

# DEENDAYAL PORT AUTHORITY

An ISO 9001:2008 & ISO 14001:2004 Certified Port

Mobile: 9825227048

Mail: [xeneDPA@gmail.com](mailto:xeneDPA@gmail.com)



Office of the Executive Engineer (E)  
Ground Floor, P & C Building,  
New Kandla - Kachchh,  
Pin.370210-Gujarat.

No.: EL/WK/

Date: 14/08/2024

## **EXPRESSION OF INTEREST**

(This Notice is issued only to elicit Expression of Interest from the parties interested in the work and does not constitute any binding commitment from the Deendayal Port Trust to proceed with the work or invite any or all the parties in the subsequent bidding process. The Open Tenders will be issued subsequently)

To,

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_.

Sub: "Up gradation of Substations outside cargo jetty area at DPA."

Sir,

You are requested to submit Expression of Interest for "Up gradation of Substations outside cargo jetty area at DPA." as per schedule-B, Scope of Work and Technical Specifications.

The Expression of Interest should reach to this office on or before 21/08/2024.

Yours faithfully

Sd/-  
Executive Engineer (E)  
Deendayal Port Authority

**II of Quantities (BOQ)**

Sr. No.	Description	Qty.	Unit	Rate		Amount
				In Figure	In Words	
1	Supply of 11KV, Gas Insulated RMU Breakers indoor application, various ratings RMU Modules as per Technical Specification No. 01.					
(a)	6 Module RMU	2	No.			
(b)	4 Module RMU	4	No.			
2	Installation, Testing & Commissioning of supplied various ratings modules 11 KV Indoor application, RMU panel for at various substation as per Technical Specification No. 02.					
(a)	6 Module RMU	2	No.			
(b)	4 Module RMU	4	No.			
3	Design & Supply of LT Distribution Panels as per Technical Specification No. 3.					
(a)	20 Ways (2 I/C, 1 Bus Coupler, 17 O/G).	3	No.			
(b)	15 Ways (2 I/C, 1 Bus Coupler, 12 O/G).	1	No.			
(c)	10 Ways (2 I/C, 1 Bus Coupler, 7 O/G).	2	No.			
(d)	8 Ways (2 I/C, 1 Bus Coupler, 5 O/G).	1	No.			
4	Installation, Testing & commissioning LT Distribution panel as per Technical Specification No. 4.					
(a)	20 Ways (2 I/C, 1 Bus Coupler, 17 O/G).	3	No.			
(b)	15 Ways (2 I/C, 1 Bus Coupler, 12 O/G).	1	No.			
(c)	10 Ways (2 I/C, 1 Bus Coupler, 7 O/G).	2	No.			
(d)	8 Ways (2 I/C, 1 Bus Coupler, 5 O/G).	1	No.			
5	Supply of 11/0.433 KV indoor					

	type distribution transformer shall be of energy efficient Level 1 as per relevant IS with up to date amendment of following ratings as per Technical Specification No. 5.					
(a)	1000 KVA	2	No.			
(b)	500 KVA	5	No.			
(c)	250 KVA	4	No.			
6	Installation, Testing & Commissioning of level 1 transformer of rating 1) 1000KVA, 11/0.433KV 2) 500 KVA, 11/0.433KV 3) 250 KVA, 11/0.433KV As per Technical Specification No.6.	2 5 4	No. No. No.			
7	Supply at site 3 Core HT armoured aluminium conductor XLPE cable of 11KV grade of the following type & size as per IS: 7098 (Part-II)2011 & as per Technical Specification No. 7.					
(a)	3 core x 150 Sq.mm	500	Mtr.			
8	Supply at site 4 Core LT armoured aluminium conductor XLPE cable of 1.1KV grade of the following type & size as per IS: 7098 (Part-I)1985 & as per Technical Specification No. 8.					
(a)	4 core x 150 Sq.mm	1000	Mtr.			
9	Laying of HT /LT XLPE Cable through various mediums as per Technical Specification No. 9.	1500	Mtr.			
10	Through RCC/Road/Rail Crossing by putting suitable diameter Heavy Duty HDPE pipe of 150 mm in between crossing as per Technical Specification No. 10.	300	Mtr.			
11	Providing of HT11 KV XLPE heat shrink termination kit as per					

	Technical Specification No. 11.					
(a)	3C x 150 Sq.mm. (Indoor Type end termination kit)	20	No.			
(b)	3C x 150 Sq.mm. (Outdoor Type end termination)	15	No.			
(c)	3C x 150 Sq.mm. (Straight through)	20	No.			
12	Fixing of HT11 KV XLPE Cables of following sizes with heat shrink kit as per Technical Specification No. 12.					
(a)	3C x 150 Sq.mm. (Indoor Type end termination kit)	20	No.			
(b)	3C x 150 Sq.mm. (Outdoor Type end termination)	15	No.			
(c)	3C x 150 Sq.mm. (Straight through)	20	No.			
13	Providing of LT XLPE heat shrink termination kit as per Technical Specification No. 13.					
(a)	4C x 150 Sq.mm. (Indoor Type end termination kit)	30	No.			
(b)	4C x 150 Sq.mm. (Outdoor Type end termination)	10	No.			
(c)	4C x 150 Sq.mm. (Straight through)	30	No.			
14	Fixing of HT 11 XLPE Cables of following sizes with heat shrink kit as per Technical Specification No. 14.					
(a)	4C x 150 Sq.mm. (Indoor Type end termination kit)	30	No.			
(b)	4C x 150 Sq.mm. (Outdoor Type end termination)	10	No.			
(c)	4C x 150 Sq.mm. (Straight through)	30	No.			
15	Supply, Laying, Fixing of 1.1 KV, 10 core, 2.5 sq.mm, copper conductor, PVC insulated armoured control cable as per Technical specification No. 15.	200	Mtr.			
16	Preparation of Earth Station as per Technical specification no. 16.					

(a)	Pipe in pipe Copper Earthing	50	No.			
17	Supply of 50 x 5 mm copper earth strip as per technical specification no. 17.	250	Mtr.			
18	Supply of 50 x 6 mm Hot Dip galvanized GI earth strip as per technical specification no. 18.	1000	Mtr.			
19	Laying & connecting of copper & GI earth strip as per technical specification no. 19.	1250	Mtr.			
20	Disconnection, removal and shifting of old VCB Panels, LT Panels, cables, any other accessories from existing place to the place at Kandla as directed & as per Technical Specification No. 20.	1	Lot			
21	Fabrication work for preparation of Trench cover of various sizes with chequer plate of 6 mm thick including suitable size of angle, flat & handle, also includes 2 coat of red oxide & 2 finish coat of epoxy paint Complete with labour and material.	5	Ton			
<b>Total Amount: Rs.</b>						

(In Words: Rs. \_\_\_\_\_ )

**Note:** The rates should be inclusive of all taxes, duties, fees, cess etc. and all incidental charges: but exclusive of GST.

**Seal & Signature  
of Contractor**

**Executive Engineer (E)  
Deendayal Port Authority**

## Scope of Work & Technical Specifications

### **Name of work: Up gradation of Substations outside cargo jetty area at DPA.**

Deendayal Port Trust intend to strengthen the Down Stream 11/0.433 KV Substations HT/LT Distribution network at outside cargo jetty area including Oil Jetty for providing Healthy HT/LT power. The work involves Supply, Installation, testing & commissioning of HT sealed SF-6 GAS insulated RMU panels, LT Distribution Panels, cable network and earthing at various substations as directed by EIC.

The brief Scope of work is as under:

The Contractor should visit the site at their own cost before quoting the rates, to ascertain the site of work, once the work order issued no excuse shall be entertained regarding site conditions. The Work includes...

- Supply, Installation, Testing & commissioning at various rating sealed gas insulated application Ring Main units (RMU) of given modules.
- Supply, Installation, Testing & commissioning at various rating LT Distribution Panels.
- Supply, Installation, Testing & commissioning at various rating Indoor type Distribution Transformers.
- Supply & Laying of HT & LT Cables.
- SITC of Cable joints & end terminations.
- Earthing shall be carried out as per IS.

After Completion of work successfully, contractor shall submit the four-set project compendium in hard copy which shall contain, the complete single line Drawing, Schematic drawing, all Test Reports, operation & Maintenance manual & instructions of RMU Module panel etc. to Engineer in Charge.

#### **1. TECHNICAL SPECIFICATION FOR ITEM NO. 1.**

The scope of work comprises of the following:

The Gas insulated RMU switchgear shall comply with the requirement stated in the following standard & specification amended up to date.

