

MORMUGAO PORT TRUST
ENGINEERING MECHANICAL DEPARTMENT

NOTICE INVITING BUDGETORY OFFERS

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| Name of Work | Relocation of Power Factor Improvement System of 33KV Substation. |
| Date of submission of offers | on or before 23/11/2016 at 1430 Hrs. |
| Address for communication: | SE(E-H) Engineering Mechanical Dept., Mormugao Port Trust, Mormugao, Goa – 403802. |
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CHIEF MECHANICAL ENGINEER
MORMUGAO PORT TRUST

TECHNICAL SPECIFICATIONS

1.1. GENERAL

In view of the widening of Railway network, Mormugao Port Trust, Goa, has proposed to relocate Power Factor Improvement System of 33KV Substation, from present location to rooms designated in the 33KV Substation Building.

1.2. SCOPE OF WORK

The Scope of Work broadly includes:

1.2.1 Disconnection, Dismantling and Shifting of transformers.

- a) Disconnection and dismantling of 2 nos. (2MVA, 33KV/415V) transformers, 1 no (5MVA, 33KV/3.3KV) and 1 no. (4MVA, 33KV/3.3KV,) transformers.
- b) Demolition of laterite masonry wall of size 10.4mtrsX6mtrsX0.6mtr.
- c) Shifting of 01no. 2MVA transformer (33KV/415V) to 5MVA-3 transformer room. (Approx. distance @ 30 mtrs).
- d) Shifting 01 no. of 2 MVA transformer to MM shed, Baina as directed by the site engineer (Suitable crane will be provided for all the activities as required by The Port). However vehicle for shifting of the transformers and other equipments is in contractor's scope. (Approx. distance @ 4 Kms).
- e) Shifting of 2 nos. transformers (5MVA, 4MVA) to near substation as directed by the site engineer (Suitable crane will be provided for all the activities as required by The Port). However vehicle for shifting of the transformers and other equipments is in contractor's scope. (Approx. distance @ 50 Mtrs).
- e) Disconnecting, dismantling and shifting of 02 nos. of neutral grounding resistors of 5MVA-3 and 4MVA-1 transformers to location as directed in MM Shed, Biana or as directed by the site engineer.
- f) Providing of RCC 1:2:4 base foundation for extending the existing transformer base of 5MVA-3 transformer, so as to also accommodate 2MVA transformer.
- g) Installation of 01no 2MVA transformer in 5MVA-3 transformer room. The total weight of the transformer is around 7.5 T.

1.2.2. Disconnection, Dismantling and Shifting of Capacitor Banks

- a) Removing of the existing ballast in the 4 MVA -1 transformer sump. Thereafter, provision of Rubble packing, soling and PCC 1:3:6 for filling up the oil sump in existing 4MVA-1 transformer room (3.4mtrsX4.5mtrsX0.7mtr) to make the room ready to house the capacitor bank panels.
- b) Disconnecting and dismantling 1 set of Capacitor banks, Bus ducts along with busbar and earthing strip, Capacitor control Panels, along with LT cables, and 2 nos. capacitor racks with 8 banks each of 120KVAR.
- c) Shifting and installation of 01 set of the Capacitor rack, capacitor units (16x120KVAR) and Capacitor Control Panels in the 4 MVA-1 transformer room. Grouting to be provided as required.
- d) Painting of the existing 1 no. set of Capacitor rack and capacitor Control panels with suitable oil paint, preferably of the same colour after installation.
- e) Disconnecting and dismantling of battery charger and battery bank (48V supply).
- f) Shifting and installation of battery charger and battery bank(48V) to 4MVA-1 transformer room.
- g) Painting of the existing battery charger panel with suitable oil paint, preferably of the same colour.
- h) Providing an opening in the RCC wall between (5MVA and 4MVA room) suitable to pass the bus-duct (90mmX60mm) and plastering the same. The work should be neat and smooth.
- i) Fabrication of new bus-duct, 3000A capacity of 14SWG GI Sheet and epoxy painted with bus bar supports etc if required and installing of existng copper bus bar with new hardware (insulator, nuts, bolts, etc.) as required and connecting on both sides (2MVA transformer secondary and 415V breaker.)
- j) Fabrication of MS Structure for cable trays, supports etc as required.

