West Bengal State Electricity Distribution Company Limited

(A Govt. Of West Bengal Enterprise)

Technical Specification for 12kV, 400A, 18.4 kA Floor Mounted Indoor Type Totally Enclosed Series Trip Metering Switchgear with Vacuum Circuit Breaker Unit

Technical Specification for 12kV, 400A, 18.4 kA Floor Mounted Indoor Type Totally Enclosed Series Trip Metering Switchgear with Vacuum Circuit Breaker Unit.

1.00 SCOPE OF SPECIFICATION :

1.01 This Specification covers the design, manufacture, assembly of components, testing at Manufacturer's Works, supply and delivery of 12kV, 400A,18.4 kA FLOOR MOUNTED INDOOR TYPE TOTALLY ENCLOSED SERIES TRIP METERING SWITCHGEAR WITH VACUUM CIRCUIT BREAKER including all accessories by Road Transport to different sites, for Indoor Installation in switch room measuring 5M x 4M x 3.5M (height) with door of size 2.75M (height) x 1.8M (width)

2.00 **APPLICABLE STANDARDS :**

2.01 The offered equipment including all accessories shall conform to latest versions of following standards.

1	Indian Electricity Rules 1956	Latest edition
2	Indian electricity act 2003	Latest edition
3	Switchgear and control gear	IEC: 60694, IEC: 60298, IEC: 62271-200, IEC: 60529. IS: 3427, IS 12729, IS 12063, IS:13947, IS: 9046
4	Circuit Breaker	IEC 62271-100, IS 13118, IS 2516
5	Vacuum Interrupter	IEC 60056
6	Potential Transformer	IEC:60186, IS 3156
7	Current Transformer	IEC:60185, IS 2705
8	Painting	IS 5
9	Connection & Wiring	IS 375
10	Indicating Instruments	IS:1248
11	Control switches and push buttons	IS 6875
12	Electromagnetic Compatibility	IEC 61000
13	Code of practice for phosphating iron & steel	IS 6005

3.00 **CLIMATIC CONDITIONS :**

3.01 For the purpose of designing, following climatic conditions shall be considered.

1.	Elevation above Mean Sea level.	Within 1000 M
2.	Maximum ambient air temperature.	50^0C
3	Maximum daily weightage average temperature	45^0C
4.	Minimum ambient air temperature.	3 ^{0}C

5.	Relative Humidity	95 %
6.	Pollution Level	Heavily Polluted atmosphere
7.	Seismic Consideration.	The sites fall within seismic zone (iii) or (iv) as classified in the IS 1983.
8	Annual average no. of rainy days	100 days

4.00 **APPLICATION :**

4.01 The equipment shall be installed on floor in indoor locations towards the following applications :

1 To protect WBSEDCL's Distribution System for Fault in Consumer's Installation.

2 To protect and isolate 11kV Bulk Power Supply Feeder for Fault in Outgoing System.

3 Automatic Tripping of Switchgear Unit in case of fault in Feeding System.

4 To open or close Switchgear Unit under no load, rated load, fault condition.

5 To effect Service Connection to High Voltage Bulk Power Consumer by way of connection of switchgear unit between 11 kV Dist. System with consumer's high voltage installation.

6 To measure Current, Voltage, Energy & Power Factor of Feeding System.

5.00 **TECHNICAL PARAMETERS** :

5.01 For the purpose of designing, following technical parameters shall be considered :

1	Nominal voltage	11 kV
2	Rated Voltage	12 kV
3	Phase	3
4	Frequency	50 Hz
5	Rated Current	400 A
6	Rated Short Circuit Level	18.4 kA Symmetrical for 3 seconds.
7	Rated Breaking Current	18.4 kA Symmetrical
8	Rated Short Circuit Making Current	46 kAp

9	Insulation Level :		
	(a)	Power Frequency Withstand Voltage	28 kV rms for 1 minute.
	(b)	Impulse Withstand Voltage	75 kVp at 1.2 x 50 micro second wave crest.
10	System Earthing		H.T. System is effectively earthed.
11	Maximum Temperature Rise		As per provision of IS

6.00 **SPECIFIC REQUIREMENT :**

6.01 General :

6.011 The equipment shall be indoor type, metal enclosed, floor mounted Series Trip, Triple Pole, Metering Switchgear with Vacuum Circuit Breaker, suitable isolation and horizontal draw out facility. Panel Manufacturer must be the VCB Manufacturer.

6.012 The equipment shall be totally enclosed metal clad for indoor application.

6.013 Vacuum Interrupter shall be rated for 100 nos. operation at interrupting capacity of 26.3 kA.

6.014 Before despatching equipment all external holes shall be blocked suitably so that no foreign element may enter into it.

6.015 The equipment furnished under this specification shall be suitably packed for transportation maintaining space and weight limitations.

6.02 **Construction** :

6.021 The equipment shall consist of stationary type, self supporting sheet steel cubicle and series trip metering switchgear with draw out type circuit breaker and fixed type Potential Transformer.

