

TENDER  
FOR  
1.0 LLPD (Exp. 1.5 LLPD) AUTOMATIC DAIRY PLANT  
FOR  
HARINGHATA, NADIA

NIT No: WBARD/WBLDC/NIT- BD-003/2023-24 Date of Issue: 10/04/2023



**WEST BENGAL LIVESTOCK DEVELOPMENT CORPORATION LIMITED**  
**(A Govt. Of West Bengal Undertaking)**  
**LB-2, Sector-III, Salt Lake City, Kolkata – 700 106**  
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 Managing Director  
 W.B.L.D.C.Ltd.

**Section - I**  
**Invitation for Bid**

<b>Invitation for Bid (IFB)</b>			
<b>Bid Reference</b>	<b>WBARD/WBLDC/NIT - BD-002/2023-24</b>	<b>Name of Project</b>	Haringhata Dairy Project
<b>Description</b>	<b>Design, Supply, installation and commissioning (including loading &amp; unloading) of various Equipment for 1.0 LLPD (Exp. 1.5 LLPD) Dairy Plant ,Haringhata , Nadia on Turnkey Basis FOR site basis.</b>		
<b>Estimated Project Cost</b>		(in Rs)	<b>65,58,00,000/-</b>
<b>EMD</b>		(In Rs.)	<b>1,00,00,000/-</b>
<b>Duration (months)</b>		15 months from the date of PO	
<b>Bid Sale Start</b>		<b>10/04/2023 FROM 06:55 P.M.</b>	
<b>Bid Sale Stop</b>		<b>02/05/2023 UP TO 11:30 A.M.</b>	
<b>Last Date &amp; Time of Bid submission</b>		<b>02/05/2023 UP TO 11:30 A.M.</b>	
<b>Address for Communication</b>		The Managing Director, West Bengal Livestock Development Corporation Ltd., LB-2, Sector-III, Salt Lake City, Kolkata-700106. <b>Contact (Mr. S. Das ): 9875633163 ; 9007872759</b>	
<b>Site Visit (Mandatory)</b>		<b>17.04.2023 to 20.04.2023 (From 11.30 AM to 4.00 PM)</b> <b>Contact (Mr. S. Das ): 9875633163 ; 9007872759</b>	
<b>Date of Pre-Bid Meeting (Mandatory)</b>		24/04/2023 at 2.00 pm at HQ	

1. The bidders must meet the following minimum qualifying criteria:
  - a. The Bidder, in the same name and style, should be in business at least for last **FIVE YEARS** at the time of bid opening. In case of change of name of bidder by merger / acquisition / change in status, the bidder may be eligible based on the documentary evidence.
  - b. The Bidder should have valid registration under various Acts that may be applicable for the contract proposed. This shall include but not limited to Income Tax, Companies Act, GST, the building & other construction workers' welfare cess act, Employee State Insurance, Contract Labour, Provident fund etc.
  - c. The **Bidder's Gross Financial Turnover** in the same name and style in each of the last **Three** financial years ending 31st March (i.e., 2019-20, 2020-21 & 2021-22) shall be not less than **INR 100.0 Crores. CA certified Turnover Certificate to be attached as a proof.**
  - d. The bidder should have positive net worth in last two financial years.
  - e. The bidder should have cash profit in any two financial years out of the last three financial years.
  - f. The Bidder or its JV partner in the same name and style shall have successfully executed / completed contracts of similar nature of works that is **turnkey project on their own name involving Design, Supply and Labour job for Installation, Testing Commissioning of Fully Automated Dairy Plant of similar capacity from any of co-operative Dairy plant)** during the last three years ending last day of the month before the month in which bid is open.

**Note:**

For evaluation and comparison of bids, the purchaser may, at its discretion, ask the bidder for clarification on the bid. The shortfall information / documents shall be sought only in case of historical documents which pre-existed at the time of tender opening, and which have not undergone change since then.

So far as the submission of the documents is concerned with regard to qualification criteria, after submission of the tender, only related shortfall documents shall be asked for and considered. For example, if the bidder has submitted a supply order without its completion / performance certificate, the certificate can be asked for and considered. However, no new supply order shall be asked for and considered so as to qualify the bidder.