1.2.3. HT Cables

- a) Transportation of 33KV, 3Cx300sqmm XLPE cable approximately 65 mtrs in length from MM complex to 33KV substation.(approx. distance 4 Kms). However vehicle for shifting of the transformers and other equipments is in contractor's scope.
- b) Laying and Termination of 33KV, 3Cx300sqmm cable on both ends with heat shrinkable indoor type kits of Raychem make. Connecting one end of the

cable to 33KV incoming breaker and the other end to the primary of 2MVA transformer. (All nut-bolts should be of SS).

1.2.4. LT cables

- a) Removing of existing LT cable (16 nos. of various lengths) 3Cx300sqmm in capacitor panel to banks and re-laying the same to the new location.
- b) Carrying out of all Terminations of LT cables 3Cx300sqmm as necessary. (All nut-bolts should be of SS).
- c) Supply, Laying, glanding and termination of control cable around 300 mts., 12Cx2.5sqmm armored from 33KV breaker to power factor system.

1.2.5 APFC Relay

- a) Supply, installation and commissioning of Automatic Power Factor Controlling relay (APFC) of approved make with control wiring and auxiliary relays etc., as required. As built power and control drawings for the same to be handed over to the port after completion of the work.

1.2.6 Earthing

- a) Providing 8 nos. of Earthing system with cast iron pipe of 100mm Dia. 2500mm long and 13mm thick with salt, charcoal, proper chamber etc complete as per IS 3043 specifications.
- b) Grid the Earthing with GI flat of 50 x 6mm.

1.2.7 Painting of Transformer and capacitor rooms

- a) Painting of 02 nos. rooms with acrylic distemper of reputed company.

2.1. TECHNICAL SPECIFICATIONS:-

2.1.1 CABLE SUPPORT

Cable supports for 300sqmm LT cable from control panel to Capacitor bank has to be of MS angles 50X50X6mm and flats of 50X6mm.

2.1.2 RCC FOUNDATION

The RCC Foundation for 2MVA transformer to be extended on the existing 5MVA transformer base. Before casting at site, the drawings to be approved from Port's Civil Department.

2.1.3 SUPPLY AND LAYING OF 1.1KV, 12 CORE X 2.5 SQ.MM CONTROL CABLE

- i. The cable measurements are tentative and may vary as per site condition. The cable is to be laid internally from the 2MVA, 33KV/415V transformer to 33KV breaker. The scope includes supply and laying of L.T. 1.1KV, 12 Core 2.5 sq. mm. copper armoured, PVC sheathed flexible conforming to relevant IS standards with ISI mark of approved make.
- ii. Note: Test certificates from the manufacturers for the cable shall be submitted along with the supply of cable.

2.1.4 EARTH PITS AND EARTHING:

- i. The earth system shall be designed and installed so as to meet the requirement of CEA. The value of resistance of earth system should not exceed the value acceptable to the Central Electricity Authority.
- ii. The earth value shall be obtained in accordance with relevant standards and the earth values shall be measured after installation in the presence of MPT Engineer.
- iii. The earth connection shall be made of GI strip of adequate size conforming to IS 3043 to safely carry the maximum fault current for a short period without burning the conductor and pass on the fault current which is in excess of this, additional earth connections under fault condition and at no time the potential shall exceed 10 volts between the equipment and earth. The earth system shall be mechanically robust and joints shall be capable of retaining low resistance even after many passages of fault current.
- iv. Interconnections and joints for earth conductors shall be riveted and soldered for retaining low resistance.
- v. Each earth bar should be connected to the main earth through a bolted removable link. All ground connections shall be compounded and braided.

