E-Procurement Notice

Design, Supply, Installation, Testing and commissioning of Freon-Based IBT (Ice Bank Tank) Refrigeration System

REQUEST FOR QUOTATION (RFQ)

Purabi

August-2025

West Assam Milk Producers' Co-Operative Union Ltd. ★ Panjabari, Guwahati-37 ★ Regd.No.G-8/76-77 Date 18.8.76

West Assam Milk Producers' Co-operative Union Ltd.
PURABI DAIRY

REQUEST FOR QUOTATIONS
Procurement of Goods under RFQ
E-Procurement Notice
(Two-Envelope Single stage bidding process)

Purchaser: West Assam Milk Producers' Cooperative Union Limited
Contract title: Design, Supply, Installation, Testing and commissioning of Freon-Based IBT (Ice Bank Tank) Refrigeration System
RFQ No: WAMUL/Dairy Plant/Refrigeration/25-26/01
Date: 11th August-2025

Doc. No.: FR-080902

The West Assam Milk Producers' Cooperative Union Limited WAMUL, (Purabi Dairy) invites Quotations in sealed envelope from eligible bidders for "Design, Supply, Installation, Testing and Commissioning for Freon- Based IBT (Ice bank Tank) Refrigeration System" interested bidders are requested to submit both technical and financial bid in a sealed envelope separately. The bids in Sealed Cover-I containing "Technical Bid" and Sealed Cover-II containing " Financial Bid" and should be placed in a third sealed cover inscribing "Design, Supply, Installation, Testing and Commissioning for Freon- Based IBT (Ice bank Tank) Refrigeration System" as per specifications and other terms and conditions as below:

Sl. No	Item/Job Description	Technical Specifications/ Scope of Work/Others	BOQ (Bill of Quotation)	Location
1	Design, Supply, Installation, Testing and commissioning of Freon-Based IBT (Ice Bank Tank) Refrigeration System	At Annexure-I	At Annexure-II	Dhemaji Dairy Plant, Jamuguri, Panchali, Dhemaji-787057

The bids should reach WAMUL on or before 26-08-2025, addressing to " The Managing Director", West assam Milk Producers' Co-operative Union Limited, R.K Jyoti Prasad Agarwala Road, Juripar, Panjabari, Guwahati- 781037.

Timeline for submission of the bid documents

Sl. No.	Item	Dates
1	Bid Publishing Date	11-08-2025.
2	Bid Submission End Date	26-08-2025.

For any future clarification and/or corrigendum(s) shall be communicated at Purchase Department at WAMUL (Purabi Dairy) Panjabari Office.

Contact: Ph.: 9707013600/7002391318
Email : sandhya@purabi.coop/jasmine.gogoi@purabi.coop

R.K. Jyoti Prasad Agarwala Road, Panjabari, Guwahati-781 037
E-mail : info@purabi.coop • Website : www.purabi.coop • GST No. 18AAAJW0070G1Z6

1. Terms and Conditions:

1.1 .Experience of the bidder for Design, Supply, Installation, Testing and commissioning of Freon-Based IBT (Ice Bank Tank) Refrigeration System.

a) The bidder should be a **Manufacturer/OEM/Dealers** authorized by Manufacturers. (Relevant documents required for manufacturer and in case of dealer, authorization certificate by the principle manufacturer is required)

b) The bidder should have been in the business with **same name and style** for the last three financial years ending 31st March i.e. FY 2021-22, 2022-23 & 2023-24 or 2024-25. (Years should be consecutive)

c) The bidder should have completed atleast 3 contracts for same/similar works of value equal to or more than Rs. 30 Lakhs in **each of the last 3 financial years** ending 31st March i.e. FY 2021-22, 2022-23 & 2023-24 or 2024-25 (Relevant documents required: relevant P.O./W.O. copies, Work completion certificate, Invoices, LOI or any other equivalent documents)

d) Financial Turnover:

If the Bidder is a Manufacturer
The bidder's financial turnover should be minimum of Rs.1 Crore **in each of the last three financial years** ending 31st March i.e FY 2021-22, 2022-23 & 2023-24 or 2024-25 (Years should be Consecutive). Relevant documents required: Audited balance sheet or valid Chartered Accountant certified copy (having valid UDIN no)
If the Bidder is a Dealer (authorized by manufacturer)
The bidder's financial turnover should be minimum of Rs.50 Lakhs **in each of the last three financial years** ending 31st March i. FY 2021-22, 2022-23 & 2023-24 or 2024-25 (Years should be Consecutive). Relevant documents required: Balance sheet or valid Chartered Accountant certified copy (having valid UDIN no).

e) The bidder should have a valid GST Registration, Pan Card, MSME (if applicable) etc.

1.2. Earnest Money Deposit (EMD): Rs. 30,000.00/- (Rupees Thirty Thousand) shall be submitted in the form Demand Draft (DD) in the name of "West Assam Milk Producers Cooperative Union Ltd" Payable at Guwahati. The EMD can be forfeited by the purchaser, if the bidder is not earnest about their bid and withdraw it before the validity period is over.