6.022 The Panel including Circuit Breaker Cubicle shall have structural frame work enclosed on all sides and top by sheet steel of minimum thickness 2 mm. Fire retardant non-hygroscopic anti tracking insulating sheet barrier & cover shall be provided for circuit breaker trust assembly. Supporting insulator, if required, shall be of adequate strength made of resin cast component.

6.023 The Vacuum Circuit Breaker truck shall be suitably isolated from the operator by use of additional thick metal sheet protective cover in front of VCB truck.

6.024 The Cubicle shall have a front access door with a removable back cover.

6.025 The circuit breaker, bus bar, instrument transformer shall be installed in separate compartments within the cubicle. The compartments shall be so constructed that failure of one device of equipment does not affect the device of other compartment.

6.026 Meters, lamps, switches shall be flush mounting type and shall be installed in easy accessible position within the appropriate chamber on the front of the cubicle.

6.027 All fixing bolts, screws etc. appearing on the panel shall be so arranged as to present a neat appearance. Door hinges shall be concealed type.

6.028 The equipment shall be provided with right angle Side Entry Cable End Box at Incoming Side and provision for fixing rear Entry Cable End Box at the Outgoing side.

6.03 **Circuit Breaker : Type & Rating :**

6.03(01) Circuit Breaker shall be vacuum interrupting type.

6.03(02) Circuit Breaker shall be floor mounted stationary, self supporting suitable isolation, horizontal draw out type self aligning primary and secondary disconnectors.

6.03(03) The equipment shall be provided with mechanical 'ON' and 'OFF' facility by operating suitable closing and opening devices. Circuit Breaker shall be provided with mechanical 'ON' and 'OFF' indicators.

6.03(04) The Breaker shall have (3) three positions : Test, service, isolated/ withdrawal positions marked.

6.03(05) Mechanical safety interlocks shall be provided so that it is not possible for a circuit breaker :

1. To be put into the cubicle unless it is secured in position.
2. To be either rack in or out from and to the service position unless its contacts are safely open.
3. To be withdrawn or inserted in the fixed housing unless it is at the isolated and Withdrawal position.
4. To be operated in service position unless the primary and secondary isolating contacts are fully engaged.

6.03(06) Automatic Safety Shutters shall be provided to completely cover the female primary disconnected when the breaker is withdrawn. Provision shall be made for padlocking spout shutters independently.

6.03(07) The normal continuous current rating of Circuit Breaker shall be 400 Amps. at rated Voltage.

6.03(08) Automatic tripping of the Circuit Breaker shall be effected by A.C. operated trip coils as specified in this specification.

6.03(09) The Vacuum Circuit Breaker shall be provided with operation counter.

6.03(10) Vacuum Interrupter of VCB shall have provision for contact erosion marking with limit.

6.03(11) Circuit Breaker shall be provided with Name Plate and Rating Plate as per provision in I.S.

6.04 **BUS BAR & RISER** :

6.041 The main Bus Bar and Riser shall be of high conductivity electrolytic copper liberally sized and normal continuous current rating shall be 800 Amps & 600 Amps respectively at rated voltage.

6.042 The main Bus Bar and Riser shall be either tinned or silver plated.

6.043 All end connections shall be suitably supported to withstand stresses due to maximum short circuit current to absorb operational shock and also to take care any thermal expansion.

6.044 Three Phase Bus and Riser shall be adequately insulated with fire retardant non-hygroscopic anti-tracking sleeve for rated voltage.

6.045 All insulating spacer barrier shall be made of fibre glass adequately insulated for rated voltage.

6.046 Necessary provision shall be made for testing current transformer primary by removing insulated tapping portion of the joints without any difficulty.

6.05 **CIRCUIT BREAKER CLOSING MECHANISM :**

6.051 The Circuit Breaker shall be provided with manually charged spring closing mechanism trip free nature. One spring charging & operating handle shall be provided with each equipment. The Breaker shall have mechanical indicators for spring "CHARGED" and spring "DISCHARGED".

6.06 **AUTOMATIC TRIPPING ARRANGEMENT :**

6.061 Automatic Tripping of Circuit Breaker for Phase fault shall be effected by A.C. Operated 2 nos. Trip Coils connected in series in the outer phases of C.T. Secondary shunted by time limit fuses. Automatic tripping of Circuit Breaker for ground fault shall be effected by A.C. operated 1 no. Trip Coil without any shunt fuse in residual path of C.T. Secondary.

6.062 Trip Coils and time Limit Fuses for phase fault protection shall be of 2.5 Amps and 4 Amps rating respectively and Trip Coil for ground fault protection shall be of 1.0 Amp rating.

6.063 Provision shall be made for adjusting over current setting from 50 to 200% and earth fault setting from 10 to 40%

6.064 T.L. Fuses of Trip Circuit shall be provided in a Fuse Box having sealing facility. The Fuse Box shall be located in such an accessible position in the front of instrument chamber so that the Fuse can be replaced without opening the door of the cubicle.