- vi. In cast iron pipe earthing with copper plate the earth electrodes shall be driven to a depth of not less than 2.7 meters below the ground level and at least 3 meters away from the building and any other earth electrodes treating the soil surrounding the electrodes with the salt, coke and charcoal in accordance with IS 3043.
- vii. The internal diameter of the cast iron earth electrode shall not be less than 100mm. The thickness of the cast iron pipe shall not be less than 13mm. The electrode shall as far as practicable be embedded below permanent moisture level and placed without over lapping the resistance area of earth electrodes. Suitable size flange shall be provided to the cast iron pipe for connecting the earth leads.
- viii. A suitable brick cemented enclosure for neutral and body earth will be as per IE Rule (i.e) 450mm x 450mm with 125mm wall thickness. The depth of the masonry work will be not less than 600mm below the ground level and with suitable cover provided by the contractor enclosing the earth electrodes and shall be able to take up the load of lorries, etc., operating in that area. The top surface of the earth pit shall be in level with the finished surface level of the surrounding area.

2.1.5 SUPPLY AND LAYING OF GI FLAT:

Supply and laying of 1 run of 50 x 6 mm GI flats from the Earth Pits to transformer, control panels and capacitor bank racks. Interconnecting the new pits to the existing pits.

2.2 INSTALLATION, TESTING AND COMMISSIONING

Installation, testing and commissioning of one set of 2MVA, 33KV/415V transformer, control panels and capacitor bank racks, along with Automatic Power Factor Controlling Relay etc. and Refurbishment of exhaust fans 05nos. of the transformer rooms. The tentative single line drawing of the Existing arrangement and proposed arrangement is shown for the reference. However, the work has to be carried out as per the site conditions

2.3 LIST OF APPROVED MAKES:

| Sr. No. | Item | Name of Manufacturers |
|---------|---|---|
| 1 | Voltmeter and Ammeter | AE / MECO / YOKINS / NIPPEN |
| 2 | Selector switches, Push buttons, Emergency Switches | KAYCEE / L & T / GE / BCH / LEGRAND |
| 3 | HRC Fuses | L & T / GE / SIEMENS / ABB / INDO KOPP |
| 4 | Indicating light | AE / KAYCEE / VAISHNAV / L & T / SIEMENS |
| 5 | MCB | L & T / LEGRAND / SIEMENS / ABB / SCHNEIDER |
| 6 | Sub Distribution Board | L & T / LEGRAND / SIEMENS / SCHNEIDER / HENSEL |
| 7 | EL MCB | L & T / SCHNEIDER / LEGRAND / SIEMENS / ABB |
| 8 | FRLS PVC insulated copper conductor single/multi core stranded wires of 650/1100 volt grade | HAVELLS / FINOLEX / RPG / UNIFLEX / NICCO / RR Kables |
| 9 | Steel Conduit/PVC Conduit | BEC / AKG / NIC |
| 10 | Switches, TV & Telephone Socket outlets, Boxes | MK / CLIPSAL / LEGRAND / NORTH WEST / ANCHOR |
| 11 | Light Fixtures | PHILIPS / BAJAJ / WIPRO / CROMPTON |
| 12 | Lamps and Tubes | PHILIPS / WIPRO / BAJAJ / CROMPTON |
| 13 | Ceiling fans/Wall bracket fans / Exhaust Fans | HAVELLS / CROMPTON GREAVES / USHA / ORIENTAL |
| 14 | Cable lug & Cable Gland | DOWELLS / JHONSON / RAYCHEM |
| 15 | Terminal Blocks | WAGO & CONTROLS / PHOENIX CONTACTS / OBO BETTERMANN |
| 16 | Multi-function Meter | ABB / SIEMENS / L&T / HPL |

