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PATNA DAIRY PROJECT

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Dear sir,

We are interested to install "one set of sub main panel (power control centre) required for feeding powder to Glycol Plant panel and two other Ammonia Vilter compressors.

Detail technical specification of power control centre is enclosed herewith Page 1 to 05.

You are requested to submit your offer in sealed envelop latest by 9.7.21 super-scribing quotation for 'Power control centre'.

Thanking you,

Yours faithfully,

Manager (Pur)

Encl : a.a.

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Specification of Metal Clad Type LT Power Control Centre

(Sub Main panel)

Quantity required – one set

(1) **Capacity**: 3 phase, 50 Hz,415 Volts ,800 Amps

(2) **Specification:**

The power control center in sheet steel enclosure (metal Clad Type sub main panel) is required to supply LT power to motor control centre for Glycol Chilling system and Two (2) Ammonia Vilter compressors operated through 125 HP Motors Plus 3 chilled water motors each of 7.5 HPs .

The manufacturer of the panel must possess a type test certificate / accreditation from CPRI as per followings

Sl no	Description	Required
1	Type of sub main panel	INDOOR
2	LT Power sub main panel operation	Front operated
3	Incoming feeder suitable for receiving power through	Two EXISTING cables each of 300 Sqmm
4	Fault Level	50 KA
5	Supply voltage	415 V, 50 Hz, 4 Wire

(2.1) **Housing Details**

The PCC (Sub main panel) shall be fabricated using pressed and shaped cold rolled sheet steel sections structure of adequate thickness. The sheet steel used for panel shall be min. 14 SWG sheet except that the partition plates and inter-panel barriers may be made of 16 SWG. The PCC shall be indoor, floor mounted, self-supported on 80 MM X 40 MM "C" section, front openable, cubicle type made up of vertical panels of uniform height, dust, weather and vermin proof. The switchboard shall conform to degree of protection not less than IP 44.

Panel (Switch Board) shall be extensible at both the ends by addition of vertical sections. Ends of the bus bars shall be suitably drilled for this purpose. Panels at extreme ends shall have openings, which shall be covered with plates screwed to the panel. The switchboard shall be provided with integral base frame. The panel base plate/cable gland plate shall be 2.5 mm thick.

All hardware shall be zinc plated. All joints and connections shall be made by galvanized zinc passivated or cadmium plated high tensile strength steel bolts, nuts and washers secured against loosening.

The maximum height and width of the panel shall be decided by biider however it is restricted to 2100 mm and 600 mm respectively maximum Length shall be decided by bidder for accommodating various switch gears.

Panel shall be provided with suitable lifting hooks. These hooks when removed shall not leave any opening in the board.

The maximum and minimum height of operating handles/push buttons of components shall be 1900 mm and 300 mm rrespectively.

All equipment of a single feeder shall be housed in a separate enclosed compartment /cubical. ACB modules shall be of draw out type.
Suitable cable and bus alleys shall be provided. Cable alleys shall be provided with hinged doors. Adequate number of slotted cable supports shall be provided in cable alleys. All doors shall be provided with concealed type hinges and captive screws. Rear doors also shall be open able. Gaskets of durable materials shall be provided all-round the perimeter of adjacent panel, panel and base frame, removable covers and doors and cutouts.

All components shall be front operated. The PCC shall be single front type unless specified otherwise. For draw out modules, only handles of switches, knobs, cutouts for lamps and meters shall be arranged on the front doors to permit operation without opening the doors. Relays of circuit breakers shall be mounted on front doors of the compartments. Other accessories of ACB shall be mounted on withdraw able chassis.

(2.2) Painting

All metal surfaces shall be thoroughly cleaned and degreased to remove all scales, rust, grease and dust. Fabricated structures shall be pickled and treated to remove any trace of acid. The under-surface shall be prepared by applying a coat phosphate paint and a coat of yellow zinc primer. The under surface shall be made free from all imperfections before undertaking the final coat.

After preparation of the under surfaces, the panel shall be spray painted with final two coats of approved shade of powder coating paint.

The finished panels shall be dried in stoving ovens in dust free atmosphere. Panel finish shall be free from imperfections like pin holes, orange peels, run off paint etc.

All unpainted steel parts shall be cadmium plated or suitably treated to prevent rust, corrosion, etc.Nameplates for all incoming and outgoing feeders shall be provided on doors of each compartment. Nameplates shall be fixed by screws only and not by adhesives..

(2.3) Bus bar Sizing Connection and Supports

The Aluminium bus bars shall be made of high conductivity electrolytic aluminum alloy conforming to grade E9 iE IS-5082. Buses shall have uniform cross section throughout the length of the panel and up to the incoming feeder terminals. Maximum current density permissible for these bus bars shall be 0.8 Amps/sq. mm for bus bar area above 500 sq. mm and 1.0 Amp/sw. mm for bus bar area below 500 sq. mm. A suitable section earthing bus bar (minimum 300 sq. mm.) shall be provided outside the PCC at back bottom throughout the length of the PCC.