1.3. Performance security: The successful bidder shall furnish to WAMUL a performance security @10% of the contract value in the form of Bank Guarantee or a Bank Draft from any Nationalized/Scheduled Bank in favour of "**West Assam Milk Producers Cooperative Union Limited**" Payable at Guwahati" within 30 days of award of contract .The PBG will be valid till the warranty obligation period .The Performance Security furnished by the successful bidder will be retained by the office up to the warranty obligation period and returned within 60 days of expiry of the contract. The PBG held by the office till it is returned to the successful bidder will not earn any interest.

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Failure of the successful bidder to furnish Performance Security within the period stipulated shall constitute sufficient ground for annulment of award and the Office may make the award to the next lowest evaluated bidder. The Performance Bank Guarantee Format is enclosed.

1.4. Validity of the Quotation: Quotation must be valid for 120 days from the last date of submission of bids. The rates quoted by the bidder shall be fixed for the duration of the contract and shall not be subject to adjustment on any account.

1.5. Delivery/Completion Time: Material to be delivered and installed within 70 days from the date of issue of purchase order.

1.6. Price Bid

a) The Prices shall be quoted in Indian Rupees only

b) Freight: To be arranged by the supplier.

c) Packing, Forwarding, GST, Freight, loading, unloading, Insurance and other incidental charges will be part of the evaluation.

d) Each bidder shall submit only one quotation. Bidder shall not contact other Bidders in matters relating to this Quotation

e) The contract shall be for the full quantity as described above.

1.7. Terms of Payment: 100% payment within 30 days after successful delivery and installation of the material at site and submission of invoice to be certified by competent authority of WAMUL.

1.8. Variation: ±10% variation in the Work Order value shall be considered in the final bill settlement.

1.9. Warranty: The system shall carry a warranty of 12 months from the date of commissioning.

1.10. Liquidated Damages: If the bidder fails to deliver any or all the goods or perform the services within the time period(s) specified in the purchase order/contract, the WAMUL shall, without prejudice to its other remedies under the purchase order/contract, deduct from the purchase order/contract price, as liquidated damages, a sum equivalent to the following clauses which is applicable as per Order.

a) 0.5% of the full contract value for each completed week of delay

OR

~~b) 0.5% of the value of delayed items/services only, for each completed week of delay.~~

The total amount so deducted shall not exceed 10% of the purchase order/contract value. Once the maximum is reached, the WAMUL may consider cancellation/termination of purchase order/contract, and forfeiture of performance/ deposit bond

1.11. Documents: ***The Quotation shall comprise two Parts, namely the Technical Part (Seal and Signed tender Document, Experience Documents, Specifications Etc.) in a sealed Envelope and the Financial Part (BOQ-Annexure-II) in an another separate Envelope and both the parts shall be incorporated in one single Envelope.***

i) The Technical Part of Quotation shall comprise the following

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a) Letter of Quotation – Technical Part
b) Delivery & Work Completion Period –within 70 days from the date of issue of Work Order.
c) Technical specification
d) Complete address and contact details of the Bidder having the following information:
Name of Firm
Address for communication
Telephone No(s): Office
Mobile No.
Electronic Mail Identification (E-mail ID)

Bidder shall submit: Self attested copy of PAN, Self-attested copy of GST, MSME Certificate (if available) Self-attested copy of Trade License, Bank Account details on letterhead of the firm and the RFQ document.

The Technical Part of Quotation shall not include any financial information related to the Quotation price. Where material financial information related to the Quotation price is contained in the Technical part of Quotation, the Quotation shall be declared as non-responsive.
ii. The Financial Part of Quotation shall comprise the following:

(b) Price Schedule/ BOQ wherein the rates shall be entered (As mentioned in Annexure-II)

1.12. Opening and Evaluation of Technical Parts of Quotations:

a) The 'Technical Part' of the Quotations will be opened on the specified date and time. The Financial Part of the Quotations shall remain unopened until the subsequent technical opening.

b) The Purchaser shall examine the technical part of the quotation to determine whether the quotation has been properly signed meets the eligibility criteria conforms to all terms, conditions, Technical specifications, warranty/guarantee etc.; and the bidder has accepted the delivery schedule.

c) Only Quotations that are both substantially responsive to the RFQ document, and meet all
Qualification Criteria shall qualify for opening of the Financial Parts of their Quotations at the second Opening.

d) Purchaser shall notify to those Bidders who have failed to meet the Qualification Criteria or whose Quotations were considered non-responsive to the requirements in the RFQ document, advising them that their Technical Part of Quotation failed to meet the requirements of the RFQ document; and that their Financial Part of the Quotation shall not be opened.

Simultaneously Purchaser shall notify to those Bidders whose Technical Parts of Quotations have been evaluated as substantially responsive and meeting the Qualification Criteria that their quotation has been evaluated as substantially responsive to the RFQ document and that their financial part of bid will be opened online and date will be intimated.

1.13. Opening and Evaluation of Financial Parts of Quotations: The 'Financial Part' of the Quotations will be opened on the specified date and time.

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The Purchaser shall examine and confirm that Letter of Quotation – Financial Part and Price Schedules/BOQ are in accordance with the requirements specified in the RFQ document. If any of these documents or information is missing, the offer shall be rejected.

a) The Quotations would be evaluated for complete set of items under this RFQ.
b) The evaluation shall be based on the total price of Goods including GST and any other taxes, freight Transit insurance which will be payable on the finished goods at the time of invoicing as FOR delivery.