6.07 **CURRENT TRANSFORMER :**

6.071 The equipment shall be provided with 3 (three) nos. dual core dual ratio Current Transformer(C.T.) having following particulars :

1.	**Ratio**	100-50/5-5A & 50-25/5-5A
2.	**No. of Core**	Two(Core-I for Metering and Core-II for Protection).
3.	**Accuracy Class**	5 P 15 for Protection Core & 0.5S for Metering Core with ISF less than equal to 5 at lower ratio.
4.	**V.A. Burden**	15VA for Protection Core & 10VA for Metering Core.
5.	**Short Time Current Rating**	18.4 KA for 1 second

6.072 C.T. shall be resin-cast and shall be free from absorption of moisture.

6.073 C.T. shall be connected with P1 in Bus side.

6.074 C.T. shall be rated to carry 120 % of rated current

6.075 C.T. shall be suitably supported to withstand stresses due to maximum short circuit current to absorb operational shock and also to take care any thermal expansion.

6.076 C.T. shall be easily replaceable by removing cover of the equipment.

6.077 Secondary Terminals of C.T. shall be easily accessible to facilitate easy replacement/removal and testing of C.T. at site without dismantling. Disconnecting type terminals are to be used.

6.078 C.T. ratio change over link shall be provided on the Terminal Board at the front side of the Panel.

6.079 One of the Secondary Terminal of each C.T. shall be shorted and earthed at terminal point.

6.080 C.T. shall be provided with terminal marking, wiring diagram and rating plate as per provision in I.S.

6.08 **POTENTIAL TRANSFORMER :**

6.081 The equipment shall be provided with (3) three phase Potential Transformer (P.T.) having following particulars :

1.	**No. of Phase**	Three
2.	**Ratio**	$11000/\sqrt{3}$ **/** $110\sqrt{3}$ Volts
3.	**Vector Group**	Star / Star
4.	**Accuracy Class**	0.5
5.	**VA Burden**	30 VA/Phase
6.	**Protection of H.V. & L.V.**	H.R.C. Fuse

6.082 P.T. should be 3 phase, 5 Limb or 3 single phase with Star Connection made to form 3 phase PT having Star point Earthed for both type of PT in HV & LV side.

6.083 P.T. shall be dry or resin-cast type.

6.084 P.T. shall be connected at Incoming side.

6.085 P.T. shall be non-draw out fixed type.

6.086 P.T. shall be mounted on top of the Unit.

6.087 Over Voltage factor of P.T. : 1.2 for continuous & 1.9 for 8 Hrs.

6.088 P.T. shall be provided with suitable H.R.C. fuses both at H.V. & L.V. sides which shall be easily accessible without dismantling.

6.089 (A) P.T. shall be suitably supported to absorb operational shock and also to take care any thermal expansion.

6.089 (B) P.T. Secondary Fuse Boxes shall be provided with sealing arrangement.

6.089 (C) P.T. shall be provided with terminal marking, wiring and vector diagram and rating plate as per provision in I.S.

6.089 (D) P.T. shall be suitable for use in Effectively Earthed System.

6.089 (E) Rigidity of primary star point with earth bus shall be confirmed. Connection of Primary neutral with main earth bus to be made with solid copper wire & minimum 10 mm diameter or equivalent copper flat.

6.09 **METERS & METERING ACCESSORIES :**

6.091 Ammeter : Three nos. Ammeter 96 mm. sq. 90 deg scale, flush type shall be provided in the upper most position of the panel. The Ammeter shall be suitable for direct reading and shall be suitably calibrated according to dual ratio C.T. of the unit. Ammeter shall be connected from the protection cores of C.T. Secondary.

6.092 **Test Terminal Block :** Standard Test Terminal Block with cover (without any hole) having Sealing Arrangement shall be provided in metering circuit of equipment panel for connection to 3 phase 4 wire Energy Meter. TTB to be placed beneath the Energy Meter.

6.093 **Space & Wiring for Energy Meter :** Necessary space shall be provided in man height position of the equipment panel for housing projected type Energy Meter. Space is to be provided for fixing of Energy Meter of dimension 250 mm(W) x 300 mm(H). Necessary wiring shall be drawn from Test Terminal Block for connection of Energy Meter.

6.10 **SPACE HEATER AND CUBICLE PLUG & SWITCH** :

6.101 60W 230V A.C. Space Heater with thermostat and toggle switch shall be provided in the cubicle close to interrupting chamber.

6.102 A 230 Volts A.C. operated 6 amps. 3-Pin Plug & Toggle Switch shall be provided inside the instrument chamber of panel for working in the panel.

6.103 External 230 Volts A.C. supply shall be arranged in the multi core cable box by the user.

6.104 Necessary wiring shall be provided for cubicle plug and switch circuit from the multi core cable end box through a set of fuse and link.

6.11 PROVISION FOR FUTURE REMOTE ARRANGEMENT :

6.111 Necessary provision shall be made for Future Remote status/indication facility by way of wiring from 1 no. N/O and 1 no. N/C potential free contacts of auxiliary switches upto multi core cable end box.

6.12 BOARD TERMINAL BLOCKS **:**

6.121 Multiway Terminal Blocks complete with necessary binding screws and washers for wiring connections shall be provided for terminating cubicle wiring.

6.122 The Terminal Blocks shall have at least 25% spare terminals.

6.123 The Terminal shall be bolted type, robust, rust free and suitable for connection of at least 2 nos. 4 sq.mm. copper wires per terminal. Disconnecting type terminals is to be used in CT Circuit.