- g. In addition to the above, the following information/documents should also be uploaded along with the online bid by the bidder for evaluation/determination of their eligibility:
  - 1. Copy of Income Tax Returns for three previous financial year.
  - 2. Copy of TDS certificate issued by the clients to substantiate the claim for the value of works executed in the private sector.
  - 3. Copy of form 26AS for the last three financial years
  
- h. Even though the bidder meets the specified criteria, it may be disqualified if it has:
  - 1. Made untrue or false declaration in the forms, statements and attachments submitted in proof of their qualification
  - 2. Record of poor performance such as abandoning the works, not properly completing the contract, inordinate delays in completion or financial failure etc.
  - 3. If the bidder is overbooked beyond his capacity to execute the work as per required schedules.
  
- i. Joint ventures are allowed to participate in the Bid with prior approval in writing from the purchaser. One of the JV partner must fulfil the Eligibility Criteria mentioned above in Point number (a) to (h).

**2. BID PURCHASE**

- 2.1 Bid can be downloaded and submitted on E procurement Website.
- 2.2 The bid shall be uploaded offer along with eligibility criteria, supporting documents, Technical Offer, and commercial offer separately on the web site and submit the hard copy to Purchaser's office in two sets.

**3. Bid Security**

All the bid must be accompanied by bid security (Earnest Money Deposit – EMD) in the form specified in the bidding document. The bids not accompanied with EMD shall be summarily rejected. The bid security shall be denominated in Indian Rupees of value as specified and shall be in the form of Bank Guarantee from Nationalized or Scheduled Banks or Demand draft in favour of The Managing Director, West Bengal Livestock Development Corporation Ltd., payable at mentioned in IFB.

The Bid security may be forfeited if

- ❖ A bidder or supplier withdraw its bid during the period of bid validity specified by the bidder/ supplier on the bid form or
- ❖ In case of successful bidder/ supplier if the bidder/ supplier fails to sign the contract.

4. Rights Reserved by Purchaser

4.1 **West Bengal Livestock Development Corporation Ltd.,** at its sole discretion and without assigning any reason thereof, reserves the right to accept and / or reject the whole or part of any or all the bids received.

5. Validity

The offer should be valid for 90 days from the date of tender opening.

  
Managing Director  
W.B.L.D.C.Ltd.

**Section II**  
**Instructions to Bidder**

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## **1 Cost of Bidding**

- 1.1 The Bidder/Supplier shall bear all costs associated with the preparation and submission of its bid, and the "West Bengal Livestock Development Corporation Ltd.", will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

## **2 Contents of Bidding Document**

- 2.1 The goods required, bidding procedures and contract terms are prescribed in the Bidding Document. The contents of the Bidding Document are organized in sections as given in the Table Contents at the beginning of this document.
- 2.2 The Bidder/Supplier is expected to examine all instructions, forms, terms and specifications in the Bidding Document. Failure to furnish all information required as per the Bidding Document or submission of a bid not substantially responsive to the Bidding Document in every respect will be at the Bidder/Supplier's risk and may result in the rejection of its bid.

## **3 Clarification of Bidding Document**

- 3.1 A prospective Bidder/Supplier requiring any clarification on the Bidding Document may notify the Purchaser in writing by fax/E-Mail at the Purchaser's mailing address indicated in the Invitation for Bids. The Purchaser will respond in writing to any request for clarification on the Bidding Document, which it receives not later than 7 days prior to the deadline for the submission of bids prescribed by the Purchaser. Written copies of the Purchaser's response (including an explanation of the query but without identifying the source of inquiry) will be sent to all prospective Bidder/Suppliers, which have received the Bidding Documents. However, the Bidder/Suppliers cannot consider delay in receipt of clarifications, as a cause for requesting extension in the due date of submission of the bids.

## **4 Amendment of Bidding Document**

- 4.1 At any time prior to the deadline for submission of bids, the Purchaser may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective Bidder/Supplier, modify the Bidding Document by amendment.
- 4.2 The amendment will be notified in writing or by fax or Email to all prospective Bidder/Suppliers, which have received the Bidding Documents and will be binding on them. The amendment will be attached to the bidding document sold subsequently.
- 4.3 In order to afford prospective Bidder/Suppliers reasonable time, in which to take the amendment into account in preparing their bids, the Purchaser may, at its discretion, extend the deadline for the submission of bids.

## **5 Pre-Bid Meeting**

Prebid meeting as date and time as mentioned in notice is mandatory , If any bidder or his/her representative fails to attend pre-bid meeting , purchaser has every right to cancel his/her technical bid without showing any reason . Site visit is compulsory prior to attend Pre-Bid meeting (Date and time as per date schedule in tender notice).