Metal Enclosed switchgear	IEC 62271-200/IEC20 298/IS 12729:1988
Medium voltage switch	IEC 265
Alternation current dis-connector (Load Break isolator & Earthing switch)	IEC 60129/ IEC 62271 - 102/ IS 9921
Specification of Alternation current Breakers	IEC 62271-100/IEC/60056/IS:13118:1991
Panel Design , SF-6 Circuit Breakers	IEC 62271-1/IEC 60694
Current Transformer	IEC 60044-1/IEC 60185/IS 2705:1992

HV switches	IEC 60265/IS 19920:1981
Filling of SF-6 in RMU	IEC 376
Pressure of SF6 gas	1.4 bars at 20 °C
Cable bushings	DIN 47636
Temperature class	-25 °C - +40 °C Indoor
Degree of protection: - SF6 tank: IP 67 - Front cover: IP 2X - Cable cover:	IEC 60273/IS 13947 (P-1) IP 67 IP 2X IP 3X
Busbars	240 mm <sup>2</sup> Cu
Earth bar (external):	120 mm <sup>2</sup> Cu - Bolt dimension: M10
Colour Front Cover Side & Cable Cover	 RAL 7035 RAL 7035

➤ **General Requirement:**

The Ring Main Unit shall be installed at 11/0.433 KV various downstream Sub Stations. The RMU shall be extensible. Two Load break isolators for incoming & outgoing cables and one Circuit breaker shall be enclosed in the main tank using SF6 gas as insulating and vacuum as arc quenching medium or SF6 gas as both insulating and arc quenching medium. The main tank shall be stainless steel sheet of minimum 3mm thickness and robotically welded with a pressure relief arrangement.

**Inner enclosure (Main tank)**

The tank shall be robotically welded stainless steel sheet of minimum 3mm thickness. The tank shall be sealed and no handling of gas is required throughout the 25 years of service life. However, the SF6 gas pressure inside the tank shall be constantly monitored by a temperature compensating gas pressure indicator offering a simple go, no-go indication. The gas pressure indicator shall be provided with green pressure and red pressure zones. There shall be one Non - return valve to fill up the gas. The manufacturer shall give guarantee for maximum leakage rate of SF6 gas will be lower than 0.1 % / year. An absorption material such as activated alumina in the tank shall be provided to absorb the moisture from the SF6 gas to regenerate the SF6 gas following arc interruption. The degree of protection of the inner enclosure shall be IP 67.

The compact RMU Unit shall be provided with a pedestal made up of M.S. Angle to mount the unit on plain surface. The height of the bottom of cable box shall be 300 to 500 mm as per site condition to provide the turning radius for the HT cable termination or as directed by EIC.

➤ **BUSBARS :**

The three nos. of continuous Busbars made up of EC grade tinned copper of rating current 630A shall be provided. The Short time rating current shall be 20 kA for 3 seconds for 11KV. The Busbar connections shall Anti - oxide greased.

ELECTRICAL DATA – 12 kV - 28kV-1min

Nominal voltage: 11 kV

Rated frequency: 50 Hz

Rated current bus bars: 630 A

Rated current cable switch Disconnecter: 630 A

Short time withstands current:

- Cable switch Disconnecter with interface C (400-bolt) bushing: 21 kA RMS 3 Seconds

-Vacuum circuit breaker with interface C (400-bolt) bushing: 21 kA RMS 3 Seconds

Rated current for transformer T-off: 630 A

Impulse withstands voltage: To earth and between phases: 95 kV

Insulation level: - Power frequency 1 min: 28 kV.

Relay & Protection Scheme-Numerical Relay with Control Supply 24V DC, 50HZ. Phase current input Relay shall be suitable for 1A and %A CT secondary (selectable at site) Relay shall be suitable for 2CT as well as 3CT connection. Ground current input Relay shall be suitable for residually connected CT input and also for CBCT input. The relay shall have provision for digital inputs, speed switch inputs. The Communication System of the relay shall be equipped with RS485 for remote communication or for connection to DCS, SCADA or PLC. The relay shall be suitable for port for connection to Laptop and PC preferably of front side. The relay shall support multiple / universal protocols for communication with any type of DCS / SCADA. Make & Type of relay must be REF615 of ABB or 7SJ62 or latest version as directed by EIC with provision of external DC Power supply with 1 Hr. backup facility.

➤ **FAULT PASSAGE INDICATORS / Earth Fault Indicators (FPI/EFI):**

These shall facilitate quick detection of faulty section of line. The fault indication may be on the basis of monitoring fault current flow through the device. The unit should be self- contained requiring no auxiliary power supply. The FPI shall be integral part of RMU.

**Front plate**

The front shall include a clear line diagram of operating system which indicates different functions. The position indicators shall give a true reflection of the position of the main contacts and shall be clearly visible to the operator. The lever operating direction shall be clearly indicated in the mimic diagram. The manufacturer's plate shall include the switchboard's main electrical characteristics.

➤ **Danger Board:**

The danger Board plate as per relevant IS shall be riveted on the front plate of the RMU in Languages viz. Gujarati, Hindi, English.



**TYPE and ROUTINE TESTS:**

Type tests:

The equipment offered in the tender should have been successfully type tested at NABL Laboratories in India or ERDA or equivalent international laboratories for the tests in line with the relevant standard and technical specification and manufacture to submit the valid type test certificates older not more than 5 years from the date of NIT.

**Following Type Test must have been carried out.**

Short time current withstand test and peak current withstand test.

Lightening Impulse voltage withstand test.

Temperature rise test.

Short Circuit current making and breaking tests.

Power frequency voltage withstand test (dry).

Capacitive current switching test confirming to IEC.

Mechanical operation test.

Measurement of the resistance of the main circuit.

Checking of degree of protection of main tank and outer enclosure.

Checking of partial discharge on complete unit.

**➤ ACCEPTANCE & ROUTINE TESTS:**

All acceptance and routine tests as stipulated in the respective applicable standards amended Up-to-date for all the equipment shall be carried out by the contractor in the presence of DPT representative & TPIA without any extra cost to the purchaser before dispatch.

The Tenderers shall have full facilities to carry out all the acceptance and routine test as per the Applicable standards. After finalization of the program of type/acceptance/routine testing, the Contractor shall give 15 days' advance intimation to the DPT, to enable him to depute TPIA for witnessing the tests. The routine tests carried out by the manufacturer at the works in presence of TPIA.

The routine tests are as follows:

1. Conformity with drawings and diagrams,
2. Measurement of closing and opening speeds,
3. Measurement of operating torque,
4. Checking of filling pressure,
5. Checking of gas-tightness.
6. Dielectric testing and main circuit resistance measurement.
7. Power frequency voltage
8. Resistance test for the circuit.
9. Mechanical operation tests.

The contractor in the presence of TPIA representative shall carry out all above acceptance and routine tests. The supplier shall give at least 15 days advance

intimation to the DPT to enable them to depute their representative for witnessing the tests.

The DPT reserves the right for carrying out any other tests of a reasonable nature at the works of the supplier/laboratory or at any other recognized laboratory/research institute in addition to the above mentioned type, acceptance and routine tests at the cost of the DPT to satisfy that the material complies with the intent of this specification.

➤ **DRAWINGS:**

All drawings shall conform to relevant IEC Standards Specification. All drawings shall be in ink.

The Contractor / Firm shall submit dimensional general arrangement drawings of the equipments, illustrative and descriptive literature in triplicate for various items in the RMUs, which are all essentially required for future automation.

- i) Schematic diagram of the RMU panel
- ii) Instruction manuals
- iii) Catalogues of spares recommended with drawing to indicate each items of spares
- iv) List of spares and special tools recommended by the supplier.
- v) Copies of Type Test Certificates as per latest IS/IEC.
- vi) Drawings of equipments, relays, control wiring circuit, etc.
- vii) Foundation drawings of RMU.
  - viii) Dimensional drawings of each material used for item Vi.
- ix) Actual single line diagram of RMU/RMUs with or without extra combinations shall be made displayed on the front portion of the RMU so as to carry out the operations easily.

The following should be supplied by contractor:

Copies in triplicate of printed volumes of operation, maintenance and erection Manuals in English along with the copies of approved drawings and type test reports etc. sets of the manuals as above shall be supplied to the Executive Engineer, DPT. A three set soft copy of the all Technical compendium, Test Reports and Drawing furnished in a CD/DVD.

➤ **NAME PLATE:**

Each RMU and its associated equipments shall be provided with a nameplate legible and indelibly marked with at least the following information.

Name of manufacturer

Type,

Serial number

Voltage Current

Frequency

Symmetrical breaking capacity

Making capacity

Short time current and its duration

Purchase Order number and date  
Month and Year of supply

### TRAINING

All successful Tenderers shall provide training to operational Staff and Engineers of DPT. The training shall be for not less than one week. Boarding, lodging and traveling expenses for the deputed trainer will be borne by the Contractor. Training to be given to the following staff of DPA.