6.13 SECONDARY & SMALL WIRING :

6.131 The manufacturer shall furnish and install all wiring for the equipment and devices located at the Panel Board and Wiring shall be completed in all respect so as to ensure proper functioning of control, protection, metering and indications.

6.132 Fuses shall be provided to enable individual circuit to be isolated from bus wire without disturbing the other circuits.

6.133 All wiring shall be done with flexible beat resistant Switch Board coloured wires P.V.C. insulated with standard copper conductor suitable for 1100 volts service.

6.134 Minimum permissible size of wire for different circuits shall be 4 sq.mm. for C.T. Circuit and 2.5 sq.mm for all other Circuits.

6.135 The colour scheme of wires shall be as per provision in the I.S.

6.136 Each wire shall be identified at both ends with wire designation in accordance with stipulation in I.S. Inter Locking type plastic ferrules shall be used for identification.

6.137 The wires shall be suitably grouped in bunches by non-metallic wiring cleats or bands with each bunch adequately supported along its run to prevent sagging due to flexibility or vibration conforming to I.S.

6.138 All wiring shall be done in such a way that it will have sufficient clearance from H.V. System.

6.139 Other than L.T. PT Fuse, no Fuse shall be provided in energy metering circuit carrying voltage source from P.T. Secondary.

6.14 AUXILIARY SWITCH :

6.141 Auxiliary Switches having sufficient number of normally open and normally closed contacts properly rated and robust in nature shall be provided for following functions :

Sl.No.	Function	Type & No. of Contact
1.	C.B. ON Remote Ind.	1 N/O
2.	C.B. OFF Remote Ind.	1 N/C
3.	Spare (for future use)	1 N/C + N/O

6.142 Necessary wiring shall have to be provided for connecting Auxiliary Switches upto Board Terminal/Multi Core Box/Device Terminals via Secondary Isolating Contacts as the case may be.

6.15 GROUND BUS :

6.151 A grounding bus rated to carry rated fault current shall be provided along the full length of the unit. The Panel shall be provided with external studs for earthing connection.

6.16 MULTI CORE CABLE END BOX :

6.161 A weather proof and water proof Indoor Type Multi Core Terminal Box shall be provided at a suitable location at the rear upper portion of Switchgear to connect user's Multi Core Cable for following functions :

1. External 230 Volts A.C. Incoming Supply.
2. Terminals of potential free 1 N/O and 1 N/C spare contacts of Auxiliary Switches for future use.

6.17 **CABLE TERMINATION ARRANGEMENT :**

6.171 H.T. Power Cable from Incoming Side shall enter the Switchgear through right angle Side Entry cable End Box. 1 no. right angle Side Entry Cable End Box shall be supplied for connection of Incoming Cable with Bus bar of the equipment.

Side Entry Cable End Box shall be completed with tubular tinned copper lugs, armour clamp, gland plate, brass gland, for termination of H.T. XLPE Power Cable of size upto 3C x 300 sq.mm. (Incoming Power Cable) in air insulation with Bus bar of Switchgear through that tinned copper extension piece.

6.172 H.T. Power Cable of Outgoing Side shall enter the rear bottom portion of the Switchgear through rear Entry Cable End Box. Normally no rear Entry Cable End Box shall be supplied with the Switchgear unless otherwise required for design consideration. But provision shall be made for housing, fixing and covering user's Cable and Cable End Box for termination of H.T. XLPE Power Cable of size upto 3C x 300 sq.mm. (Outgoing Power Cable).

6.18 **SEALING PROVISIONS :**

6.181 The equipment shall have provision for sealing the followings:

1. C.T. and P.T. Chamber.
2. P.T. Fuses.
3. T.L. Fuse Box of Trip Circuit.
4. All Fuses and Links.
5. Test Terminal Block.
6. Board Terminal Block
7. Metering Chamber.
8 All openable doors and plates.

6.19 **PROCEDURE FOR SEALING WILL BE AS MENTIONED BELOW :**

1. The back cover of the Switchgear shall be provided with sealing arrangement both at the upper side and at the lower side at 2 diagonally opposite counters. This arrangement shall be made with sheet metal stips having holes of 4 to 6 mm. dia and welded at proper places of the cubicle and back cover.
2. PT shall be fixed type and to be installed at the Top of the panel. The PT & the secondary fuse Unit shall be covered by a Metal Box with diagonal sealing arrangement so that after the said unit is sealed, no part of the PT, fuse grips and connections become accessible from outside.
3. The front door of Switchgear Panel where meters to be installed shall be provided with sealing arrangement with similar extension pieces welded at appropriate placed one at the upper side and another at lower side of the cubicle and door.
4. The multiway terminal block and ratio change over link blocks inside the cubicle where all the secondary leads from the C.T. & P.T. will terminate shall be covered with insulated transparent cover having suitable sealing arrangement for preventing access to those terminals for manipulation of corrections or loosening the same.
5. Test terminal block of metering circuit shall be covered type having suitable sealing arrangement.
6. All other sealing arrangement will be as per provisions in the Technical Specification.