1.14. Award of contract:

The Purchaser will award the contract to the bidder whose quotation has been determined to be substantially responsive and who has offered the lowest evaluated quotation price.

No price negotiation will be done with any bidder. The purchase order will be issued to the lowest responsive bidder.

Notwithstanding the above, the Purchaser reserves the right to accept or reject any quotations and to cancel the bidding process and reject all quotations at any time prior to the award of contract.

The bidder whose bid is accepted will be notified of the award of contract by the Purchaser prior to expiration of the quotation validity period. The terms of the accepted offer shall incorporate in the supply order.

1.14. Cancellation of Contract: WAMUL shall be free to cancel the order either in full or in part, in the case of non-delivery of material/non completion of installation within the stipulated delivery/completion period.

1.15. Rejection: WAMUL reserves the right to reject the goods either in part or full if at the time of delivery, it is noticed that the goods supplied do not conform to the specifications/description given in the Work Order.

1.16. For any dispute/legal issues, the jurisdiction is at Guwahati Only.

Sd/-
Managing Director-WAMUL

West Assam Milk Producers' Co-Operative Union Ltd. Regd.No.G-8/76-77 Date 18.8.76 Panjabari,Guwahati-37

Letter Pad of CA Firm

Standard format

TO WHOMSOEVER IT MAY CONCERN

We..... based on audited books of accounts for the financial year 2021-22, 2022-23, 2023-24 or 24-25 and verification of documents, records and information provided to us by the Management of
.....
....., having its registered office at.....
..... Confirm the following:

Sl. No.	Financial Year	Turnover (Rs.)
1	21-22	
2	22-23	
3	23-24	
4	24-25	

Signature

Date

Place

Seal/Stamp of CA Firm

ANNEXURE-I

(Scope of Work/ Technical Specifications/ Other Requirements)

1.0 SCOPE OF WORK

Design, supply, installation, testing and commissioning of a Freon-based Ice Bank Tank (IBT) refrigeration system to support the milk pasteurization process at Purabi Dairy Plant, Dhemaji.
The job is on turnkey basis and includes:
- Ice Bank Tank (IBT) with agitator and copper coils
- Scroll/semi-hermetic compressors with standby arrangement
- Twin condensing units (air-cooled)
- Control panel with electrical switchgear and instrumentation
- Refrigerant piping, valves, sensors, gauges
- Chilled water pumps with GI Class-C pipe
- Refrigerant charging with R-407C
- Electrical cabling, earthing and control wiring
- PUF insulation, fittings, and accessories
- Testing, commissioning and on-site training of WAMUL staff.

2.0 LOCATION OF WORK

Purabi Dairy Plant, Dhemaji, Assam. Coordinates-27.50851114729514, 94.5242577779821

3.0 DESIGN AND FUNCTIONAL REQUIREMENTS

- Milk Chilling Capacity: 10,000 litres/day
- Morning: 7,000 L chilled from 10°C to 4°C
- Evening: 3,000 L chilled from 10°C to 4°C
- Operating Hours: Max. 16hrs /day, 8 hrs between milking sessions
- Milk pasteurization chilling capacity -10,000 litres/day
    a. Inlet Milk Temperature at pasteuriser-15 degree centigrade.
    b. Outlet Milk temperature from Pasteuriser-4 degree centigrade.

    - Refrigerant: R-407C (Eco-friendly)
    - Compressor: 2 Nos. (Scroll/Semi-hermetic), of suitable capacity.(1W+1S)
    - IBT: MS (6 mm bottom, 4 mm walls), outer GIPP(**Galvanized Iron Pre-Painted)**, insulated with 80 mm PUF
    - Coils: 5/8", 22 gauge copper coils
    - Pumps: 2 Nos. Of suitable capacity

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4.0 TECHNICAL SPECIFICATIONS

a. Compressor: Scroll or Semi-hermetic, with standby
b. Condensing Unit: Air-cooled, fin & tube type, skid-mounted
c. IBT Tank: Suitable capacity with MS tank, insulated with 80 mm PUF, top sandwich panels
d. Agitators: Suitable capcity motors, top mounted
e. Chilled Water Pumps: Suitable capacity, C-class GI pipe line, NRV, accessories
f. Refrigerant: R-407C, initial gas charge included
g. Control Panel: CRCA powder coated, auto/manual, protection relays, timers
h. Piping: Copper / Powder-coated MS with Class-C GI fittings
i. Electricals: As per reuirement with FRLS insulation, earthing etc

5.0 BATTERY LIMITS AND RESPONSIBILITIES

Bidder Scope:
- Complete refrigeration system and accessories
- Agitators, pumps, IBT, piping, cabling, insulation
- Testing, commissioning, first gas charge, oil
- Operator training

WAMUL Scope:
- Milk Chiller
- Power supply till IBT panel
- Cleaning chemicals and water
- Site preparation and civil foundation

6.0 SITC

Sl. No.	Description of Item	Quantity	Unit
1	Ice Bank Tank with copper coils and MS fabrication	1	No
2	Freon Based Condensing Unit of suitable capacity	2	No
3	Electrical Control Panel with instrumentation	1	Set
4	Agitator of suitable capacity	2	No
5	Refrigerant R-407C - Initial Gas Charge	1	Lot
6	Refrigerant Piping and Insulation	1	Lot
7	Electrical cabling and control wiring	1	Lot
8	Chilled Water Pump of suitable capacity	2	Nos
9	Installation, testing and commissioning	1	Job
10	PUF Insulation with GI cladding	1	Lot
11	Training and Handover	1	Job

7.0 COMPLETION TIME

The work shall be completed within 10 weeks from the date of issue of Purchase Order.