**Venue of the meeting:** As per IFB

**Date of Pre-Bid meeting:** as per IFB

Clarifications shall be submitted to the bidders on the same day.

## 6 Language of Bid

- 6.1 The Bid prepared by the Bidder/Supplier and all correspondence and documents relating to the bid exchanged by the Bidder/Supplier and the Purchaser shall be written in the **English language**. Any printed literature furnished by the Bidder/Supplier may be written in another language so long as **accompanied by an English translation** of its pertinent passages in which case, for the purposes of interpretation of the bid, the English translation shall govern.

## 7 Documents Comprising the Bid

- 7.1 The bid prepared by the Bidder/Supplier shall comprise the following Components:

- A Bid Form and a Price Schedule completed in accordance with Clauses 7, 8 & 9 to be uploaded as commercial bid

Technical Bid (to be submitted online)

- Documentary evidence established in accordance with Clause 10 that the Bidder/Supplier is qualified to perform the contract if its bid is accepted.
- Documentary evidence established in accordance with Clause 11 that the goods and ancillary services to be supplied by the Bidder/Supplier conform to the Bidding Document.
- Bid security (Earnest Money Deposit) furnished in accordance with Clause 12 along with the bid security details form.
- A statement of deviation and exception to the provision of bidding documents.

## 8 Bid Form

The Bidder/Supplier shall complete the Bid Form and appropriate Price Schedule furnished in the Bidding Document, indicating for the goods to be supplied, a brief description of the goods, their country of origin, quantity, and prices.

## 9 Bid Prices

- 9.1 The Bidder/Supplier shall indicate on the appropriate Price Schedule attached to this document the total bid prices of the goods it proposes to supply, install, and commission under the contract. To this end, the Bidder/Suppliers are allowed the option to submit bids for anyone or more packs specified in the "Schedule of Requirement" and to offer discounts for combined packs. However, Bidder/Suppliers must submit a bid for the complete requirement of goods and services specified under each pack, failing which, such bids will not be considered for evaluation & comparison and will not be considered for award.

- 9.2 Prices indicated on the Price Schedule shall be entered separately in the following manner:

- The price of the goods quoted ex-factory, ex-showroom, ex-warehouse or off-the-shelf, as applicable, including all customs duties and other duties, sales, and other taxes already paid or payable on the components and raw material used in the manufacture or assembly of goods quoted ex-factory or on the previously imported goods of foreign origin quoted ex-showroom, ex-warehouse or off-the-shelf.
- Any applicable duty (Customs Duty etc. for import) applicable and payable on the goods along with tariff numbers and the details of classification of the goods, if this contract is awarded AS A PERCENTAGE OF EX-WORKS PRICE or otherwise indicating clearly in the price schedule format given.
- Any sales and other taxes applicable, which will be payable on the goods if this Contract is awarded AS A PERCENTAGE OF EX-WORKS, packed indicating clearly in the price, schedule format given.

- Charges for packing and forwarding, inland transportation, insurance, and other local costs incidental to delivery of the goods to their destination; AS A PERCENTAGE OF EX-WORKS PRICE or otherwise indicating clearly in the price schedule format given.
- The cost of installation and commissioning as described in the technical specifications and in accordance with Special conditions of Contract about erection, testing and putting the equipment into satisfactory operations, including successful completion of performance and guarantee tests to be performed at the destination by Bidder/Supplier and AS A PERCENTAGE OF EX-WORKS PRICE or otherwise indicating clearly in the price schedule format given.
- The cost of incidental services listed in Clause 7 of Special Conditions of Contract AS PERCENTAGE OF EX-WORKS PRICE or otherwise indicating clearly in the price schedule format given.

9.3 The Bidder/Supplier's separation of price components in accordance with above will be solely for the purpose of facilitating the comparison of bids by the Purchaser and will not in any way limit the Purchaser's right to contract on any of the terms offered.

9.4 **Price of spare parts** All the Bidder/Suppliers are required to submit the following details about the spare parts, along with their bids:

- Spare parts required for the items quoted by the Bidder/Suppliers, as mentioned in BOQ.
- Item wise prices of all the spare parts valid, for acceptance by the Purchaser and placement of orders, for one year from the date of commissioning.
- The prices of the spares, if any as per BOQ shall be optional for evaluation

## 10. Price Adjustment

Please note that this is a fixed price PO and once the order placed, no price escalation shall be entertained.