6.20 **TROPICAL FINISH :**

6.201 The equipment i.e. Panel shall be tropical finished for long use in open air indoor condition.

6.21 Accessories :

6.211 One no. Spring Charging Handle and One no VCB operating handle to be supplied with each panel.

6.22 **PAINTING :**

6.221 Modern method of painting as per provision in the standards shall be followed for painting all interior and external surfaces of Switchgear Panel with paint shade RAL 7032 having thickness of minimum 80 microns.

6.23 **NAME, RATING, MARKING, PROPERTY PLATE, WINDING & VECTOR DIAGRAM :**

6.231 Name & Rating Plate to be provided for Circuit Breaker and CT & PT shall contain all information as per provision in the Indian Standards.

6.232 Property Plate mentioning 'PROPERTY OF WBSEDCL', and 'Guarantee for 5 years' shall be provided.

6.233 Connection Diagram Plate shall be provided as per provision in the standards.

6.234 All terminals including earthing terminal shall be properly marked.

6.235 Winding Diagram Plate shall be provided in C.T. & P.T.

6.236 Vector diagram plate shall be provided in P.T.

6.24 **TEMPERATURE CATEGORY :**

6.241 The Panel shall be suitable for upper limit of temperature category as specified in the standards.

7.00 **SCHEMATIC CIRCUIT DIAGRAM :**

7.01 Tender purpose single line Electrical Circuit diagram of the equipment is enclosed in Annexure- D.

8.00 **TESTS :**

8.01 **TYPE TESTS :**

The Bidder shall have to submit all Type Test Reports as mentioned below, carried out in a CPRI/NABL accredited third party Laboratory /Govt. recognised Test House on 12 kV, 400A, 18.4 KA Floor Mounted Indoor Type Totally Enclosed Series Trip Switchgear with Vacuum Circuit Breaker Unit of identical design along with tender documents as pre-requisites, failing which their offer may not be technically acceptable. The submitted Test Reports shall amply prove that the Tests have been carried out within 5 years from the due date of Tender.

A) <u>12 KV switch gear panel with VCB:</u>

a) Short time withstand and Peak withstand current test
b) Lightning Impulse voltage withstand test
c) Temperature rise Test
d) Mechanical Endurance Test
e) Short circuit test with basic duties
f) Single phase breaking capacity test.
g) Cable charging breaking current test
h) IP Test

B. Current Transformer

a. Short Time Current Test
b. Impulse Voltage Withstand Test
c. Temperature Rise Test

C. Potential Transformer

a. Impulse Voltage Withstand Test
b. Temperature Rise Test

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.

8.02 **ROUTINE & ACCEPTANCE TESTS :**

8.021 The equipment along with CT & PT shall be subjected to routine and acceptance tests in accordance with provisions of relevant standards. Test for Over Voltage Factor in respect of P.T. should be done for at least one PT per offered lot as Acceptance Test.

8.03 **TEST WITNESS :**

8.031 Acceptance Test shall have to be performed in presence of WBSEDCL without any extra cost. The manufacturer shall give at least fifteen (15) days advance notice for conducting such tests.

8.04 **TEST REPORTS :**

8.041 Six (6) copies of Routine and Acceptance test reports shall have to be furnished to the purchaser for approval before despatch of the offered equipment.

9.00 **PERFORMANCE CERTIFICATE :**

9.01 Copies of Performance Certificates of similar equipment supplied to various organization shall have to be furnished in triplicate along with the tender.

10.0 **CREDENTIALS :**

10.01 **The bidder shall have credential for supply of the tendered items to WBSEDCL / other Power Utilities /other Govt. Departments in earlier occasions within last three financial years.**

11.00 **DRAWINGS, DATA AND MANUALS :**

11.01 The following drawings & documents shall be furnished in triplicate with the Tender :

(i) Brochures for technical data sheet of vacuum interrupter
(ii)GA drawing 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.
(iii)Mounting arrangement with foundation plan and loading for installation of equipment

11.02 Six copies of above mentioned drawings, data and manuals of offered equipment shall have to be submitted for approval and final distribution afterwards.

11.03 In addition to above, each crate containing mentioned equipment shall also accompany in water proof folder and set of approved drawings, data and manuals as mentioned above.

11.04 Before starting manufacture of the equipment, the manufacturer shall have to take approval of the design drawings from the WBSEDCL.

12.00 **PRICE :**

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

13.00 **GUARANTEED TECHNICAL PARTICULARS :**

13.01 Tenderer shall furnish Guaranteed Technical Particulars and other information of offered equipment as per Schedule enclosed in Annexure- E.

14.00 **DEVIATION :**

14.01 All deviations from the specification shall be recorded in the 'Deviation Sheet' with reference to respective Clauses of the Specification by drawing specification for the same. Unless deviations are recorded in the Deviation Sheet and submitted with the offer it will be taken for granted that the offer is made in conformity with the specification.

15.00 **VALIDITY PERIOD :**

15.01 The Offer against Tender should remain valid for a minimum period of 120 days from the next day of opening of the Tender. However, WBSEDCL may, on the merit of case, request extension of validity of the Offer for a further suitable period without any change in Terms & Conditions of the Offer.