- 1) Engineers - 5 Nos.
- 2) Forman - 5 Nos.
- 3) Electrician & Helpers - 10 Nos.

### 1. Technical Specification No. 01 for Item No. 1(a)

This includes supply of 11 KV, 630Amp, Indoor Compact Switchgear (Gas Insulated), Extensible on One Side, Motor Driven Spring Charging having 06 nos. Circuit Breaker Modules mentioned as under:

- **Module No. 01 & 02** as 11KV Incomer with Metering Facility along with PT and Electrically & Mechanically interlocked.
- **Module No. 03, 04** as 11KV outgoing feeders.
- **Module 05, 06** for 11/0.433 KV distribution transformers.

The Circuit breaker module shall be supplied with three position isolator/earthing switch, bus bars, interlocking, earth bar and stored spring energy mechanism.

Qty.	Details of Module No. 1 & 2
1	Stored energy mech. For manual and Motor Driven Spring Charged operation
1	PT for incomer for metering purpose , 11KV/110 v Class 0.5s
1	Multifunction meter.
1	Energy Meter (CT Operated) including provision n fixing of CT with 2..5VA & accuracy class 0.5S in both incomer
1	circuit breaker 12kV, 630A
1	Control voltage, trip coil 24 V DC
1	Protection system: - Relay make & Type: - REF615 of ABB or equivalent of latest version of ABB or Siemens as directed by EIC with provision of external DC Power supply with 1 Hr. backup facility.
1	Set of 03nos. Ring Core Protection CTs having ratio 300-200/1-1, 5VA, 5P10 (considering the cable-size less than or equal to 3Cx 300 sq. mm HT XLPE cable )
1	Breaker ON(red)/OFF(green)/TRIP(amber) LED Indication
1	Capacitive voltage indication fixed type
1	Suitable Power Pack for Auxiliary DC Power supply for Relays

Qty.	Details of Module No. 03 & 04
1	Stored energy mech. for manual and Motor Driven Spring Charged operation

1	circuit breaker 12kV, 630A
1	Control voltage, trip coil 24 V DC
1	Protection system: - Relay make & Type: - REF615 of ABB or equivalent of latest version of ABB or Siemens as directed by EIC with provision of external DC Power supply with 1 Hr. backup facility.
1	Energy Meter (CT Operated) including provision n fixing of CT with 2..5VA & accuracy class 0.5S in all the feeder.
1	Set of 03nos. Ring Core Protection CTs having ratio 150-100/1-1, 2.5VA, 5P10 for Module No. 3,4,5,6 & Module No: 7, 8 having CT Ratio 150-100/1-1 5 VA, 5P10 (considering transformer rating of 1500kVA and cable-size less than or equal to 3Cx300sqmm)
1	Breaker ON(red)/OFF(green)/TRIP(amber) LED Indication
1	Capacitive voltage indication fixed type

Qty.	Details of Module No. 05 & 06
1	Stored energy mech. for manual and Motor Driven Spring Charged operation
1	Circuit breaker 12kV, 630A
1	Control voltage, trip coil 24 V DC
1	Protection system: - Relay make & Type: - REF615 of ABB or equivalent of latest version of ABB or Siemens as directed by EIC with provision of external DC Power supply with 1 Hr. backup facility.
1	Energy Meter (CT Operated) including provision n fixing of CT with 2..5VA & accuracy class 0.5S in all the feeder.
1	Set of 03nos. Ring Core Protection CTs having ratio 150-100/1-1, 2.5VA, 5P10 (considering X'mer rating of 1500kVA and cable-size less than or equal to 3Cx300sqmm)
1	Set of Transformer Protection Annunciation Scheme comprising of: 01no. Master Trip Relay (24VDC) 06no. Aux. Relays (24VDC) 01no. 8-Window Annunciator & Hotter Suitable for providing facility for Buccholz/OTI/WTI Alarm/Trip Indication,
1	Breaker ON(red)/OFF(green)/TRIP(amber) LED Indication
1	Capacitive voltage indication fixed type
1	Suitable Power Pack for Auxiliary DC Power supply for Electro-Mechanical Aux Relays and Master Trip Relays

**In addition to above following material to be supplied by Contractor for each panel.**

Qty.	Material to be Supplied by Contractor with each panel
08	Set of Terminal Protector boots for covering cable-termination.
1	Manometer installed on RMU for Gas Pressure indication.
2	Operating handle

The cable entry shall be from bottom and the end terminations shall be done on front side. The separate CBCT shall be provided in the entry of each phase.

**Technical Specification No. 01 for Item No. 1(b)**

This includes supply of 11 KV, 630Amp, Indoor Compact Switchgear (Gas Insulated), Extensible on One Side, Motor Driven Spring Charging having 04 nos. Circuit Breaker Modules mentioned as under:

- **Module No. 01 & 02** as 11KV Incomer with Metering Facility along with PT and Electrically & Mechanically interlocked.
- **Module 03 & 04** for 11/0.433 KV distribution transformers.

The Circuit breaker module shall be supplied with three position isolator/earthing switch, bus bars, interlocking, earth bar and stored spring energy mechanism.

Qty.	Details of Module No. 1 & 2
1	Stored energy mech. For manual and Motor Driven Spring Charged operation
1	PT for incomer for metering purpose , 11KV/110 v Class 0.5s
1	Multifunction meter.
1	Energy Meter (CT Operated) including provision n fixing of CT with 2..5VA & accuracy class 0.5S in both incomer
1	circuit breaker 12kV, 630A
1	Control voltage, trip coil 24 V DC
1	Protection system: - - Relay make & Type: - REF615 of ABB or equivalent of latest version of ABB or Siemens as directed by EIC with provision of external DC Power supply with 1 Hr. backup facility.
1	Set of 03nos. Ring Core Protection CTs having ratio 300-200/1-1, 5VA, 5P10 (considering the cable-size less than or equal to 3Cx 300 sq. mm HT XLPE cable )
1	Breaker ON(red)/OFF(green)/TRIP(amber) LED Indication
1	Capacitive voltage indication fixed type
1	Suitable Power Pack for Auxiliary DC Power supply for Relays

Qty.	Details of Module No. 03 & 04.
1	Stored energy mech. for manual and Motor Driven Spring Charged operation
1	Circuit breaker 12kV, 630A
1	Control voltage, trip coil 24 V DC
1	Protection system: - - Relay make & Type: - REF615 of ABB or equivalent of latest version of ABB or Siemens as directed by EIC with provision of external DC Power supply with 1 Hr. backup facility.
1	Energy Meter (CT Operated) including provision n fixing of CT with 2..5VA & accuracy class 0.5S in all the feeder.
1	Set of 03nos. Ring Core Protection CTs having ratio 150-100/1-1, 2.5VA, 5P10 (considering X'mer rating of 1500kVA and cable-size less than or equal to 3Cx300sqmm)
1	Set of Transformer Protection Annunciation Scheme comprising of: 01no. Master Trip Relay (24VDC) 06no. Aux. Relays (24VDC)

	01no. 8-Window Annunciator & Hotter Suitable for providing facility for Buccholz/OTI/WTI Alarm/Trip Indication,
1	Breaker ON(red)/OFF(green)/TRIP(amber) LED Indication
1	Capacitive voltage indication fixed type
1	Suitable Power Pack for Auxiliary DC Power supply for Electro-Mechanical Aux Relays and Master Trip Relays

**In addition to above following material to be supplied by Contractor for each panel.**

Qty.	Material to be Supplied by Contractor with each panel
04	Set of Terminal Protector boots for covering cable-termination.
1	Manometer installed on RMU for Gas Pressure indication.
2	Operating handle

The cable entry shall be from bottom and the end terminations shall be done on front side. The separate CBCT shall be provided in the entry of each phase.

## **2. TECHNICAL SPECIFICATION FOR ITEM NO. 2.**

This includes installations, testing and commissioning of supplied RMU panel of 08 Modules & 06 Modules at Existing Electrical 11/0.433 KV Sub-Stations. After commissioning of supplied RMUs the existing system shall be removed and same should be deposited in Sub Division Store / main Store of DPT including loading unloading and transportation as directed by EIC.

All the RMU Panels application shall be erected by using suitable size of M.S. channel supplied & erected by contractor, as per each module approved foundation drawing) foundation bolts including grouting of the bolts of each Module RMU panel. Each RMU panel shall be connected with 2 separate and distinct Earthing.

After installation of RMU panels, necessary test and trial are to be carried out for proper functioning of safety, devices, relay etc. and before commissioning RMU Panel all the tests required under relent ISS and IEC – Rules 1956 shall be carried out and the result shall be in conformity with specifications and copies of test results shall be furnished to EIC. The Relay setting shall be done by Contractor according to connected load of each RMU outgoing panel and respectively the Relay setting of Incomer panels.