8.0 WARRANTY

The system shall carry a warranty of 12 months from the date of commissioning.

9.0 TRAINING

Bidder shall provide complete training to WAMUL personnel for operation, maintenance, and troubleshooting.

LIST OF TECHNICAL DOCUMENTS AND DRAWINGS TO BE SUBMITTED WITH BID

1. Layout & P&I Drawings:
   - Site layout of equipment
   - IBT and compressor room layout
   - P&I diagrams (Freon system, chilled water)
   - Electrical schematic

2. Load Calculations:
   - Refrigeration load break-up (morning/evening)
   - Ice coil sizing
   - Compressor sizing and selection basis
   - Chilled water histogram (hourly)

3. Electrical and Utility Load:
   - Electrical consumption: connected/running/peak
   - Raw/soft water demand

4. Supporting Documents:
   - Technical deviations, if any
   - Literature of components offered
   - Execution schedule: PERT/Bar Chart
   - Site staff pattern and operations staffing
   - List and cost of spares for 2 years

Motor Control Centre (Sheet steel)

1. **FUNCTIONAL REQUIREMENTS**

To receive, control and distribute electrical power at 440 V, 50 Hz, AC in a sheet steel housing.

2. **Design Requirement and Scope of Supply**

a. **Statutory Requirements :**

Motor control centre is to be manufactured / assembled as per the latest ISI Specification, Indian Electricity Rules, including special requirements of concerned State Electricity Inspectorate and the detailed specification mentioned below. The manufacturer of the panel must possess a type test certificate/ accreditation from CPRI.

b. **Housing Details** :

i. The switchboard shall be fabricated using pressed and shaped cold rolled 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 switchboard shall consist of free standing front openable panels arranged to form a continuous line-up of uniform height. Cold rolled sheets shall be used for doors and front covers. Front doors shall be hinged type and bus bars and cable alleys covers shall be bolted type.

ii. 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 cable gland plate shall be 2.5 mm thick.

iii. The switchboard shall be totally enclosed, dust, weather and vermin proof. The switchboard shall conform to Degree of protection not less than IP 44. Gaskets of durable material shall

be provided for doors and other openings. Suitable hooks shall be provided for lifting the boards. These hooks when removed shall not leave any opening in the board.

iv. All hardware shall be corrosion resistant. All joints and connections shall be made by galvanized zinc passivated or cadmium plated high tensile strength steel bolts & nuts. Spring washers shall be provided to secure against loosening.

v. The switchboard shall be non-draw out wardrobe type design except for ACB cubicles used, if any, for incoming, out-going and bus coupler. Suitable cable & bus bar alleys shall be provided. In case plant room dimensions prohibit provision of cable/bus alleys in front, panel depth may be increased suitably to accommodate cables/buses on back of MCC. All components of the switchboard shall generally be approachable from front. However, MCC can be in double front execution also if specifically asked for. The maximum and minimum operating handle/push button height of any feeder shall not be more than 1900 mm or less than 300 mm with reference to panel bottom. Supporting arrangement for dressing of power and control cables in cable alleys also shall be provided. Maximum shipping length of MCC shall be 2500 mm.

vi. Painting:

All metal surfaces shall be thoroughly cleaned and De-greased to remove all scales, rust, grease and dirt. Fabricated structures shall be pickled and treated to remove any trace of acid. The under-surface shall be prepared by applying a coat of phosphate paint and a coat of yellow zinc chromate 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.

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.

vii. Nameplates :

Apart from panel nameplate highlighting the operating voltage, the 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. Engraved nameplates shall preferably be of 3-ply (Black-White-Black) acrylic sheets or anodized aluminum. Special danger plates shall be provided as per requirement.

Inside the panels, stickers should be provided for all components giving identification no. as per detailed wiring diagram.

c. **Bus bar Sizing Connection and Supports**:

i. The bus bars shall be made from high conductivity electrolytic aluminum conforming to grade E91E of IS 5082. The bus bars and supports shall be capable of withstanding the rated and short circuit current stated in the single line diagram/feeder details. Minimum size of power bus bars shall be 200 Amps rating. **Maximum current density permissible for Aluminum bus bars shall be 0.8 Amps/mM2 for bus bar area above 500 mM2 & 1.0 Amp/mM2 for bus bar area below 500 mM2. Aluminum bus bars to be provided.** An earthing bus bar of minimum 150 mM2 section aluminum shall be provided outside panel at bottom throughout the length of the panel. Provision shall be made to connect the earthing bus bar to the plant earthing grid at two ends. All doors shall be earthed using flexible copper connections to the fixed frame of the switchboard.