Provision shall be made to connect the earthing bus bar to the plant earthling grid at two ends. All doors shall be earthed using flexible cooper connections to the fixed frame of the switchboard.

The bus bars will be provided with heat shrinkable high dielectric PVC insulating sleeves of 1100V grade. Red, yellow and blue color shall be used for phase bus bars and black color shall be used for neutral bus bars. The sleeves should be non-inflammable and self- extinguishing type. Joints shall be shrouded suitably. Supports for bus bars shall be made of suitable size non-hygroscopic and non-inflammable epoxy Compound SMC/DMC block and these should be adequate in number so as to avoid any sag in the bus bars.

The bus bars shall be adequately supported by suitable size non-hygroscopic and non- inflammable epoxy compound cast blocks, adequate numbers and size to avoid sags in bus bars and these shall be capable of withstanding stresses due to short circuit currents of the associated switch gear. Main bus bars shall have rupturing capacity of 50 kA.Minimum clearance between main bus bars phase-to-phase 25 mm and between phases to earth 20 mm.

(2.4) Power Connection

Interconnections between the main bus bars and individual switch units shall be made by using copper or aluminum bus bar strips of adequate rating. These interconnections and terminals shall also be shrouded suitably. The outgoing power connections from MCCBs / ACBs will be through PVC insulated aluminum conductor armored cables or through Insulated Al / Cpper bus bars of suitable capacity

The cable entry shall be designed by bidders as per convenient however either top or bottom entry as specified in feeder details in hand sketch may be followed.

Removable gland plates of 12-gauge thickness shall be provided on top / bottom of panel, for cable entries. The cable alleys shall also be totally isolated from switchgears by suitable partition plates.For outgoing feeders, cable termination directly at switchgear terminals shall not be allowed and hence panel builder should make provision by suitable bus link from switchgear terminals so that required no. of cables could be connected to these links.

(2.5) Auxiliary Wiring

Wiring for all controls, protection, metering, signaling etc. inside the switchboard shall be done with 1100 V grey color PVC insulated copper conductors. Minimum size of control wire shall be 1.5 mm².All control wiring should be provided with necessary sockets/lugs at both the ends. Each termination shall be identified at both the ends by PVC ferrules having numbers corresponding to control circuit diagram.

(2.6) Hand Sketch /proposed Design Plan of required Sub Main Panel

<table>
<tr><td rowspan="4">Cubical for fitting -1 digital Ampere meter of capacity 0-800 /1000 Amos with 3 pieces of CTs of CT ratio 800(1000) / 5 with selector switch and-1 pC of Digtial voltmeter with Selector switch of 500 Volts</td><td rowspan="4">BUS BAR Chamber (Vertical)with suitable size AL Bus bars duly coated [3 Phase & Neutral]</td><td>MCCB of 400 AMPS for feeiding power to existing Glycol panel</td><td rowspan="4">Chamber / cubical drawing OUTGOING CABLES</td></tr>
<tr><td>MCCB of 250 ANPS for feeiding power to Vilter Compressor no -1</td></tr>
<tr><td rowspan="2">ACB for Main Incomer of capacity 800 Amps ,3 Phase & Netral ,415 Volts[Two cables each of 300 Sq mm have been already drawn near place of installation of this panel</td><td>MCCB of 250 AMPS for feeiding power to ilter Compressor no - 2</td></tr>
<tr><td>Spare cubical suitable for fitting MCCB of 400 AMPS in Future</td></tr>
</table>

(3.0) Scope of supply

(3.1) Metal cald Type panel as specified above - 01 set

Panel shall have following switch gears and other components.

(3.1.1) Air Circuit Breakers (ACB)) –

- Capacity -800 Amps of 4 pole design [3 Phase & neutral for receiving power from main panel through Two AL cables of 300 SQ mm each]
- Qty Required - 01 set
- Specification

Air circuit breaker (ACB) shall be fully draw type, manually operated and shall have built-in

Microprocessor based programmable protection and mechanical spring charging stored energy type provided with mechanical indicators to show 'Open'. 'Closed', 'Service' & 'Test' positions, mechanically operated emergency tripping button etc. Microprocessor based programmable protection unit shall have settings for overload, short circuit, instantaneous and earth fault currents with time delay and LED indicators to show various conditions such as Power ON, Overload, Short-circuit, Instantaneous Earth Fault, Percentage load, Self Diagnostic Test etc.

The control supply shall be 240 V AC. 6 NO + 6 NC auxiliary contacts shall be provided. 'Red', 'Green' & 'Amber' indication lamps shall be incorporated to show 'Closed', 'Open' & 'Auto trip' conditions respectively.