16.00 **TYPE TESTS (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 WBSEDCL, shall have to be arranged by the successful Manufacturer from any lot offered for inspection, sample chosen at random after successful Routine Test by our Inspection Team, as per relevant ISS from CPRI/NABL accredited third party laboratory /Government recognized Test House in presence of WBSEDCL'S representative.

However the necessary cost of the Type Test charges will be reimbursed to the party on production of necessary supporting documents.

17.00 **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) Calculation Sheet for price Variation on the basis of IEEMA or CACMAI as applicable with base date of order.
g) Challan in triplicate.
h) Way bill, if applicable.

ANNEXURE –A

LEGEND OF SYMBOL USED IN SUGGESTED SINGLE LINE SCHEMATIC DIAGRAM

SYMBOL REFERENCE	DESCRIPTION OF DEVICE
52	Vacuum Circuit Breaker : 12kV, 18.4 KA, 400 A
52a & 52b	Breaker Auxiliary Switch contact
S.I.C.	Breaker Secondary isolating contacts.
C.T.	Dual Core , Dual Ratio Current Transformer : Ratio - 100-50/5-5A & 50-25/5-5A Accuracy Class : 5P15/0.5S, Burden : 10 VA(for Metering) & 15 VA(for Protection)
P.T.	3-Phase Potential Transformer : RATIO $\frac{11000V}{\sqrt{3}} / \frac{110V}{\sqrt{3}}$ Vector Group : Star / Star , Accuracy Class : 0.5, Burden : 30 VA / Phase
52T – R 52T – B 52T – N	Series Trip Coil for R Phase, Series Trip Coil for B Phase, Series Trip Coil for Earth Fault
TLFS – R TAFS – B	Time Limit Fuse for trip circuit in R Phase, Time Limit Fuse for trip circuit in B Phase.
F1, F2, F3	H.T. P.T. Fuse.

SYMBOL REFERENCE	DESCRIPTION OF DEVICE
FS1 – FS6	L.T. Fuse.
LK1 – LK4 RCL1, REL2	Link C.T. Ratio change over link.
T.T.B.	3-Phase Test Terminal Block.
T.V.M.	Trivector Energy Meter (to be supplied and installed by WBSEDCL.)
A.	Ammeter
T.S.	Toggle Switch
C.I.L.	Cubical illumination lamp 230V , A.C. LED Lamp.
H	Heater
H.S.	Heater Switch.
TH	Thermostat.
E	Earth terminal.

ANNEXURE – 'B'

GENERAL TECHNICAL REQUIREMENTS

Sl No	Item Description	Requirement
A.	**General** :	
1.	Applicable Standard.	IEC : 62271, IS : 13118
2.	Type	11 kV Metal-Clad Series Trip Metering Panel with VCB.
3.	Rated Voltage.	11000 Volts
4.	Phase	Three Phase
5.	Frequency	50 Hz
6.	Rated Normal Current.	400 Amps.
7.	Rated Short Circuit Current Capacity.	18.4 KA for 3 Sec
8.	Rated Making Current.	46 KA (P)
9.	Insulation Level : a) Power Frequency Withstand Voltage b) Impulse withstand Voltage 1.2x50 micro seconds wave crest	 28 kV 75 kV (P)
10.(i)	Dimension of Panel (H X W X D) (Maximum Limit)	2200 X 700 X 1800 mm
10(ii)	Maximum Width of the Side Entry Cable End Box	300 mm
11.	Degree of Protection	IP 5X & IP 4X for LV & HV compartment respectively
B.	**Circuit Breaker**	
1.	Type	Indoor Series Trip Metering Panel with VCB

Sl No	Item Description	Requirement
2.	Make	Panel manufacturer must be VCB manufacturer
3.	Normal Voltage	11 kV
4.	Highest System Voltage	12 kV
5.	Frequency	50 Hz
6.	No. of Poles	Three
7.	Rated Current	400 Amps
8.	Short Time Current	18.4 KA for 3 Sec.
9.	Breaking Capacity	18.4 KA
10.	Making Capacity	46 KA
11.	Single Phase Capacitor Breaking Capacity	400 A rms
12.	Line Charging Breaking Capacity	10 A rms
13.	Cable Charging Breaking Capacity	25 A rms
14.	Duty Cycle	O – 3 Min – CO – 3 Min - CO
15.	Closing time	< 100 milli Sec
16.	Breaking time	< 80 milli Sec
17.	No. of Contacts in Auxiliary Switch (spare)	4 NO + 4 NC
18.	Minimum phase to phase Clearance	110 mm
19.	Minimum phase to ground clearance	90 mm
20	Type of operating mechanism	Spring charge stored energy type
21.	Mechanical Safety Interlock	To be provided
22.	No of Break per Phase	One
23.	Mechanical Endurance Capacity	2000 operation (M1)
C.	**Current Transformer**	
1.	Make	Plastofab, BMC, Pragati, ECS, Kappa, Schneider
2.	Type	Resin cast
3.	Voltage Grade	12 kV
4.	Reference Standard	IS : 2705, IEC:60185
5.	Class of Insulation	Class E or better
6.	Frequency	50 Hz
7.	Ratio	100-50 / 5-5A & 50-25 / 5-5A
8.	Class of Accuracy	Metering core : 0.5S Protection core : 5P15
9.	Rated burden	Metering core : 10 VA Protection core : 15 VA
10.	Accuracy Limit Factor	15
11.	Instrument Security Factor	≤5 at lower ratio
12.	Short Time Current Rating	18.4 KA for 1 Sec.
D.	**Potential Transformer**	
1.	Make	Plastofab, BMC, Pragati, Audio Vision, ECS
2.	Type	Dry and fixed type
3.	Reference Standard	IS :3156, IEC:60186
4.	Rated Primary Voltage	11000 Volts