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

iii. Minimum clearance between phase to phase shall be 25 mm and that between phase to neutral / earth shall be 20 mm.

d. **Power Connection** :

i. For power interconnection within the panel board :

Copper conductor PVC insulated cables of adequate cross section shall be used. FOR CURRENT RATING ABOVE 63 AMPS ALUMINUM BUSBAR STRIPS OF ADEQUATE RATING SHALL BE USED. MINIMUM SIZE OF COPPER CONDUCTOR TO BE USED SHALL BE 4.0 mM2. Cable lugs/ sockets of suitable size and type shall be used for all interconnections.

ii. For all aluminum to copper connections: The copper surface will be silver-plated and the aluminum surface will be properly cleaned and supplied with oxide inhibiting grease.

iii. For all outgoing motor feeders, the suitable size terminal blocks shall be provided in cable alleys and wiring up to these from contactors shall be done by panel SUPPLIER. These terminal blocks shall be heavy-duty type to withstand high starting currents.

iv. For incoming & outgoing feeders of the MCC, aluminum conductor cable will be used and hence the panel is to be designed for receiving these and wherever required cable boxes with bus bar extensions for receiving more no. of cables, shall be provided in panel by SUPPLIER. Removable gland plates of 12 SWG thicknesses shall be provided on top/ bottom of panel, for cable entries.

v. To prevent accidental contacts, all interconnecting cables / bus bars and all terminals also shall be shrouded.

vi. Standard colour code of red, yellow and blue for phases and black for Neutral to be followed for all bus bars/conductors.

e. Auxiliary wiring and Terminals :

i. Wiring for all controls, protection, metering, signaling etc. inside the switchboard shall be done with 1100 volts gray colour PVC insulated FRLS copper conductors. Minimum size of these conductors shall be 1.5 mM2. However, CT circuit wiring shall

be done with 2.5 mM2. Control wiring to components fixed on doors shall be flexible type.

ii. The complete panel would be subdivided into different sections by purchaser and each section shall have its own control circuit with fuse and indication. Terminal block (Minimum 3 ways) for control wiring shall be provided for each outgoing Motor feeder in its cubical. 10% spare terminals shall always be available in each terminal block. Control wiring up to these terminal blocks shall be done by SUPPLIER.

iii. All control wiring should be provided with necessary cable sockets / lugs at both ends.

iv. Conductors shall be terminated using compression type lugs. Each termination shall be identified at both the ends by PVC ferrules. The identification termination numbers should match with those on drawings.

v. Control wiring for motor feeders should be such that the "green" light of motor feeder is "ON" only when control as well as power circuit of feeders is "ON" and it shall have its own fuse.

vi. For all motor starter feeders, provision for control wiring to remote ON/OFF control is to be made. The auxiliary wiring for the same shall be brought up to terminal block in the feeder's cubicle.

f. **Switchgears** :

i. **Air Circuit Breakers (ACBs) :**

These shall be manually operated, fully draw out type with **built-in microprocessor based programmable protection**, and suitable for 415 V, 50 Hz. supply. 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. Mechanical spring charging mechanism stored energy type shall be provided with mechanical indicators to show 'Open', 'Closed', 'Service' & 'Test' positions. The circuit breaker shall be provided with mechanically operated emergency tripping device. This device shall be available on the front of the panel.

The control supply shall be 240 V AC. 6 NO + 6 NC auxiliary contacts shall be provided.

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. The ACB feeder cubical door cannot be opened when ACB is "ON". However, it shall be possible to defeat this interlock for inspection purpose. Closing and trip coils shall work under the following voltage variation conditions:

Closing coils	-	85 % to 110 % of rated voltage
Trip coils	-	50 % to 130 % of rated voltage

For series tripping, overload, short circuit and under voltage/shunt trip release shall be provided. **While incoming feeder ACB shall be provided with under voltage coil, the outgoing feeders ACBs shall be provided with shunt trip.**

The built-in earth fault relay shall be provided for incoming feeders ACB.

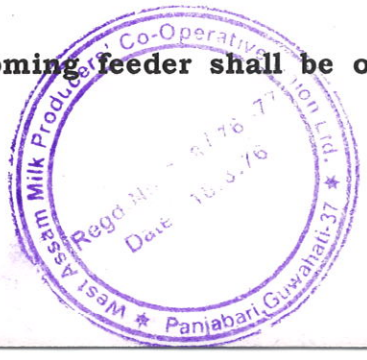
Current rating, short circuit current, protection relays etc. shall be as specified in feeder details.

The circuit breaker position shall be indicated electrically. The following indicating colours shall be used :

BREAKER 'CLOSE'	-	RED
BREAKER 'OPEN'		GREEN
BREAKER 'AUTO TRIP'		AMBER

The circuit breaker shall be provided with mechanically operated emergency tripping device. This device shall be available on the front of the panel.

<u>Note</u> :The air circuit breaker for incoming feeder shall be of 4 pole construction, unless stated otherwise.



ii. **Moulded Case Circuit Breakers (MCCB) :**

MCCBs shall always be provided with separate operating handle mechanism with door interlocking. The MCCBs shall be of tripple/four pole construction (as required in the feeder details) arranged for simultaneous three/four pole manual closing or opening and automatic instantaneous tripping on short circuits. MCCBs shall be provided with adjustable type tripping device with inverse time characteristics for over load protection. All MCCBs are to be provided with operating handles interlocked with cubicle doors.