- **The interlocks shall be as under:**

It shall not be possible to plug in a closed-circuit breaker or to draw out a circuit breaker in closed position. It shall not be possible to operate a circuit breaker unless it is in fully plugged-in, test or fully isolated position. In test position, the breaker shall be tested without energizing the power circuit. Whenever specified, interlock to prevent paralleling shall be provided. Closing and trip coils shall work under the following voltage variation conditions:

Closing coils 85 % to 110 % of rated voltage Trip coils

50 % to 110 % of rated voltage

For series tripping, overload, short circuit and under voltage/shunt trip release shall beprovided.

Stored energy mechanism shall be provided with mechanical indicators to show spring 'Charged' or 'Discharged'condition.The earth fault relay to be provided for incoming feeders Current rating, short circuit current, protection relays etc. shall be as specified in feeder details.Incoming feeder ACB of 4 pole design & of specified rating shall be provided with

- Single phase preventer and Microprocessor based LCD display digital meter for measurement and display of Multifunctional Electrical Parameters such as voltage, current, active power, frequency, power factor, active energy, active power, reactive powered.
- The bus coupler ACB of 3 pole design and specified rating shall be provided with CT operated digital type Ammeter with selector switch and indication lamps.

(3.1.2) Molded Case Circuit Breakers (MCCBs)

Quantity required: - 3 nos

Capacity –

- 400 Amps of 4 pole design -01 no [3 Phase & neutral for receiving power from busbars and feeding to main Glycol panel presently fed with 150 Sqmm cable ,
- 250 amps of 4 pole - 02 nos design for vilter compressor motors no- 01 & 02 each operated with 125 HP motors.

Specifications

MCCBs shall always be provided with separate operating handle mechanism with door interlocking. The MCCBs for all ioutgoing feeders shall be of four pole construction arranged for simultaneous manual closing or opening of all the poles of the MCCB and automatic instantaneous tripping on short circuits. Closing mechanism shall be quick make, quick break and trip-free type. 'ON' 'OFF' and 'Trip' indications shall be provided on the front cover with door interlocking facility. All feeders having MCCB shall be provided with neutral link complete with isolating link.

MCCBs shall be provided with adjustable type tripping device with inverse time characteristics for over-load protection and CT operated Ammeter with selector switch, indication lamps.

The MCCBs shall be rated for continuous maximum duty as specified. The rating of the MCCBs shall be as per the feeder details.

Minimum rated breaking capacities shall be as under:

MCCBs --- up to 100

Amps 35KA Above100

Amps 45KA

The control voltage shall be 240 V AC.

(3.1.3) Current Transformers (CTs) for main panel current indication

Current Transformers shall be cast resin type. CTs shall preferably be mounted on stationery parts. The short time withstand rating of CTs shall be equal to that of the associated switchgear for one second.

The protection CTs shall be minimum 15 VA, accuracy class 5P and an accuracy limit factor of greater than "10.0". The instrument CTs shall be minimum 10 VA, accuracy class "1.0"and

an accuracy limit factor less than "5.0". Separate CTs to be provided for protection and metering purposes.

(3.1.4) Indicating Instruments

[All shall be DIGITAL type]

- Ampere meter (0-800 / equivalent) Amps -01 no complete with 3 CTs of 800- 1000 /5 for main incomer with selector switch
- Voltmeter 0-500 Volts – 01 no with selector switch

Indicating instruments shall be of 96 mm square, flush mounting type digital instruments with LCD or LED DISPLAY. While voltmeters and ammeters shall have 3 ½ digit display, the power factor meter shall have 4-digit display. Energy meter shall be suitable for measuring unbalanced loads of 3 phase, 4 wire system and shall not be mounted on doors of cubicle but permanently inside the cubicle. The accuracy class of KW / KWH meters shall be a minimum of 2.5. The meters shall be provided as given in the feeder requirement.

(3.1.5) Indicating Lamps

Indicating lamps shall be of LED (cluster of high intensity light emitting diodes) type, suitable for 240 V AC supply. These shall be provided with translucent covers of red, green and amber colors as required. These lamps shall be of minimum 22.5 mm dia. Indication lamps to be provided for all feeders.

NOTES:-

(a) Although Hand sketch of Panel has been given but bidders are rquested to design the panel as per technical suitability & design.

(b) All outgoing feeders' cubicals having MCCBs must have R, Y& B phase Indications.

(4.0) Installation & commissiiong:

i) This panel shall be installed near the existing Glycol Panel where two cables of size 300 SQ mm (X2) have already been brought from main panel. The cables will be connected to main incomer ACB of 800 Amps with CABLE glands & Aluminum lugs being supplied by bidder.

Installation & commissioning including charging of the panel shall be in the scope of bidder.

ii) Connections of out going feeders shall be done by Dairy itself.

(6.0) Approved makes i) For ACB & MCCBs - L& T / Siemens/ Schnieder

ii) Instruments - L & T or equivalent make

(The end)