## 11. Bid Currency

Prices shall be quoted in Indian Rupees only if a contract is awarded against this invitation for bid. Please note that this is a fixed price PO. No price adjustment shall be allowed on account of any changes in the landed cost due to variation in the Exchange rates and / or Customs Duty (combined effect).

## 12. Documents Establishing Bidder/Supplier's Experience and Qualifications (soft copy to be uploaded online)

12.1 Pursuant to Clause 7 the Bidder/Supplier shall furnish, as part of its bid, documents establishing the Bidder/Supplier's qualifications to perform the Contract if its bid is accepted. The Bidder/Supplier should also give information in the format attached to the Bidding Document.

- The documentary evidence of the Bidder/Supplier's qualifications to perform the Contract if its bid is accepted, shall establish to the Purchaser's satisfaction
- That in the case of a Bidder/Supplier offering to supply goods and services under the Contract which the Bidder/Supplier did not manufacture or otherwise produce, the Bidder/Supplier has been duly authorised by the goods' manufacturer or producer to supply the goods. The bid shall include manufacturer's authorisation form given in the bidding documents.
- The Bidder/Supplier has the financial, technical and production capability necessary to perform the Contract. To ascertain this, all bids submitted shall include the information as per the pro forma along with qualification application (Table 1, 2 & 3) in Appendices II.

- Copies of original documents defining the constitution or legal status, place of registration and principal place of business of the company or firm or partnership, etc.
  - Details of experience and past performance of the Bidder/Supplier on equipment offered and those of similar nature and those of similar nature within the past 5 years and details of current contracts in hand and other commitments.
  - Major items of plant and equipment available/ installed in the Bidder/Supplier's factory premises.
  - Qualification and experience of key personnel for successful execution of the contract.
  - Reports on financial standing of the Bidder/Supplier such as profit and loss statements, balance sheets and, auditor's report of the past three years, bankers' certificates etc.
  - Information regarding any current litigation in which the Bidder/Supplier is involved
- 12.2 Bidder/Suppliers who meet the criteria given above are subject to be disqualified if they have made untrue or false representations in the forms, statements and attachments submitted in proof of the qualification requirements or have record of poor performance such as abandoning the work, not properly completing the contract, inordinate delays in completion or financial failures etc.
- 13. Documents Establishing Goods' Conformity to Bidding Document (Soft copy to be uploaded online)**
- 13.1 Pursuant to **Clause 6** the Bidder/Supplier shall furnish, as part of its bid, documents establishing the conformity to the Bidding Document of all goods and services, which the Bidder/Supplier proposes to supply under the Contract.
- The documentary evidence of the goods' and services' conformity to the Bidding Document may be in the form of **literature, drawings, and data**, and shall furnish:
  - A detailed description of the goods' essential technical and performance characteristics
  - A list giving full particulars, including available sources and current prices, of all spare parts, special tools, etc. necessary for the proper and continuing functioning of the goods for a period of two years, following commencement of the goods' use by the Purchaser; and
  - A **clause-by-clause commentary on the Purchaser's Technical Specifications** demonstrating the goods and services' substantial responsiveness to those specifications or a statement of **deviations and exceptions** to the provisions of the Technical Specifications.
  - All the above documents shall be uploaded on the e tender website as mentioned in the IFB.
- 13.2 The purposes of the commentary to be furnished pursuant to above, the Bidder/Supplier shall note that standards for workmanship, material and equipment, and references to brand names or catalogue numbers designated by the Purchaser in its Technical Specifications are intended to be **descriptive only and not restrictive**. The Bidder/Supplier may substitute alternative standards, brand names and/or catalogue numbers in its bid, provided that it demonstrates to the Purchaser's satisfaction that the substitutions are substantially equivalent or superior to those designated in the Technical Specifications.
- 14. Bid Security (Earnest Money Deposit)**
- 14.1 Bid security proof to be uploaded online and DD/bank guarantee to be submitted in the office of Purchaser as mentioned in the IFB
- 14.2 Pursuant to Clause 6 the Bidder/Supplier shall furnish, as part of its bid, bid security (Earnest Money Deposit) as specified in the NIT (Notice Inviting Tender)/IFB.
- 14.3 The bid security is required to protect the Purchaser against the risk of Bidder/Supplier's conduct, which would warrant the security forfeiture.