Closing mechanism shall be quick make, quick break and trip free type. Operating handle shall give a clear `ON', `OFF' & `TRIP' indication. Control voltage for MCCB shall be 240 volts. 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 upto 100 Amps	**35 KA**
Above 100 Amps	**50 KA**

Note : All feeders having 3 pole MCCB shall be provided with neutral link complete with isolating link. However, the MCCBs for incoming and non-motor feeders shall be of 4 pole construction, unless stated otherwise.

iii. **Switches & fuse switches :**

Switches or fuse switches shall be load break, heavy duty, air break having continuous maximum rating type with manual quick make / break mechanism. Mechanical interlock shall be provided to prevent opening of door in switch 'closed' position and prevent closing of switch in door 'open' position. However, it should be possible to defeat this arrangement for testing purpose.

iv. **Fuses**:

These shall be non-deteriorating HRC cartridge link type with operation indicator which will be visible without removing fuses for the service. These shall be complete with moulded phenolic fuse base and cover. Wherever required fuse pullers shall be provided. The fuse base shall be so located in the modules to permit insertion of fuse pullers and removal of fuse links without any problem. One set of fuse pullers also shall be provided.

v. **Contactors**:

The rating of the power contactors shall be as required depending upon the feeder rating indicated in the specifications and as per the feeder details table provided in this specification below. Contactors coils shall be suitable for 240 volts, 50 Hz. unless otherwise specified. All contactors shall be supplied with minimum 2 NO + 2 NC auxiliary contacts. Additional contacts if required for interlocking etc. shall also be provided. Minimum contactor rating for power shall be 16 Amp and all contactors of Star Delta Starter to be of same rating. Rating of contactor shall be based on feeder rating.

All contactors of motor starters shall be suitable for AC 3 duty unless specified otherwise.

vi. **Protective Devices** :

Bimetal overload relays with inbuilt single phase protection shall be provided for all motor feeders. The relays shall be adjustable and self reset type.

Heavy duty starters shall be provided with saturable type current transformer operated overload relays only, which shall be suitable for motor starting time of 15-60 seconds.

Any other relays, if required for incoming & outgoing feeders shall be specified in the feeder details.

vii. **Timers** :

The timers shall be continuously adjustable and electronic type, suitable for 240 V, 50 Hz. supply. The timers for Star Delta automatic starters shall have time delay of 0 to 60 seconds between change over of contacts.

viii. **Push Buttons (PBs)** :

Push buttons shall be complete with actuator and contact block and shall be generally mounted on doors of the cubicles. Colours shall be as follow:

Stop/open/emergency	-	Red
Start/close	-	Green

It should have minimum 1 NO + 1 NC contacts. Push buttons shall conform to IP-65 protection against dust and water ingress.

ix. **Indication Lamps** :

All outgoing & incoming feeders shall be provided with 'ON' indication lamps.

Colours shall be as under :

Phases : Red, Yellow & Blue

ON : Red

OFF : Green
TRIPPED : Yellow

Indication lamps shall be in the form of cluster of high intensity light emitting diodes (LED) to give bright indication. These lamps shall be of 22.5 mm dia and having operating voltage of 240 V, AC.

x. **Current Transformers (CTs)**:

CTs shall be cast resin insulated type. Primary and secondary terminals shall be marked indelibly. CTs shall preferably be mounted on stationery parts. These shall be capable of withstanding momentary short circuit and symmetrical short circuit current for 1 second and shall have a minimum rating of 10 VA. Neutral side of CTs shall be earthed.

Protection CTs shall be of low reactance, accuracy class "SP" and an accuracy limit factor greater than "10". Instrument CTs shall be of accuracy class "1.0" and accuracy limit factor less than "5.0".

Separate CT's to be provided for protection and metering purpose.

xi. **Measuring Instruments** :

These shall be of square pattern having approximate dimensions 96 mm x 96 mm, flush mounting type. Necessary auxiliary instruments like CTs etc. are also included in the scope of supply.

All AC meters shall be of Digital type for displaying three phases reading. Suitable selector switch shall be provided if the digital meter does not have provision for simultaneous display of three phase readings.

Voltmeter shall be suitable for direct line connection. Voltmeters shall be connected through fuses only.

Intelligent Panel Meter shall be provided with incoming feeder of the MCC for the measurement and digital display of Multifunctional Electrical Parameters such as voltage, current, active power, reactive power, frequency, power factor, active energy, reactive energy, etc.

All motor feeders of 15 HP and above shall be provided with ammeter. Ammeter shall also be provided for all incoming & outgoing switches / MCCB / ACB of rating 100 A & above. Ammeters shall always be CT operated.

g. **Special Requirements :**

i. All motor feeders above 10 HP rating shall have soft starter upto 10 HP shall have DOL starters unless specified otherwise.

ii. All motor feeders up to 20 HP shall be provided with switch fuse unit or MPCB as specified in the feeder details and motor feeders above 20 HP shall be provided with MCCB having a minimum breaking capacity of 50 KA.

iii. All the power contactors of Star-Delta starters shall have same current rating.

iv. The following selection table shall be followed for switches & contactors of motor feeders unless otherwise specified :