The works also include the supply & fixing the required length insulated Rubber Mat withstand capacity up to 22 KV, the Rubber Mat will be lay in such a way, near the panel operation of RMU. The rubber mat shall be ISI Marked.

The complete work shall be carried out as directed by E.I.C. The side cable fix/adaptor box wherever necessary/required shall be provided. If required, some alteration / modification is under the scope of contractor under instruction / direction EIC. The work includes all Labour & material required for installation & commissioning of RMU and shall be done as directed by E.I.C.

### **3. TECHNICAL SPECIFICATION FOR ITEM NO. 3.**

#### **Technical Specification for LT Distribution Panel.**

#### **3. Technical Specification No. 03 for Item No. 3(a):**

##### **20 Way (2 I/C, 1 Bus Coupler, 17 O/G)**

This includes design, supply at site 20 ways, 1000 Amps, LT Distribution cubical Panel suitable for 415 Volts, 3 $\phi$ , 4 wires, 50 Hz. AC supply system including all switchgears and internal wiring.

The panel shall be dust and vermin proof, free standing, compartmentalized made from 14 SWG, indoor type, and fabricated from CRCA sheet on robust angle iron frame painted with two coats of Zink rich primer paint and two coats of colour Pigmented epoxy paint shade NO.631 of IS: 5 before painting the panel, the surface treatment shall be carried out by 7-tank process including degreasing etc. The panel shall be painted with SIEMENS grey paint.

LT distribution panel shall have 3 nos. of The busbars shall be made of high conductivity aluminium alloy of E91E grade, Bus bar joints shall be complete with high tensile steel bolt and washers and nuts bus bar of 1000 Amp (Main bus on Incoming and 800 Amps for each outgoing feeder with half of the size for Neutral Bus) rating for three Phases and Half the size of Neutral including and PVC sleeving. All the bus bar shall be supported on hylem/epoxy insulator. The Bakelite sheet of 12 mm (Minimum) thickness shall be provided in side enclosure of panel and wherever it is found necessary under relevant IS specification and IER -1956 rules.

The panel shall be provided with metallic engraved/Radium film labels on front for identification of Incoming & Outgoing feeders.

The neoprene gaskets shall be provided on the periphery of the doors of all feeders.

The sleeved electrolytic copper busbars with epoxy insulators with Bakelite support and separators shall be provided with colour code.

The panel shall be complete in all respect with cable glands, lugs for incoming & outgoing cables and also shall be provided with 2 nos. of earthing terminals.

The panel shall be comprised with following accessories: -

#### **1). INCOMER FEEDERS**

##### **a) Main Incomer Feeders (2 nos.).**

The Main Incomer Feeder shall be provided with 2 nos. 800 Amps. 30 KA, 415 Volts Four Pole – MDO (Draw out type) ACBs (Air Circuit Breaker) with Microprocessor released over current, Short circuit and Earth fault relay for each feeder, with Shunt Trip & under Voltage Coil.

The Digital Multi-function Meter 1 No. for each feeder with LCD display shall be provided with parameters like KWH, MD, Voltages of each phase, Line current for each Phase, P.F of each Phase, P.F average, Instantaneous kW, Frequency & Date & Time.

The LED Indication lamps 6 nos. for R, Y, B, ON, OFF and trip indication shall be provided on each feeder.

The 3 nos. CTs having ratio of 800/5 Amps, class-1 tape wound, shall be provided for metering on each feeder and 4 nos. control fuses / neutral links are to be provided with each incomer & the control wiring shall be done with copper wire. Also ELR (Earth Leakage Relay with CBCT to in provided in both Incomer.

The Incomers shall be mechanically and electrically interlocked.

**b) Bus coupler Feeder: 1 No.**

The Bus Coupler shall be provided with 1 nos. 800 Amps, 30 KA. 415 Volts Four Pole – MDO (Draw out type) ACBs (Air Circuit Breaker) with Static Release Over current, Short circuit and instantaneous relay, with Shunt Trip & Under Voltage Coil.

The LED Indication lamps 3 nos. for ON, OFF and trip indication shall be provided on Bus Coupler feeder.

Control fuses and neutral links are to be provided with Bus Coupler & the control wiring shall be done with copper wire.

The Bus Coupler shall be mechanically and electrically interlocked.

**2) OUTGOING FEEDERS (17 Nos.):**

This type of Outgoing Feeders shall be provided with following.

- 02 nos. 400 Amps Panel Mounted SDFU (Switch Disconnecter Fuse Unit) suitable for 440V AC Application shall be with extended operating handle and door interlock & Padlock facility.
- 08 nos. 200 Amps Panel Mounted SDFU (Switch Disconnecter Fuse Unit) suitable for 440V AC Application shall be with extended operating handle and door interlock & Padlock facility.
- 07 nos. 250 Amps, 415 Volts, 10 KA breaking capacity Panel Mounted MCCB Microprocessor based for each feeder with extended rotary handle.

The LED Indication lamp 1 no. for ON indication shall be provided on each feeder. The control wiring & power wiring shall be done with cooper wire properly and the power wiring shall be brought up to the Power terminal block of suitable ampere capacity.

The panel shall be design, fabricated and supplied from manufactures having CPRI/ERDA type test certificate of similar capacity for not less than 3 years. Before manufacturing of the panel the drawing shall be submitted to DPA for approval All the material shall be used as per approved make list of DPA.



### **3. Technical Specification No. 03 for Item No. 3(b):**

#### **15 Way (2 I/C, 1 Bus Coupler, 12 O/G)**

This includes design, supply at site 15 ways, 1000 Amps, LT Distribution cubical Panel suitable for 415 Volts, 3 $\phi$ , 4 wires, 50 Hz. AC supply system including all switchgears and internal wiring.

The panel shall be dust and vermin proof, free standing, compartmentalized made from 14 SWG, indoor type, and fabricated from CRCA sheet on robust angle iron frame painted with two coats of Zink rich primer paint and two coats of colour Pigmented epoxy paint shade NO.631 of IS: 5 before painting the panel, the surface treatment shall be carried out by 7-tank process including degreasing etc. The panel shall be painted with SIEMENS grey paint.

LT distribution panel shall have 3 nos. of The busbars shall be made of high conductivity aluminium alloy of E91E grade, Bus bar joints shall be complete with high tensile steel bolt and washers and nuts bus bar of 1000 Amp (Main bus on Incoming and 800 Amps for each outgoing feeder with half of the size for Neutral Bus) rating for three Phases and Half the size of Neutral including and PVC sleeving. All the bus bar shall be supported on hylem/epoxy insulator. The Bakelite sheet of 12 mm (Minimum) thickness shall be provided in side enclosure of panel and wherever it is found necessary under relevant IS specification and IER -1956 rules.

The panel shall be provided with metallic engraved/Radium film labels on front for identification of Incoming & Outgoing feeders.

The neoprene gaskets shall be provided on the periphery of the doors of all feeders.

The sleeved electrolytic copper busbars with epoxy insulators with Bakelite support and separators shall be provided with colour code.

The panel shall be complete in all respect with cable glands, lugs for incoming & outgoing cables and also shall be provided with 2 nos. of earthing terminals.

The panel shall be comprised with following accessories: -

#### **1). INCOMER FEEDERS**

##### **a) Main Incomer Feeders (2 nos.).**

The Main Incomer Feeder shall be provided with 2 nos. 800 Amps. 30 KA, 415 Volts Four Pole – MDO (Draw out type) ACBs (Air Circuit Breaker) with Microprocessor released over current, Short circuit and Earth fault relay for each feeder, with Shunt Trip & under Voltage Coil.

The Digital Multi-function Meter 1 No. for each feeder with LCD display shall be provided with parameters like KWH, MD, Voltages of each phase, Line current for each Phase, P.F of each Phase, P.F average, Instantaneous kW, Frequency & Date & Time.

The LED Indication lamps 6 nos. for R, Y, B, ON, OFF and trip indication shall be provided on each feeder.

The 3 nos. CTs having ratio of 800/5 Amps, class-1 tape wound, shall be provided for metering on each feeder and 4 nos. control fuses / neutral links are to be provided with each incomer & the control wiring shall be done with copper wire. Also ELR (Earth Leakage Relay with CBCT to in provided in both Incomer.

The Incomers shall be mechanically and electrically interlocked.

**b) Bus coupler Feeder: 1 No.**

The Bus Coupler shall be provided with 1 nos. 800 Amps, 30 KA. 415 Volts Four Pole – MDO (Draw out type) ACBs (Air Circuit Breaker) with Static Release Over current, Short circuit and instantaneous relay, with Shunt Trip & Under Voltage Coil.

The LED Indication lamps 3 nos. for ON, OFF and trip indication shall be provided on Bus Coupler feeder.

