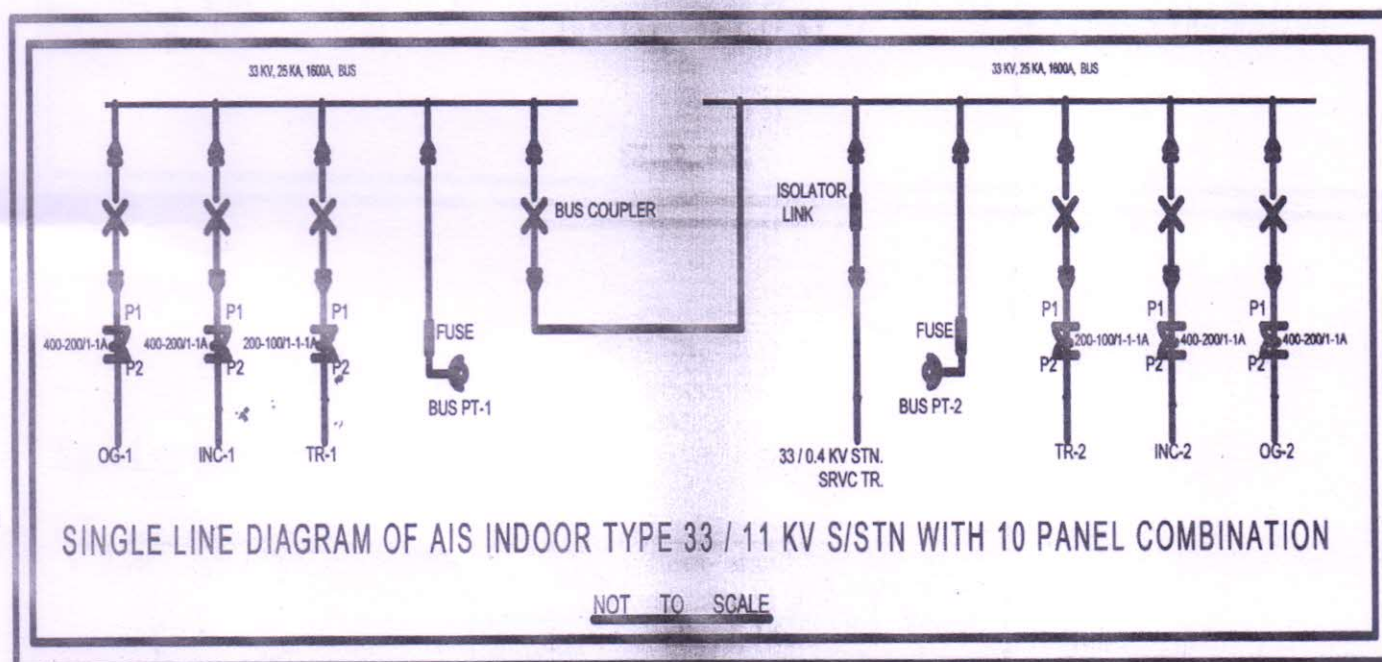
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(c) 10 Panel Switchboard with VCB :

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

Single Line Diagram of Composite Panels



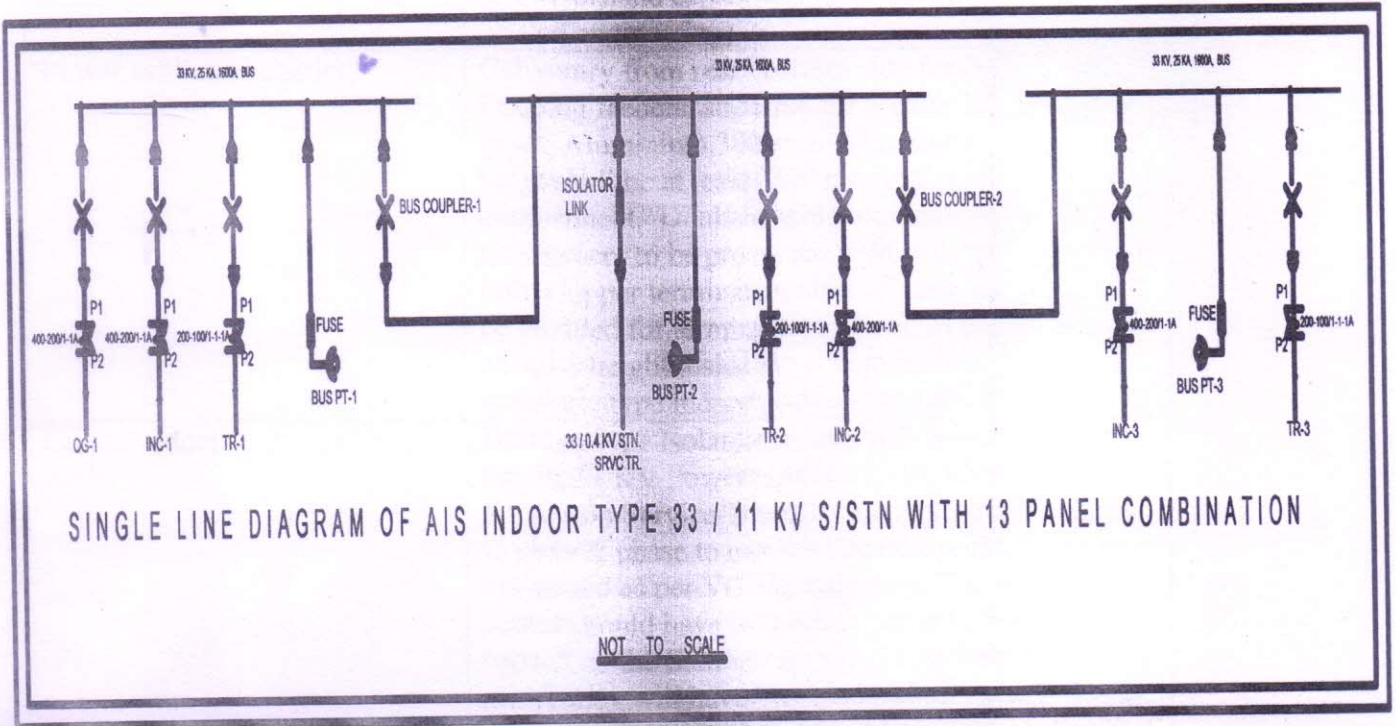
(d) 13 Panel Switchboard with VCB :