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| | | SOCOMECON/CONZERVE (ENERCON) |
| 17 | DWC HDPE Pipe | DURA LINE / CARLON / EMTELLE |
| 18 | Contactors | L&T / SCHNEIDER / SIEMENS/ABB / BCH |
| 19 | MCCB | L&T / SIEMENS / SCHNEIDER / ABB |
| 20 | VCB / SF6/ Isolator | SIEMENS / AREVA / ABB / SCHNEIDER |
| 21 | Push Buttons | SIEMENS / ABB / TELEMECANIQUE / L&T / SCHNEIDER |
| 22 | Relays | L&T / ABB / SIEMENS / SCHNEIDER/AREVA |
| 23 | Timers | L&T / SIEMENS / TELEMECANIQUE/ABB |
| 24 | Indicating Light | L&T / SIEMENS / TELEMECANIQUE / ABB / GE |
| 25 | Indicating Instruments | AE / MECO / CONZERVE / L&T |
| 26 | HT Cable | FINOLEX / RPG / UNIFLEX / TORRENT / HAVELLS / UNISTAR /NICCO |
| 27 | LT Cable (XLPE and FRLS) | UNISTAR / FINOLEX/ NICCO / HAVELLS / RPG / UNIFLEX |
| 28 | Termination Kit | BIRLA / 3M / RAYCHEM /DENSON |
| 29 | CTs | L&T / AREVA / JYOTI / KAPPA / PRAGATHI |
| 30 | PTs | AREVA / KAPPA / PRAGATHI |
| 31 | HT Panels | SIEMENS / SCHNEIDER / ABB / AREVA |
| 32 | LT Panels | SIEMENS / L&T / SCHNEIDER / ABB |
| 33 | Cable Trays (FRP) | LEGRAND / ERCON / NEEDO / SUMMIP |
| 34 | ACB | SCHNEIDER / SIEMENS / ABB / L&T |
| 35 | Selector Switch | KAYCEE / L&T / SIEMENS / BCH / GE / SALZAR |
| 36 | Capacitor Banks | EPCOS / L&T / SCHNEIDER |

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| 37 | Trivector Meter (Digital) | L&T / SCHNEIDER / SIEMENS / HPL SOCOMECC |
| 38 | Capacitor Panels | ABB / L&T / EPCOS / SCHNEIDER |
| 39 | Power Factor Correction Relay | EPCOS / L & T / ABB |
| 40 | Elastomeric Mat | PREMIER POLYFILM LTD / POLYELECTROSAFE / CHALLENGER |
| 41 | MS & GI Conduits Accessori | STEEL MARK / NIC |
| 42 | Transformer | ABB / SCHNEIDER / SIEMENS |
| 43 | Compact substation | ABB / SCHNEIDER / SIEMENS |
| 44 | Elevators | OTIS/ JOHNSON / THYSSENKRUPP/ MITSUBISHI / HYUNDAI/OMEGA/SCHINDLER |
| 45 | Paints | ASIAN/ BERGER/NEROLAC |
| 46 | Items not covered above | As per samples approved |

BILL OF QUANTITIES

| Sr No | Description | Unit | Qty | Rate | | Amount |
|-------|--|----------|-----|--------|----------|--------|
| | | | | In Fig | In Words | |
| 1. | Disconnecting, Dismantling, Shifting and Installation of transformers. | | | | | |
| a. | Disconnection & dismantling 2 nos. (33KV/415V, 2MVA), 1 no (33KV/3.3KV, 5MVA) and 1 no. (33KV/3.3KV, 4MVA) transformers. | Nos. | 04 | | | |
| b. | Demolition of laterite masonry wall of size 10.4mtrsX6mtrsX0.6mtr. | LS | 01 | | | |
| c. | Shifting, installation and commissioning of 2MVA transformer to 5MVA-3 transformer room. (Approx. distance @30mtrs). | No. | 01 | | | |
| d. | Shifting of transformers (5MVA, 4MVA near substation) and 2 MVA to MM shed. | LS | 01 | | | |
| e. | Disconnecting, dismantling and Shifting of Neutral Grounding Resistors of 5MVA-3 and 4MVA-1 transformers near Substation. | Nos. | 02 | | | |
| f. | Providing of RCC 1:2:4 for extending the existing 5MVA-3 transformer base, so as to mount 2MVA transformer as required. | L.S. | 1 | | | |
| 2. | Disconnecting, Dismantling and Shifting of Capacitor banks, bank racks and control panels. | | | | | |
| a. | Removing of the existing ballast in the sump of 4MVA-1 transformer room, thereafter providing of Rubble packing, soling and PCC 1:3:6 for filling up the oil sump in existing 4MVA-1 transformer room to make the room ready to house the capacitor bank panels. | Cu. Mtr. | 11 | | | |
| b. | Dismantling Capacitor banks, Bus ducts along with busbar and earthing strip, Capacitor control Panels, along with LT cables, and 4 nos. capacitor racks with 8 banks each of 120KVAR. | Set | 01 | | | |
| c. | Shifting, installation and commissioning of one set of Capacitor rack, capacitor units (16X120KVAR) and capacitor Control panels in 4MVA-1 transformer room. | Set | 01 | | | |
| d. | Painting of the existing set of Capacitor rack, capacitor Control panels with suitable oil paint, preferably of the same colour. | L.S. | 1 | | | |
| e. | Disconnecting and dismantling of battery charger panel and battery bank(48V supply) | set | 01 | | | |
| f. | Shifting, Installation and commissioning of battery charger panel and battery bank to 4MVA-1 transformer room. | set | 01 | | | |