Control fuses and neutral links are to be provided with Bus Coupler & the control wiring shall be done with copper wire.

The Bus Coupler shall be mechanically and electrically interlocked.

**2) OUTGOING FEEDERS (12 Nos.):**

This type of Outgoing Feeders shall be provided with following.

- 02 nos. 400 Amps Panel Mounted SDFU (Switch Disconnecter Fuse Unit) suitable for 440V AC Application shall be with extended operating handle and door interlock & Padlock facility.
- 05 nos. 200 Amps Panel Mounted SDFU (Switch Disconnecter Fuse Unit) suitable for 440V AC Application shall be with extended operating handle and door interlock & Padlock facility.
- 05 nos. 250 Amps, 415 Volts, 10 KA breaking capacity Panel Mounted MCCB Microprocessor based for each feeder with extended rotary handle.

The LED Indication lamp 1 no. for ON indication shall be provided on each feeder. The control wiring & power wiring shall be done with cooper wire properly and the power wiring shall be brought up to the Power terminal block of suitable ampere capacity.

The panel shall be design, fabricated and supplied from manufactures having CPRI/ERDA type test certificate of similar capacity for not less than 3 years. Before manufacturing of the panel the drawing shall be submitted to DPA for approval All the material shall be used as per approved make list of DPA.

### **3. Technical Specification No. 03 for Item No. 3(c):**

#### **10 Way (2 I/C, 1 Bus Coupler, 7 O/G)**

This includes design, supply at site 10 ways, 1000 Amps, LT Distribution cubical Panel suitable for 415 Volts, 3 $\phi$ , 4 wires, 50 Hz. AC supply system including all switchgears and internal wiring.

The panel shall be dust and vermin proof, free standing, compartmentalized made from 14 SWG, indoor type, and fabricated from CRCA sheet on robust angle iron frame painted with two coats of Zink rich primer paint and two coats of colour Pigmented epoxy paint shade NO.631 of IS: 5 before painting the panel, the surface treatment shall be carried out by 7-tank process including degreasing etc. The panel shall be painted with SIEMENS grey paint.

LT distribution panel shall have 3 nos. of The busbars shall be made of high conductivity aluminium alloy of E91E grade, Bus bar joints shall be complete with high tensile steel bolt and washers and nuts bus bar of 1000 Amp (Main bus on Incoming and 800 Amps for each outgoing feeder with half of the size for Neutral Bus) rating for three Phases and Half the size of Neutral including and PVC sleeving. All the bus bar shall be supported on hylem/epoxy insulator. The Bakelite sheet of 12 mm (Minimum) thickness shall be provided in side enclosure of panel and wherever it is found necessary under relevant IS specification and IER -1956 rules.

The panel shall be provided with metallic engraved/Radium film labels on front for identification of Incoming & Outgoing feeders.

The neoprene gaskets shall be provided on the periphery of the doors of all feeders.

The sleeved electrolytic copper busbars with epoxy insulators with Bakelite support and separators shall be provided with colour code.

The panel shall be complete in all respect with cable glands, lugs for incoming & outgoing cables and also shall be provided with 2 nos. of earthing terminals.

The panel shall be comprised with following accessories: -

#### **1). INCOMER FEEDERS**

##### **a) Main Incomer Feeders (2 nos.).**

The Main Incomer Feeder shall be provided with 2 nos. 800 Amps. 30 KA, 415 Volts Four Pole – MDO (Draw out type) ACBs (Air Circuit Breaker) with Microprocessor released over current, Short circuit and Earth fault relay for each feeder, with Shunt Trip & under Voltage Coil.

The Digital Multi-function Meter 1 No. for each feeder with LCD display shall be provided with parameters like KWH, MD, Voltages of each phase, Line current for each Phase, P.F of each Phase, P.F average, Instantaneous kW, Frequency & Date & Time.

The LED Indication lamps 6 nos. for R, Y, B, ON, OFF and trip indication shall be provided on each feeder.

The 3 nos. CTs having ratio of 800/5 Amps, class-1 tape wound, shall be provided for metering on each feeder and 4 nos. control fuses / neutral links are to be provided with each incomer & the control wiring shall be done with copper wire. Also ELR (Earth Leakage Relay with CBCT to in provided in both Incomer.

The Incomers shall be mechanically and electrically interlocked.

**b) Bus coupler Feeder: 1 No.**

The Bus Coupler shall be provided with 1 nos. 800 Amps, 30 KA. 415 Volts Four Pole – MDO (Draw out type) ACBs (Air Circuit Breaker) with Static Release Over current, Short circuit and instantaneous relay, with Shunt Trip & Under Voltage Coil.

The LED Indication lamps 3 nos. for ON, OFF and trip indication shall be provided on Bus Coupler feeder.

Control fuses and neutral links are to be provided with Bus Coupler & the control wiring shall be done with copper wire.

The Bus Coupler shall be mechanically and electrically interlocked.

**2) OUTGOING FEEDERS (7 Nos.):**

This type of Outgoing Feeders shall be provided with following.

- 07 nos. 200 Amps Panel Mounted SDFU (Switch Disconnect Fuse Unit) suitable for 440V AC Application shall be with extended operating handle and door interlock & Padlock facility.

The LED Indication lamp 1 no. for ON indication shall be provided on each feeder. The control wiring & power wiring shall be done with cooper wire properly and the power wiring shall be brought up to the Power terminal block of suitable ampere capacity.

The panel shall be design, fabricated and supplied from manufactures having CPRI/ERDA type test certificate of similar capacity for not less than 3 years. Before manufacturing of the panel the drawing shall be submitted to DPA for approval All the material shall be used as per approved make list of DPA.

**3. Technical Specification No. 03 for Item No. 3(d):**

**8 Way (2 I/C, 1 Bus Coupler, 7 (O/G)**

This includes design, supply at site 08 ways, 1000 Amps, LT Distribution cubical Panel suitable for 415 Volts, 3 $\phi$ , 4 wires, 50 Hz. AC supply system including all switchgears and internal wiring.

The panel shall be dust and vermin proof, free standing, compartmentalized made from 14 SWG, indoor type, and fabricated from CRCA sheet on robust angle iron frame

painted with two coats of Zinc rich primer paint and two coats of colour Pigmented epoxy paint shade NO.631 of IS: 5 before painting the panel, the surface treatment shall be carried out by 7-tank process including degreasing etc. The panel shall be painted with SIEMENS grey paint.

LT distribution panel shall have 3 nos. of The busbars shall be made of high conductivity aluminium alloy of E91E grade, Bus bar joints shall be complete with high tensile steel bolt and washers and nuts bus bar of 1000 Amp (Main bus on Incoming and 800 Amps for each outgoing feeder with half of the size for Neutral Bus) rating for three Phases and Half the size of Neutral including and PVC sleeving. All the bus bar shall be supported on hylem/epoxy insulator. The Bakelite sheet of 12 mm (Minimum) thickness shall be provided in side enclosure of panel and wherever it is found necessary under relevant IS specification and IER -1956 rules.

The panel shall be provided with metallic engraved/Radium film labels on front for identification of Incoming & Outgoing feeders.

The neoprene gaskets shall be provided on the periphery of the doors of all feeders. The sleeved electrolytic copper busbars with epoxy insulators with Bakelite support and separators shall be provided with colour code.

The panel shall be complete in all respect with cable glands, lugs for incoming & outgoing cables and also shall be provided with 2 nos. of earthing terminals.

The panel shall be comprised with following accessories: -

### **1). INCOMER FEEDERS**

#### **a) Main Incomer Feeders (2 nos.).**

The Main Incomer Feeder shall be provided with 2 nos. 800 Amps. 30 KA, 415 Volts Four Pole – MDO (Draw out type) ACBs (Air Circuit Breaker) with Microprocessor released over current, Short circuit and Earth fault relay for each feeder, with Shunt Trip & under Voltage Coil.

The Digital Multi-function Meter 1 No. for each feeder with LCD display shall be provided with parameters like KWH, MD, Voltages of each phase, Line current for each Phase, P.F of each Phase, P.F average, Instantaneous kW, Frequency & Date & Time.

The LED Indication lamps 6 nos. for R, Y, B, ON, OFF and trip indication shall be provided on each feeder.

The 3 nos. CTs having ratio of 800/5 Amps, class-1 tape wound, shall be provided for metering on each feeder and 4 nos. control fuses / neutral links are to be provided with each incomer & the control wiring shall be done with copper wire. Also ELR (Earth Leakage Relay with CBCT to in provided in both Incomer.

The Incomers shall be mechanically and electrically interlocked.

**b) Bus coupler Feeder: 1 No.**

The Bus Coupler shall be provided with 1 nos. 800 Amps, 30 KA. 415 Volts Four Pole – MDO (Draw out type) ACBs (Air Circuit Breaker) with Static Release Over current, Short circuit and instantaneous relay, with Shunt Trip & Under Voltage Coil.