For this instant case, the 33 KV Multi-panel VCB will be consisting of three incoming VCB, one Outgoing Panel with VCB, three Transformer HV Control VCB, Three Bus PT Panels, two Bus – Coupler VCB with Bus Section Panel, One 33 KV Isolator Panel for tapping 33 KV Power Cable from the main Bus to Station Service Transformer installed in the Switch yard. **One tentative Layout plan & single line diagram is given below.**

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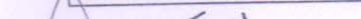
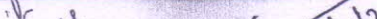

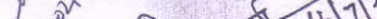









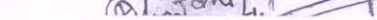


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Single Line Diagram of Composite Panels



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-2X 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 : 2750 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

Breaker to cable compartment	Through seal off bushing
 	 
	
	
	
	
	
	
	
	

	Minimum 100 mm clearance to be maintained between two rows of TB. 20% spare terminal block to be provided in each row.
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 withdraw able 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 withdraw able position. To be operated in service position unless its primary and secondary isolating contacts are fully engaged. The circuit breaker racking equipment can be

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	<p>padlocked in closed position.</p> <p>f. 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.</p>
Inter changeability	The Circuit Breakers of Incomer, Bus Coupler & Transformer/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 250 watt. For each VCB, 2 nos. trip coils to be provided.
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</p>

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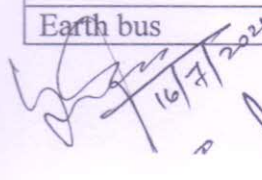
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	<p>conductivity grade copper conductor. Unavoidable joints on the primary conductor shall be welded type, preferably lap type. Current density at any point shall not exceed 1.6 A/sq.mm. Suitable insulated copper wire of electrolytic grade shall be used for CT secondary winding. Multi ratio in CT shall be 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 withdraw able 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. 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	A ground bus rated to carry maximum fault


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	<p>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. 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>CT & PT circuit : 2.5 sq. mm</p> <p>Main AC & DC circuit : 4.0 sq. mm</p> <p>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>For CT & PT circuit:</p> <p>R Phase : Red, Y Phase : Yellow,</p> <p>B Phase : Blue, Neutral : Black</p> <p>For DC circuit : Grey</p> <p>For AC circuit : Black</p> <p>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>AC Circuit : H1,H2,H3 -----</p> <p>Metering circuit : D11, D31, D51 --</p> <p>Protn. Circuit : C11, C31, C51 --</p> <p>REF Circuit : A11, A31, A51 --</p> <p>Main DC Ckt : J1, J2, J3 -----</p> <p>DC Control ckt : K1, K2, K3 ----</p> <p>Indication ckt : L1, L2,L3 -----</p> <p>Motor ckt : M1,M2,M3 ----</p> <p>PT Circuit : E11,E31,E51 ---</p> <p>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

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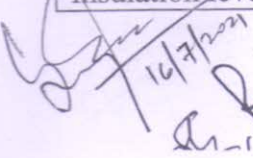
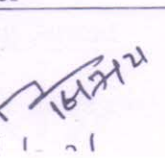
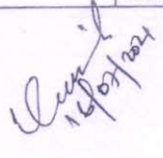
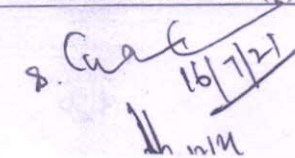
Type	Metal clad, air insulated with VCB type indoor circuit breaker
Reference Standard	IEC : 62271-100 & 200, IS 13118, IS 3427
Rated voltage	33 KV
Rated current	1600 Amps
Highest system voltage	36 KV
Insulation level	36 KV/70 KV/170 KV(P)
Frequency	50 Hz.
Enclosure degree of protection	HV compartment : IP 4X LV compartment : IP 2X
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)
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 (max)	Height : 2750 mm Depth : 3200 mm Width : 1200 mm
Paint type	Powder coated
Paint shade	RAL 7032 (both external & internal)
Paint thickness	50 microns (min)

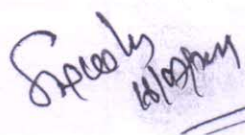
Mandatory particulars of Current Transformer

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 Vk/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	$33000/\sqrt{3}:110/\sqrt{3}:110/\sqrt{3}V$
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

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- 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., WBSEDCL.

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, WBSEDCL.

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

9/16/1

Phanabji
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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	

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	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
	(I/C, B/C, Bus Riser, ,Dummy Panel, Tr, Bus PT and Isolator Panel dimensions to be mentioned separately)			
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			

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Type of operating mechanism	
Closing time	
Opening time	
Mechanical Endurance capacity	
Electrical Endurance capacity	
Operating mechanism	
Type of isolation	
Details of mechanical interlock provided	
Interchange ability between I/C, Transformer/Feeder & B/C (Yes/No)	
No. contacts in Aux. Switch (NO & NC)	
No. contacts in Limit Switch (NO & NC)	
6. Vacuum Interrupter	
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	

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