Sr. No	415 V. Motor HP	Contactors Rating Amps.	Fuse Switch/MCCB Rating Amps.
1	0 to 10 HP	16	63
2	12.5 to 15 HP	25	63
3	20 to 25 HP	32	63
4	30 HP	32	100
5	40 to 45 HP	40	100
6	50 to 60 HP	70	100
7	65 to 70 HP	70	200
8	75 to 90 HP	110	200
9	100to 125 HP	110	250
10	150 to 180 HP	160	400

For motors of smaller ratings, MPCB with suitable thermal release may also be provided as per the requirement given in the feeder details. The following selection table shall be followed for MPCB of motor feeders unless otherwise specified:

Sl.no	415 V Motor HP	Contactor ratings (Amps)	MPCB Rating
1	0.5 to 1	16	16
2	1.5	16	3.2
3	2	16	5
4	3	16	6
5	5	16	8
6	7.5	16	13
7	10	16	16
8	12.5	16	20

Sl.no	415 V Motor HP	Contactor ratings (Amps)	MPCB Rating
9	15	16	20
10	17.5	16	25

For capacitors, rating of contactors/switch shall be double of rated current of capacitor.

v. For incoming feeder of rating higher than 600 A, ACB shall be provided unless otherwise stated in the feeder details.

vi. If the outgoing feeder rating is higher than 63 Amps., MCCB shall be provided unless stated otherwise and preferably these shall be located at the lower portion of the panel. These feeders shall also have isolating link for neutral in case 3 pole MCCBs are to be supplied as per the requirement given in feeder details.

vii. Electrical interlocking shall be provided between various feeders as required by the process and specified in feeder details.

viii. **If the total operating load on MCC is more than 600 kW, MCC shall be provided with two incoming feeders with a bus coupler unless specified otherwise**. Each incoming feeder shall have independent instrumentation and protection.

ix. Induction motors (above 15 H.P) having 3000 RPM shall require higher rating for fuses, contactors and electronic timers due to very high starting current. MCC SUPPLIER has to specially check this requirement from purchaser.

x. SUPPLIER has to submit GA & power circuit drawing for approval to purchaser before starting manufacturing of MCC.

xi. All the major components of an MCC shall be of same "Make".

LIST OF SUGGESTED MAKES FOR MAJOR COMPONENTS

Description	Make
Skid mounted Package Screw Chiller	BITZER/HITACHI/VOLTAS/CARRIER/YORK/Ice make
Motor	SIEMEN / ABB / KIRLOSKAR / BHARAT BIJLEE/ CROMPTON GREAVES / SEW
Electronic soft starter /VFD	SIEMENS / ALLEN BRADLEY /L&T / DANFOSS / SCHNEIDER / ABB / AMTECH
Evaporative Type condensers	FRICK / STAR COOLERS / THERMAX / OMEGA ICEHILL

Description	Make
Plate heat exchanger for pre-chiller, condenser	ALFA LAVAL / KELVION / DANFOSS (SONDEX)
Chilled water pump	GRUNDFOS / WILO / XYLEM / KSB / EBARA
Water Pipes	TATA / JINDAL / ZENITH / MST / KALYANI
Cassette Type Air Conditioners	DAIKIN/ TOSHIBA/ HITACHI/ VOLTAS/ LG/ BLUE STAR/ MITSUBISHI
Forced draft coolers	GUENTNER / HELPMAN / GOEDHART/ KUBA / STAR COOLERS / FRICK
Decorative Fan coil unit	CARRIER / VOLTAS / BLUE STAR
Industrial Heavy Duty Fan coil unit	STAR COOLERS / FRICK / ETHOS
Refrigerant / Oil pipes	TATA / JINDAL /KALYANI /MSL / ISMT
Water valves	SAUNDERS / L&T / AUDCO / BDK / INTERVALVE / CRESCENT / LEADER/ GEMU
Structural channels & angles	SAIL / TATA STEEL /RINL / ESSAR
Flow Switch	DANFOSS/ SWITZER / IFM / E&H / IFB / ANDERSON NEGELE / BAUMER / HONEYWELL
Vortex / Magnetic Flow meter	E&H / EMERSON / ANDERSON NEGELE
Automation system	SIEMENS / ROCKWELL / SCHNEIDER
Human Machine Interface (HMI)	ALLEN BRADLEY (ROCKWELL) / SIEMENS / SCHNEIDER
Dial type Pressure/ Temperature gauges	H.GURU / PRICOL / FIEBIG/ WARREE
Digital temperature sensors/ indicator / controller	E&H / EMERSON / ANDERSON NEGELE / IFM/ RADIX / DANFOSS
Digital temperature indicating controller with defrost control for packaged refrigeration units	DANFOSS / JONHSON CONTROLS/ DIXELL-EMERSON/ HONEYWELL
Air Circuit Breaker	SIEMENS/ L&T/ SCHNEIDER / ABB
Harmonic Filter	L&T / SIEMENS / SCHNEIDER / ABB / EMERSON / SCHAFNER / AMTECH
MCCB	L&T / SIEMENS / ABB/ SCHNEIDER / MDS LEGRAND
Switch fuse units	SIEMENS/L&T/SCHNEIDER / ABB
MPCB	L&T / SIEMENS / SCHNEIDER / ABB