The LED Indication lamps 3 nos. for ON, OFF and trip indication shall be provided on Bus Coupler feeder.

Control fuses and neutral links are to be provided with Bus Coupler & the control wiring shall be done with copper wire.

The Bus Coupler shall be mechanically and electrically interlocked.

**2) OUTGOING FEEDERS (5 Nos.):**

This type of Outgoing Feeders shall be provided with following.

- 05 nos. 200 Amps Panel Mounted SDFU (Switch Disconnect Fuse Unit) suitable for 440V AC Application shall be with extended operating handle and door interlock & Padlock facility.

The LED Indication lamp 1 no. for ON indication shall be provided on each feeder. The control wiring & power wiring shall be done with copper wire properly and the power wiring shall be brought up to the Power terminal block of suitable ampere capacity.

The panel shall be design, fabricated and supplied from manufactures having CPRI/ERDA type test certificate of similar capacity for not less than 3 years. Before manufacturing of the panel the drawing shall be submitted to DPA for approval All the material shall be used as per approved make list of DPA.

**4. TECHNICAL SPECIFICATION FOR ITEM NO. 4.**

This works includes preparation of foundation and installation, Testing & commissioning, Termination of cable in supplied LT Distribution panel at various location S/s or as per directed by EIC.

Distribution board shall be equipped with base frames made of structural steel sections along with necessary mounting hardware required for bolting/welding down the base frame to the foundation. The contractor will provide plate in the concrete floor. Floor finishing will be done at a later date, hence door/module door/removable covers shall be suitably placed so that finished floor does not obstruct the movement of such doors/covers etc.

If underground trench id not available in any substation then contractor has to prepared MS platform using suitable size of C Channel, MS Angle, MS strips etc. platform shall be 800 to 1000 mm above the ground level so that cable can easily bend & terminate in the RMUs. About 1 to 1.25 meter of platform also be made at front side to RMU panel for operation and maintenance of RMUs.

All alignment, leveling, grouting, anchoring, adjustments shall be carried out in accordance with manufacturer's instruction and/or as directed by the engineer-in-charge. All connections in distribution panel shall be completed, checked and adjusted to ensure safety and satisfactory operation of the equipment. After installation of Distribution Panel testing and commissioning, Termination, Jointing the cable shall be done as directed by Engineer in charge, material shall be used as per approved make list DPA. same should be deposited in Store as directed by EIC.

**5. TECHNICAL SPECIFICATION FOR ITEM NO. 5.**

Supply of 11/0.433 KV indoor type level 1 distribution transformer of following ratings.

- |                                |                                      |
|--------------------------------|--------------------------------------|
| 1. Rating                      | : 1000 KVA, 500 KVA & 250 KVA        |
| 2. Voltage Ratio               | : 11/0.433 KV                        |
| 3. Frequency                   | : 50 Hz.                             |
| 4. Impedance                   | : ≤ 5%                               |
| 5. Vector Group                | : Dyn-11                             |
| 6. Type of cooling             | : ONAN (Oil Immersed)                |
| 7. Tapping Range/steps         | : - 5 % to 12.5 % in steps of 2.5 %  |
| 8. Tap Changer                 |                                      |
| For 1000 KVA                   | : On-Load Tap Changer                |
| For 500 & 250 KVA              | : Off-Load Tap Changer               |
| 9. Temperature Rise (Oil/wdg.) | : 40/45 Degree centigrade            |
| 10. Terminations               |                                      |
| HV                             | : Cable Box                          |
| LV                             | : Cable Box                          |
| 11. Fittings                   | : As per enclosed list of Annexure-I |
| 12. Paint                      | : Epoxy Shade 632                    |

**Annexure - I**

1. Rating and Diagram Plate
2. 2 Nos. Earthing Terminals
3. Lifting Lugs for main tank and for all items to be handled independently
4. Drain cum filter Valve with Plug at Bottom
5. Filter valve with plug at Top
6. 6" Dial type oil thermometer with 2 contacts
7. 6" Dial type winding thermometer with 2 contacts
8. Conservator with oil filling hole with cap and drain plug
9. Silica Gel Breather
10. Air release plug
11. Off Circuit externally operated tapping switch position indicator, handle and locking device for - 5% to 12.5% voltage variation in steps of 2.5%
12. 3 Nos. Thermometer pockets
13. Explosion vent with Double Diaphragm and oil sight Glass
14. Radiator bank mounted on tank complete with Air Release Plug Drain Plug and isolating valves at points of connection with tank

15. 4 Nos. Bidirectional flat rollers
16. Marshalling Box
17. 1 No. Buchholz relay with A/T contacts with shut off valve

**TERMINATIONS:**

HV: Cable box to receive 1 no. 3 core suitable size of 11 KV XLPE cable

LV: Cable box to receive suitable nos. and size of 1.1 KV grade armoured cables

Orientation: 180 Degree, H.V. cable box to L.V. cable box

Neutral terminal shall be brought out for solid earthing.

**NOTES:**

1. Lugs Glands termination kits are in your scope of supply.
2. PAINT: The transformers shall be painted as under:
  - a) Internally with oil resisting varnish paint
  - b) Externally with 1 coat zinc chromate followed by two coats of epoxy paint shade 632 if IS-5.
3. Following routing tests as per IS shall be carried out during inspection of transformer at your works.
  - Winding Resistance Measurement Test
  - No Load Loss Measurement Test
  - Full Load Loss Measurement Test
  - Separate Source Voltage Test
  - Insulation Resistance Test
  - Turns Ratio Test
  - Polarity Phase Relationship Test
  - Breakdown Value Test (Die Electric Strength test) of Transformer Oil.
  - Impedance Voltage of Transformer
  - Heat run test will be carried out for the transformer having higher Full Load losses.
4. Yours scope of supply is limited to Design, Engineering Manufacture, Assembly, Testing, Packing and Forwarding and delivery of transformer complete with all fittings and accessories.
5. The make of transformer shall be as mentioned below.  
EMCO/KIRLOSKAR/PATSON/VOLTAMP/ABB/Schneider/ T&R

**6. TECHNICAL SPECIFICATION FOR ITEM NO. 6.**

Erection, Testing and Commissioning of supplied 1000 KVA, 11/0.433 KV, 500 KVA 11/0.433, 250 KVA, 11/0.433 KV indoor type distribution transformers at site including transformer foundation and civil work. All cable termination in both HV & LV side including termination at LT panels as well as earthing of transformer as per IER. If any alteration/modification required is in the scope of contractor. The work includes all material, tools, equipment and labour.

In placement of old existing transformers of eleven nos. the total new transformers will be eleven. The old transformers are to be shifted at main store safely as per direction of EIC.



This Work Includes Disconnect, Dismanting, Shifting of Existing Transformers. Removal of existing MS channels by demolition of concrete floor. Supply and grounding of new channels/rails of suitable size as per the foundation plan of new transformer. Necessary locking arrangement for transformer wheels shall be ensured. Any civil works to be carried out to match existing system with transformer LV terminal box shall be entirely in contractor's scope.

Removing of existing neutral and body earthing of the transformer as directed.

**7. TECHNICAL SPECIFICATION FOR ITEM NO. 7.**

This includes supply of 11 KV (UE), 3 C X 150 Sq. mm., Stranded Compact circular Aluminium Conductor, Conductor Screen with Extruded Semiconducting compound, XLPE insulated, insulation screening with extruded semiconducting compound in combination with copper tape (0.2 KA for 1 sec/ Core), cores laid up inner sheath of PVC Tape, galvanized flat steel strip armoured & overall PVC sheathed cable confirming to IS 7098/(Part-II) 2011 with latest amendments. Make of cable shall be POLYCAB/TORRENT/RPG ASIAN/ NICCO/GLOSTER/ UNISTAR/ UNIVERSAL / RAVIN-PRIME CAB

**8. TECHNICAL SPECIFICATION FOR ITEM NO. 8.**

This includes supply at site 1.1 KV grade, 4 core X 150 sq.mm aluminum conductor, XLPE insulated armoured cable confirming to IS: 7098 (Part-I) 1985 with up to date amendments and of approved make with ISI mark. The manufacturer shall produce TYPE TEST certificate with similar size of cable, which shall not be more than 3 years old. The cable shall have marking/embossing at the interval of every meter showing its progressive length. During the cable inspection, the manufacturer shall show the relevant ROUTINE TESTS to inspecting authority or otherwise the manufacturer shall produce the routine test certificate during supply of cable at site.

**9. TECHNICAL SPECIFICATION FOR ITEM NO. 9.**

This includes laying of cable 3C X 150 Sq. mm. 11 KV HT XLPE Cable / LT Cable (Supplied by DPA) in existing trench/route with all required material & labour as per direction of Engineer In-Charge. Laying of cables shall be as follows as per site requirement and as directed by EIC.