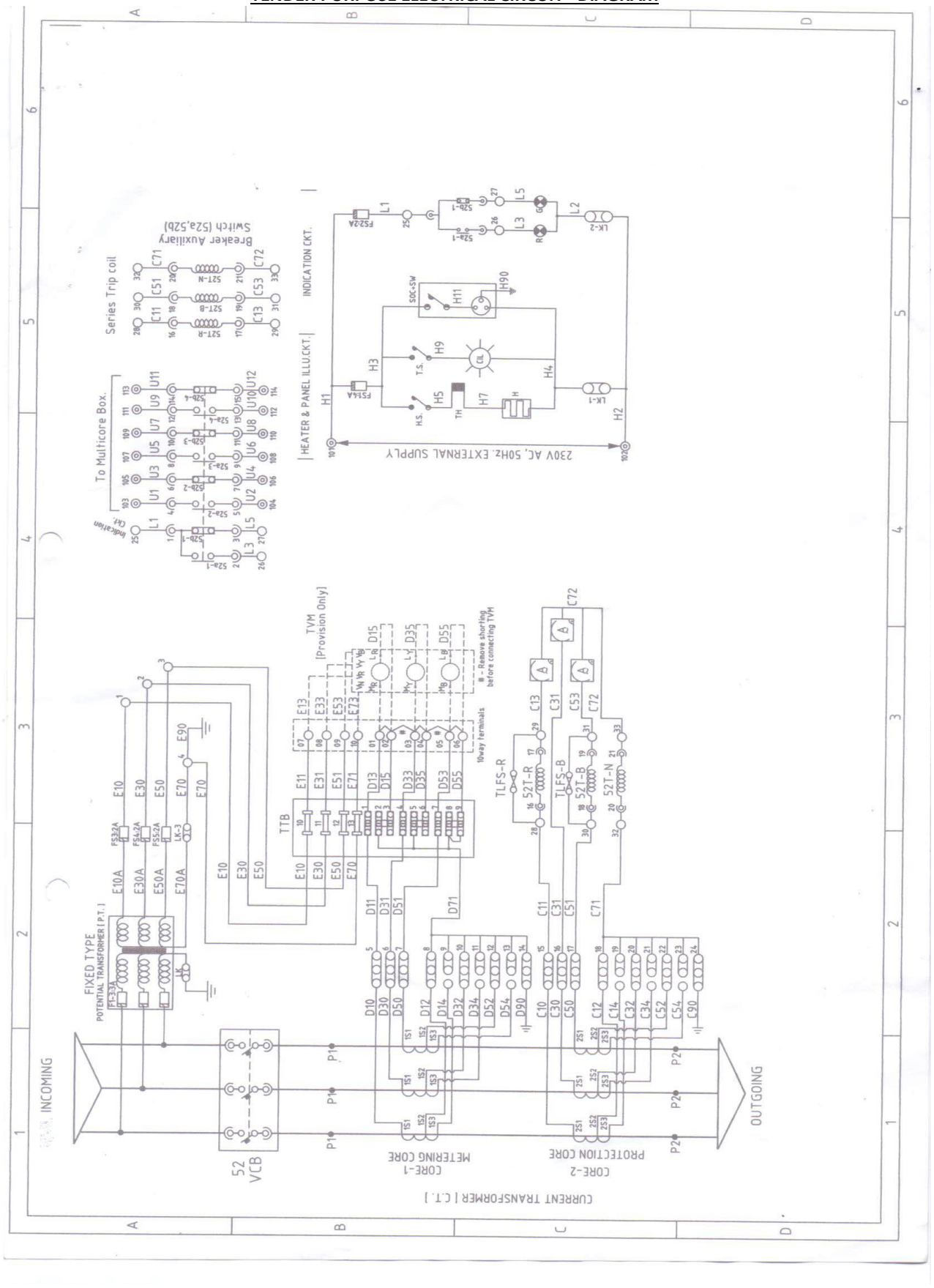
Sl No	Item Description	Requirement
5.	Rated Secondary Voltage	110 Volts
5.	Frequency	50 Hz
	Voltage Factor	1.2 Cont. & 1.9 for 8 Hrs.
6.	Winding Connection	Star Star with both side neutral earthed
7.	Core Connection	3 Phase 5 Limb or Three no. Single Phase
8.	Burden/ Phase	30 VA
9.	Accuracy Class	0.5
10.	Primary & Secondary side protection	HRC Fuse
11.	Class of Insulation	Class E or better
12.	Primary and Secondary fuse	HRC
E.	**Bus Bar**	
1.	Material	Silver plated / Tinned electrolytic copper
2.	Shape	Rectangular
3.	Current Density	Maximum 1.6 Amps per sq. mm
4.	Minimum clearance (Phase to Phase)	110 mm
5.	Minimum clearance (Phase to Ground)	90 mm
6.	Current Rating	800 Amps for Bus, 600A for Riser
7.	Type of Insulation	Full voltage sleeved with shrouds on joints
F.	**Vaccum Interrupter**	
1.	Make	CGL, ABB, BEL, Siemens, Schneider.
2.	Current Rating	More than 400A
3.	Breaking Capacity	26.3 KA
4.	Mechanical Endurance Capacity	2000 Operation
5.	Minimum Electrical Life	100 nos full Short Circuit Operation at 26.3 KA
G.	**Ammeter**	
1.	Make	KAYCEE, RECEM, RISHAV, SECURE, AE
2.	Type	Analog
3..	Accuracy Class	1.0
4.	Size	96 mm x 96 mm
H.	Incoming Cable Entry Arrangement	Right Angle Side Entry Box
I.	**Accessories**	
1.	Spring Charging Handle	One no to be supplied with each unit
2.	VCB operating handle	One no to be supplied with each unit