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Description	Make
MCB	HAGER/SIEMENS/MDS-LEGRAND/SCHNEIDER/ABB
Contactors	L&T / SIEMENS / SCHNEIDER / ABB
LT armoured Power Cables	KEC (RPG) / FINOLEX / RR KABEL / APAR / POLYCAB/ SBEE / GLOSTER / LAPP / KEI / THERMOCABLE
LT armoured Copper Control Cables	KEC (RPG) / FINOLEX / RR KABEL / APAR / POLYCAB/ SBEE / GLOSTER / LAPP / KEI / THERMOCABLE
LT steel braided copper power & control cables	LAPP KABEL / SBEE / RR KABEL
Signal & Instrument cable	LAPP KABEL / FINOLEX / POLYCAB / RR KABEL / THERMOPAD/SBEE
Protective relays / Over-load relays / Timer / MPCB	L & T/SIEMENS/ SCHNEIDER/ABB / ELMEX
Push button	L&T/SIEMENS/SCHNEIDER/ABB/TEKNIC/ VAISHNAV / GE
LED type indication lamp	L&T / SIEMENS / SCHNEIDER / ABB / BINAY/ TEKNIC
Terminal block	WAGO / LAPP INDIA /CONNECTWELL
HRC fuse	L & T/SIEMENS /EE/GE POWER / C&S
Measuring instruments	L&T / SIEMENS / IMP/ MECO / AE / RISHAB
Resin Cast / Poly Carbonate Current transformer, Potential Transformer	KAPPA / BHARTI / L&T / NEWTEK / PRECISE / AE / ELMEX / RISHABH
Rotary selector switches	L&T / SIEMENS/ SALZER /TEKNIC / KAYCEE
Power Capacitors	EPCOS / SCHNEIDER / NEPTUNE DUCATI / L&T / KHATAU JANKAR / UNISTAR
APFC Relay	BELUKE / EPCOS / L&T / SIEMENS
Cable Lugs	DOWELLS/ COMET / LAPP KABEL
Cable Gland	DOWELLS/ COMMET / LAPP KABEL / BRAVO
LT Energy meter/ Digital Voltmeter & Ammeter	SIEMENS / L&T / SCHNEIDER / RISHABH / ENERCON/ INDIAMETER /CADEL
Analog Ammeter & Voltmeter	RISHABH / IMP / MECO / AE
Digital Energy Meter	SIEMENS / L&T / SCHNEIDER /HPL SOCOMEC
Digital Power Factor Meter	SIEMENS / L&T / SCHNEIDER / RISHABH /EPCOS

Description	Make
Programmable Protection Relay	MINILEC / L&T / SCHNEIDER
Isolating Switches	SIEMENS / L&T / SCHNEIDER / ABB
Motor isolator/junction box	HENSEL / RITTAL / R STAHL/HANSU
PVC Conduit & accessories	PRECISION / CLIPSAL / POLYCAB/ P – PLAST
Cable Tray	INDIANA / MEK / PILCO / ELCON / METALICA PRESSINGS / OM ENGINEERING / OBO/ SWASTIK
Vapour proof Light fittings for cold store /deep freezes	PHILIPS / WIPRO / BAJAJ / CROMPTON GREAVES
Personal Computer	HEWLETT-PACKARD / DELL / LENOVO / IBM
UPS	EMERSON / HI-REL / DB ELECTRONICS/ SOCOMEC / REILO
SMF Battery	AMCO / EXIDE / AMARA RAJA / AMCO YUASA
Plug & Socket	LEGRAND / CLIPSAL / BCH /HENSEL
Servo Voltage Stabilizer	LOGICSTAT / SUVIK / VOLTAMP / CRYCARD / NEEL
Cooling Tower	PAHARPUR / MIHIR / ADVANCE / TEKNI

ANNEXURE-II (BOQ)							
FOR FREON BASED REFRIGERATION SYSTEM							
Sl. No.	**Description of Item**	**Unit**	**Qty**	**Basic Rate per Unit incl. of installation, freight, packing, forwarding and other incidentals (Rs.)**	**GST %**	**Unit incl. of GST & All (Rs.)**	**Total Amount incl. of GST & All (Rs.)**
1	Design, supply, installation, testing and commissioning of Ice Bank Tank (suitable capacity)	No	1				
2	Supply, installation, testing and commissioning of Freon-based condensing units (suitable capacity)(1W+1S)	No	2				
3	Supply, installation and commissioning of electrical control panel with instrumentation	Set	1				
4	Supply and installation of agitators with suitable capacity motors(1W+1S)	Set	1				
5	Supply and charging of R-407C refrigerant (first charge)	Lot	1				
6	Supply, laying, brazing and insulation of refrigerant piping with accessories	Lot	1				
7	Supply, laying and termination of electrical cabling and control wiring	Lot	1				
8	Supply and installation of chilled water pumps (suitable capacity) with GI piping, valves, NRV etc.(1W+1S)	No	2				
9	PUF insulation of tank with GI cladding and sandwich panels	Lot	1				
10	Installation, testing, commissioning of complete system including foundation and alignment(civil works such as constructing foundation excluded)	Job	1				
11	On-site training for WAMUL operational staff	Job	1				
Total Costing Amount							

Note:The quoted rates shall be inclusive of all costs such as transportation, loading/unloading, insurance, labour, tools & tackles, installation, testing, commissioning, and all incidental charges required for successful project execution at Dhemaji Dairy Plant.