- Through Hard / Soft Soil excavation including of laying of Half Round Pipe (2 Nos.) 6" inner Diameter and 1 Meter length.
- Through existing Cable Trench which includes cleaning the entire trench and removal of old detreated cables.
- On wall by providing suitable size of saddles at every 0.5 mtr.

**10. TECHNICAL SPECIFICATION FOR ITEM NO. 10.**

This includes Laying of HT/LT XLPE cable by putting suitable diameter Double Wall Corrugated HDPE pipe, through road/Rail/RCC crossing. If the Road/RCC crossing length more than length of DWC HDPE seamless pipe, then the firm shall join pipes and make a strong and trouble free connection so that pushing and pulling of cable

within such pipes is unaffected and fuss free & then lay across the Road crossing. Single cable shall be passed through one pipe, the excavated stuff shall be disposed off from the Site of work and spread in low laying area. After that re-filling with Fresh River sand cushioning & 300mm CC/RMC work must be done on by proper curing or its restoration to original position. In case of Rail Crossing, firm shall put earthing across rail track, both end, their own cost as per IE rule & act. The DWC HDPE pipe should be laid using Horizontal Boring for all the Road/Railway/RCC crossings.

The Contractor may visit the site and asses the actual site situation.

Cable lying, which shall include the route marker, cable tagging, dressing, removing the old unused cable from the RCC Trench, appropriate size of glands & ferrule work as per requirement etc.

#### **11. TECHNICAL SPECIFICATION FOR ITEM NO. 11.**

##### **(a) 3 C X 150 sq.mm (Indoor type end termination kit)**

This includes supply of heat shrinkable indoor end termination suitable for 3 core X 150 Sq.mm HT 11 KV XLPE Cables including providing fixing of Aluminum Solder less lugs for HT switchgears and copper lugs for transformer of suitable size with all required materials. The heat shrinkable indoor end termination kit shall of approved make.

##### **(b) 3 C X 150 sq.mm (Indoor type end termination kit)**

This includes supply of heat shrinkable outdoor end termination suitable for 3 core X 150 Sq.mm HT 11 KV XLPE Cables including providing fixing of Aluminum Solder less lugs for HT switchgears and copper lugs for transformer of suitable size with all required materials. The heat shrinkable indoor end termination kit shall of approved make.

##### **(c) 3 C X 150 sq.mm (Straight through)**

This includes supply of heat shrinkable Straight through joint suitable for 3 core X 150 Sq.mm HT 11 KV XLPE Cables, including providing of Aluminium Solder less ferrules of suitable size with all required materials. The straight through joint kit shall of approved

#### **12. TECHNICAL SPECIFICATION FOR ITEM NO. 12.**

##### **(a) 3 C X 150 sq.mm (Indoor type end termination kit)**

This includes fixing of heat shrinkable indoor end termination suitable for 3 core X 150 HT 11 KV XLPE Cables including fixing of Aluminum Solder less lugs for HT switchgears and copper lugs for transformer of suitable size with all required materials. The work includes all labour, tools tackles and necessary fabrication work on gland plate of the panel if required as directed by Engineer-in-Charge.

##### **(b) 3 C X 150 sq.mm (Outdoor type end termination kit)**

This includes fixing of heat shrinkable outdoor end termination suitable for 3 core X 150 HT 11 KV XLPE Cables including fixing of Aluminum Solder less lugs for HT switchgears and copper lugs for transformer of suitable size with all required

materials. The work includes all labour, tools tackles and necessary fabrication work on gland plate of the panel if required as directed by Engineer-in-Charge.

**(C) 3 C X 150 sq.mm (Straight through)**

This includes fixing of heat shrinkable Straight through joint suitable for 3 core X 150 Sq.mm HT 11 KV XLPE Cables, including fixing of Aluminum Solder less ferrules of suitable size with all required materials. The work includes all labour, tools tackles, and necessary excavation in soft soil/removal for RCC trench cover and re-fixing of the same if required as directed by Engineer-in-Charge.

**13. TECHNICAL SPECIFICATION FOR ITEM NO. 13.**

**(a) 4 C X 150 sq.mm (Indoor type end termination kit)** This includes providing of Heat shrink indoor end terminations to 4 core X 150 sq. mm LT 1.1 KV grade XLPE Cables, including providing of Aluminum Solder less Lugs & glands of suitable size with all required materials. The indoor heat shrink end terminations kit shall of approved make.

**(b) 4 C X 150 sq.mm (Outdoor type end termination kit)**

This includes providing of Heat Shrink Outdoor end terminations to 4 core X 150 sq. mm LT 1.1 KV grade XLPE Cables, including providing of Aluminum Solder less Lugs & glands of suitable size with all required materials. The indoor heat shrink end terminations kit shall of approved make.

**(c) 4 C X 150 sq.mm (Straight through)**

This includes providing of Heat Shrinkable Straight through joint to 4 core X 150 sq.mm LT 1.1 KV XLPE Cables, including providing Aluminum Solder less ferrules of suitable size with all required materials. The heat shrinkable straight through joint kit shall of approved make.

**14. TECHNICAL SPECIFICATION FOR ITEM NO. 14.**

**(a) 3 C X 150 sq.mm (Indoor type end termination kit)**

This includes fixing of Heat shrink indoor end terminations to 4 core X 150 sq.mm LT 1.1 KV grade XLPE Cables, including fixing of Aluminum Solder less Lugs & glands of suitable size with all required materials. The work includes all labour, tools tackles and necessary fabrication work on gland plate of the panel if required as directed by Engineer-in-Charge.

**(b) 3 C X 150 sq.mm (Outdoor type end termination kit)**

This includes fixing of Heat shrink outdoor end terminations to 4 core X 150 sq.mm LT 1.1 KV grade XLPE Cables, including fixing of Aluminum Solder less Lugs & glands of suitable size with all required materials. The work includes all labour, tools tackles and necessary fabrication work on Double Pole/Four Pole structure if required as directed by Engineer-in-Charge.

**(c) 3 C X 150 sq.mm (Straight through)**

This includes fixing of Heat Shrinkable Straight through joint to 4 core X 150 sq.mm LT 1.1 KV XLPE Cables, including providing fixing of Aluminum Solder less ferrules of suitable size with all required materials. The work includes all labour, tools tackles and

necessary excavation in soft soil/removal for RCC trench cover and re-fixing of the same if required as directed by Engineer-in-Charge.

**15. TECHNICAL SPECIFICATION FOR ITEM NO. 15.**

This includes supply of 1.1 KV, 10 core, 2.5 sq.mm, copper conductor, PVC insulated armoured control cable of relevant IS. This also includes laying of control cable from Transformer control panel of relevant RMU panel. Laying of cable shall be in duct, on wall as per the site requirement.

**16. TECHNICAL SPECIFICATION FOR ITEM NO. 16.**

This includes preparation of earth station with chemical treated back filled compound 25 mm Dia. copper coated solid rod, having minimum 250 micron copper coating, its base material is MS, depth should be Type 3 Mtr. Depth, Maintenance free including all accessories & Masonry work Enclosure with cover plate. The value of earth pit shall be less than  $5\Omega$ .

A cement concrete (ratio 1:4:8) chamber of at least 30 Cm. x 30 Cm. shall be provided just below the surface of ground and having RCC/CI cover of suitable size as directed. This also includes removal of extra-excavated earth from the site. Marking, painting on each earth pits with date & resistance value on pits. The work shall be carried out to entire satisfaction of Engineer-in-charge. This work includes all labour and material as directed by Engineer-in-Charge.

The back filled compound must be as per IEC -62561-7 and electrode IEC -62561-2, in this regard firm shall submit the test report and also submit the self restively Test report. self-resistivity must be 0.12-ohm meter.

**17. TECHNICAL SPECIFICATION FOR ITEM NO. 17.**

This includes supply at site copper strip of size 50x5 mm for earthing from earth station/existing earthing system to Distribution/Power Transformer, Generator, Alternator etc. as directed.

0.12-ohm meter.

**18. TECHNICAL SPECIFICATION FOR ITEM NO. 18.**

This includes supply at site of G.I strip of size 50x6 mm for earthing from earth station/existing earthing system to H.T/L.T. panel, H.T/L.T switchgears, Power/Distribution transformer etc. as directed.

**19. TECHNICAL SPECIFICATION FOR ITEM NO. 19.**

This includes supply at site, laying, fixing and connecting of copper strip of size 50x5 mm from earth station/existing earthing system to Distribution/Power Transformer, Generator, Alternator etc. as directed. The copper strip also shall be laid from earth station to Distribution/Power Transformer, Generator, Alternator etc. as directed and shall be clamped suitably on wall/floor or buried in the ground / pucca trench as directed.