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| g. | Painting of the existing battery charger panels with suitable oil paint, preferably of the same colour. | L.S. | 01 | | | |
| 3. | Providing an opening in the RCC wall, suitable to pass the bus duct (90mmX60mm), plastering the same. | L.S. | 01 | | | |
| 4. | Fabrication of new bus-duct 3000A capacity of 14SWG GI Sheet as per technical specification in schedule-‘A’ | | | | | |
| i. | Supply | Mtrs | 10 | | | |
| ii. | Erection | Mtrs | 10 | | | |
| 5. | Fabrication of MS Structure for cable trays, supports etc as required. | L.S. | 01 | | | |
| 6. | HT Cables | | | | | |
| a. | Transportation of 3CX300sqmm, 33KV XLPE cable from MM complex to 33KV Substation(distance @ 4Kms). | Mtrs. | 65 | | | |
| b. | Laying of 3CX300sqmm, 33KV XLPE cable from 2MVA feeder to transformer through the existing trench. | Mtrs. | 65 | | | |
| c. | Termination of 33KV cable with heat shrinkable indoor type kits of Raychem make and connecting the same. | | | | | |
| i. | Supply | Nos. | 02 | | | |
| ii. | Termination and connection | Nos. | 02 | | | |
| 7. | LT cables | | | | | |
| a. | Laying of old LT cable (16 nos. of various lengths) 3Cx300sqmm from capacitor panels to banks. | Mtrs | 250 | | | |
| b. | Termination of LT cables of 3Cx300sqmm as required | Set | 16 | | | |
| c. | Supply, Laying, glanding and termination of control cable 12Cx2.5sqmm armored from 33KV breaker to 2MVA transformer. | | | | | |
| i. | Supply | Mtrs | 300 | | | |
| ii. | Laying, glanding and termination of cable | Mtrs | 300 | | | |
| 8. | Automatic Power Factor Correction Relay as per technical specification in schedule-‘A’ | | | | | |
| i. | Supply | No | 01 | | | |
| ii. | Installation, testing and commissioning | No | 01 | | | |
| 9. | Providing of Cast iron pipe earthing with Copper plate in accordance with IS and as per Technical specification in schedule – ‘A’ | | | | | |

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|--------------------|---|------|-----|--|--|--|
| i. | Supply | Nos | 08 | | | |
| ii. | Installation, testing and commissioning | Nos | 08 | | | |
| 10. | Supply and laying of 50 mm x 6 mm G.I. flat Hot dip galvanized earthing strip as per Technical specification in schedule – ‘A’ | | | | | |
| i. | Supply | Mtrs | 200 | | | |
| ii. | Installation, testing and commissioning | Mtrs | 200 | | | |
| 11. | Painting of 02nos. Transformer rooms as per Technical specification in schedule – ‘A’ | LS | 1 | | | |
| 12. | Re-furbishment of Exhaust fans in transformer room. | Nos | 05 | | | |
| GRAND TOTAL | | | | | | |

(In words Rupees

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Note: The offered rates shall be inclusive of all taxes except Service Tax which will be paid as applicable. However, any new tax will be imposed by State/Central Govt. and same will be reimbursed on producing documentary proof.