ANNEXURE-C
BILL OF MATERIALS

Sl No.	Item / Equipment	Quantity
1.	11 kV Series Trip Panel	1 Set
2.	Vacuum Circuit Breaker (3 phase)	1 No.
3.	11 kV CT	3 Nos.
4.	11 kV PT	1 Set
5.	Ammeter (96mm x 96 mm)	3 Nos.
6.	Space for energy meter	250 mm (W) X 300 mm (H)
7.	Test Terminal Block (3 phase 4 wire, Link type)	1 No.
8.	LED Type Indicating Lamp (a) Circuit Breaker ON (b) Circuit Breaker OFF (c) Spring Charged	 1 No. (Red colour) 1 No. (Green colour) 1 No. (Green colour)
9.	16 Amps, 2 Poles MCB for AC Incoming Circuit	1 No.
10.	Time Limit Fuse (Red & Blue Phase)	2 Nos.
11.	Fuse & Links	As required
12.	Space Heater	3 Nos.
13	Thermostat with switch	3 Sets
14.	Power Plug with Switch	1 Set
15.	Right Angle Side Entry Cable in Box	1 Set
16.	Manual Spring Charging Handle	1 No.
17.	VCB Operating Handle	1 No.

ANNEXURE – D

TENDER PURPOSE ELECTRICAL CIRCUIT DIAGRAM



ANNEXURE - E

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)			
		Height	Width	Depth
	Dimension of Panel in mm (H x W x D)			
	Dimension of Side Entry Cable End Box			
3.	**Bus Bar**			
	Material			
	Shape			
	Size			
	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	
	Rated voltage	
	Highest voltage	
	Frequency	
	Normal Current	
	Breaking capacity	
	Making capacity	
	STC for 3 Sec.	
	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	
	Closing time	
	Opening time	
	Mechanical Endurance capacity	
	Electrical Endurance capacity	
	Operating mechanism	
	Type of isolation	
	Details of mechanical interlock provided	
	Current required for O/C Tripping	
	Current required for E/F Tripping	
	No. contacts in Aux. Switch (NO &NC)	
	No. contacts in Limit Switch (NO &NC)	
6.	**Vacuum Interrupter**	
	Make	
	Rated voltage	
	Type and model no.(Test report to be enclosed)	
	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	
	Insulation level	
	Ratio	
	Class of accuracy	
	Burden	
	STC for 1 Sec.	
	ALF of Protection core	
	ISF of Metering Core at lower ratio	
8.	**Potential Transformer**	
	Make	
	Reference Standard	
	Whether Fixed Type (Yes/No)	
	Insulation level	
	Winding connection	
	Type of Core connection	
	Ratio	
	Class of accuracy	
	Burden per Phase	
	Over Voltage Factor for 8 hrs.	
	Installation Position	
	Primary Fuse rating	
9.	**Ammeter**	
	Make	
	Type	
	Size	
	Accuracy class	
10.	**Terminal connector**	
	Make	
	Type	
	Size	
11.	**Time Limit Fuse**	
	Make	
	Continuous Current Rating	
	Fusing Current Rating	
12.	**Trip coils**	
	Number of Over Current Coil	
	Current required for O/C Tripping	
	Current required for E/F Tripping	

13	**Control wire**			
	Make			
	Size			
	i) CT Circuit			
	ii) Other Circuit			
14.	Whether Side Entry Cable Entry Box provided in Panel (Yes/No)			
15.	**Earth Bus**			
	Material			
	Shape			
	Size			
16.	**Painting Details**			
	Surface cleaning process			
	Paint details			
	Paint shed			
	Paint thickness			
17.	**Shipping dimension of equipment (mm)**	Height	Width	Depth
18.	**Accessories**			
	Spring Charging Handle (no.)			
	VCB Operating Handle (no.)			
19.	**Type Test**			
20.	**Guarantee of the complete equipment (in years)**			

Date :
Place :

Signature :
Name :
Designation :