This includes supply at site, laying, fixing and connecting of G.I strip of size 50x6 mm from earth station/existing earthing system to H.T/L.T. panel, H.T/L.T switchgears,

Power/Distribution transformer etc. as directed. The G.I strip also shall be laid from earth station to HT/LT switch gears & transformers etc. directly connected to two separate and distinct main earth as directed and shall be clamped suitably on wall/floor or buried in the ground / pucca trench as directed.

**20. TECHNICAL SPECIFICATION FOR ITEM NO. 20.**

This includes safely Disconnection, removal and shifting of old VCB Panels, LT Panels, cables, any other accessories from existing place to the allotted place at kandla as directed.

**Approved Make List for Electrical Items**

<b>Sr. No.</b>	<b>Description</b>	<b>Recommended Makes</b>
1	HT VCB	SIEMENS / CROMPTON GREAVES/ABB/Schneider
1(a)	HV Gas Insulated Breakers	SIEMENS /Schneider/ABB
2	POWER TRANSFORMERS	VOLTAMP/CROMPTON GREAVES /BHARAT BIJLEE/ BHEL/ SIEMENS/ ABB/ Schneider/T&R
3	DISTRIBUTION TRANSFORMERS	EMCO/KIRLOSKAR/PATSON/VOLTAMP/ ABB / Schneider / T&R
4	RESIN CAST TRANSFORMERS	
	A) RESIN CAST IMPREGNATED	VOLTAMP / KIRLOSKAR / EMCO
	B) DRY CAST	VOLTAMP/KIRLOSKAR/EMCO
5	HT XLPE CABLES	POLYCAB/TORRENT/RPG ASIAN/ /GLOSTER/ UNISTAR/ UNISTAR/KEI/FINOLEX/HAVELS
6	LT XLPE CABLES	POLYCAB/TORRENT/RPG ASIAN/ / RALLISON/PRIMECAB/ HAVELLS/ UNISTAR/AVOCAB / ADCAB
7	LT ACB	SIEMENS/L&T/SCHNEIDER/C&S
8	PROTECTION RELAYS	AREVA/L&T/SIEMENS/ABB/C&S
9	LT PANEL	CPRI APPROVED
10	CHANGE OVER SWITCH	SIEMENS/L&T/ABB/C&S/SCHNIDER/ LEGRAND / INDOASIAN
11	SFU FOR MAIN LT DISTRIBUTION PANELS	SIEMENS/L&T/ABB/C&S
12	SFU FOR DISTRIBUTION PANELS & FEEDER PILLERS	SIEMENS/L&T/ABB/C&S/ SCHNEIDER/ LEGRAND/ INDOASIAN/HAVELLS
13	MCCB FOR MAIN LT DISTRIBUTION PANELS	SIEMENS/L&T/ABB
14	MCCB FOR DISTRIBUTION PANELS AND FEEDER PILLERS	SIEMENS/L&T/ABB/C&S/ SCHNIDER/ LEGRAND/ INDOASIAN/HAVELLS
15	MCB/ELCB/RCCB/ RCCBO FOR MAIN LT DISTRIBUTION PANELS	SIEMENS/HAGER L&T/ABB
16	MCB FOR DISTRIBUTION PANELS AND FEEDER PILLERS	SIEMENS/L&T/ABB/C&S/ SCHNEIDER/ LEGRAND/ INDOASIAN/ HAVELLS/ STANDARD
17	MCB DISTRIBUTION BOARD	STANDARD / HENSEL/LEGRAND / INDOASIAN / HAVELLS

18	MULTI FUNCTION DIGITAL METER FOR MAIN LT DISTRIBUTION PANELS/DIGITAL KWH METERS	L&T/ENERCON/SECURE/L&G/ RISHABH
19	ANALOG VOLT/AMPARE METER FOR DISTRIBUTION PANELS AND FEEDER PILLERS	RISHABH/AE/ENERCON/L&T
20	SLECTOR SWITCH FOR VOLTMETER/AMPARE METER	L&T/SIEMENS/C&S
21	POWER CONTACTOR & OVER LOAD RELAYS	L&T/SIEMENS/ABB
22	QUARTZ TIME CLOCK SWITCH	L&T/INDOASIAN/SIEMENS
23	PVC WIRE WITH COPPER CONDUCTOR	RR KABEL / KEI / POLYCAB/MILEX/GUJCAB/ STANDARD / FINOLEX / ANCHOR
24	FLUSH TYPE SWITCHES, SOCKETS, HOLDERS AND CEILING ROSES & ELECTRONIC REGULATORS	ANCHOR/MK/NORTHWEST/VINAY /PANAMA / HAVELLS
25	DOOR BELLS/CALL BELLS	ANCHOR/LEGEND/MK/NORTHWEST
26	MODULAR SWITCHES, SOCKETS, PLATES & BOXES	ANCHOR / MK / NORTHWEST / LEGRAND /HAVELLS / INDOASIAN / SIMENS.
27	PVC CONDUIT/OVAL CONDUIT & CASSING CAPPING AND ACCESSORIES	PRECISION/VULCAN/FINOLEX/ GARWARE/ RESTOPLAST/ SWASTIK / BPI
28	GLS LAMPS & FLUORESCENT LAMPS	PHILIPS / BAJAJ / WIPRO / CROMPTON GREAVES / OSRAM / SURYA ROSHNI / GE
29	HPSV, HPMV & METAL HELIDE LAMPS	PHILIPS / BAJAJ / WIPRO / CROMPTON GREAVES / OSRAM / SURYA ROSHNI / GE
30	IGNITORS FOR HPSV, METAL HELIDE LAMPS	PHILIPS / BAJAJ / WIPRO / CROMPTON GREAVES / OSRAM / SURYA ROSHNI / GE
31	LUMINARIES	PHILIPS / BAJAJ / WIPRO / CROMPTON GREAVES / OSRAM / SURYA ROSHNI / GE/C&S
31a	LED LUMINARIES	Philips/Bajaj/Wipro/CG/Surya/Pyrotech/Syska/Nessa/C &S having surge Protection $\geq 10KV$ for fittings & internal Surge Protection for Driver of $\geq 4KV$ , LED Chip only OSRAM/CREE/Philips Lumileds/Citizen/ with LM-79,80 CERTIFICATION

32	CEILING FANS	BAJAJ/ORIENT/USHA/CROMPTON GREAVES / ALMONARD/GEC
33	WALL MOUNTING FANS	BAJAJ/ORIENT/USHA/CROMPTON GREAVES / ALMONARD/GEC
34	EXHUAUST FANS	BAJAJ/ORIENT/USHA/CROMPTON GREAVES / ALMONARD/GEC
35	HEAVY DUTY INDUSTRIAL WALL MOUNTING FANS	BAJAJ/ORIENT/USHA/CROMPTON GREAVES / ALMONARD/GEC or its equivalent
36	WATER COOLER	VOLTAS/SHRIRAM USHA/BLUE STAR
37	AIR CONDITIONERS	VOLTAS/CARRIER/BLUESTAR/USHA/ HITACHI/LG/ SAMSUNG/ONIDA
38	REFRIGERATORS	VOLTAS / CARRIER / BLUESTAR / USHA / HITACHI / LG / SAMSUNG / WHIRLPOOL
39	VOLTAGE STABILIZER	VEELINE / CAPRI
40	INVERTERS for General Purpose	LUMINOUS / MICROTEK /SUKAM
41	D.G. SETS	
	A) ENGINE	CUMMINS/GREAVES/KIRLOSKAR/ CATERPILLAR /ASHOK LEYLAND /VOLVO
	B) ALTERNATOR	STAMFORD/CROMPTON GREAVES /JYOTI/ KIRLOSKAR ELECTRIC
42	ELECTRIC MOTOR	ALSTOM/CROMPTON GREAVES /SIEMENS/ KIRLOSKAR/ABB
43	WATER PUMPS	SWASTIK / KSB
44	WATER GEYSER	BAJAJ/USHA / CROMPTON GREAVES / SPHEREHOT / RACOLD
45	LUGS & CABLE GLANDS	DOWELLS / JAINSON / BRACO
46	Solar Panels	LONGI / TRINA / GOLDI / VIKRAM / REWNYSIS / RAYZON / WAAREE or equivalent subject to submission of relevant documents of successful operation in various Government Organisations.
47	INVERTERS for Solar Power Plant	LUMINOUS / MICROTEK /EVVO /LENTO/DELTA/ABB / HITACHI /HUAWAI / SUNGROW or equivalent subject to submission of relevant documents of successful operation in various Government Organisations.

**Seal & Signature  
of Contractor**

**Executive Engineer (Electrical)  
Deendayal Port Authority**