- The bid security shall be denominated in Indian Rupees of value as specified and shall be in the form of BG or a Demand draft in favour of Purchaser payable at address mentioned in the IFB.

14.4 Any bid not accompanied with bid security in accordance with clause 14.1 and 14.3 above will be rejected by the Purchaser as non-responsive.

14.5 Unsuccessful Bidder/Suppliers' bid security will be discharged/ returned as promptly as possible but not later than 30 days after the expiration of the period of bid validity prescribed by the Purchaser. The successful Bidder/Supplier's bid security will be discharged upon the Bidder/Supplier's executing the Contract agreement on acceptance of the order.

14.6 The bid security may be forfeited:

- If a Bidder/Supplier withdraws its bid during the period of bid validity specified by the Bidder/Supplier on the Bid Form; or
- In the case of the successful Bidder/Supplier if the Bidder/Supplier fails:
  - To sign the Contract in accordance with Clause 28
  - To furnish performance security in accordance with Clause 29

## **15. Period of Validity of Bids**

15.1 Bids shall remain valid for 90 days after the last date of submission of the bids prescribed by the Purchaser, pursuant to Clause 16. A bid valid for a shorter period may be rejected by the Purchaser as non-responsive.

15.2 In exceptional circumstance, the Purchaser may prior to expiry of the initial validity period, solicit the Bidder/Suppliers' consent to an extension of the period of validity. The request and the responses thereto shall be made in writing (or by cable or telex/fax). The bid security provided under Clause 12 shall also be suitably extended. A Bidder/Supplier may refuse the request without forfeiting its bid security. A Bidder/Supplier granting the request will not be required nor permitted to modify its bid.

## **16. Format and Signing of Bid**

16.1 The Bidder/Supplier shall submit the tender online

16.2 All the technical document as well as eligibility criteria documents shall be uploaded on the website

## **17. Sealing and Marking of Bids**

17.1 NA as it is an E- Tender

## **18. Deadline for Submission of Bids**

18.1 The bid must be submitted online before the tender closing date as per IFB.

18.2 The Purchaser may, at its discretion, extend this deadline for the submission of bids by amending the Bidding Document in accordance with Clause 4 above in which case all rights and obligations of the Purchaser and Bidder/Suppliers previously subject to the deadline will thereafter be subject to the deadline as extended.

## **19. Late Bids**

Any bid uploaded by the Purchaser after the deadline for submission of bids shall be rejected as per e tender procedure.

## **20. Modification and Withdrawal of Bids**

20.1 The Bidder/Supplier may modify or withdraw its bid after the bid's submission as per e tender terms and conditions before the deadline of the bid submission.

20.2 The Bidder/Supplier's modification or withdrawal notice shall be prepared, sealed, marked and dispatched in accordance with the provisions of Clause 15. A withdrawal notice may also be sent by fax or e mail but followed by a signed confirmation copy, post marked not later than the deadline for submission of bids.

## **21. Opening of Bids by Purchaser**

21.1 The Purchaser will download the "technical bid" as per e tender procedure. After through scrutiny of technical bid including qualification criteria, only eligible bidder's (qualify the technical requirement of the bid) commercial bid shall be opened as per e tender norms.

## **22. Clarification of Bids**

To assist in the examination, evaluation, and comparison of bids the Purchaser may, at its discretion, ask the Bidder/Suppliers for a clarification of its bid. The request for clarification and the response shall be in writing and no change in the price or substance of the bid shall be sought, offered, or permitted.

## **23. Preliminary Examination**

23.1 The Purchaser will examine the bids to determine:

- Whether they are complete,
- Whether any computational errors have been made,
- Whether required sureties have been furnished,
- Whether the documents have been properly signed,
- Whether the bids are generally in order.

23.2 Arithmetical errors will be rectified on the following basis:

- If there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected. If the Bidder/Supplier does not accept the correction of the errors, its bid will be rejected. If there is a discrepancy between words and figures, the amount in words will prevail.

23.3 Prior to the detailed evaluation, pursuant to Clause 22, the Purchaser will determine the substantial responsiveness of each bid to the Bidding Document. For purposes of these clauses, a substantially responsive bid is one, which conforms to all the terms and conditions of the Bidding Document without material deviations. The Purchaser's determination of a bid's responsiveness is to be based on the contents of the bid itself without recourse to extrinsic evidence.

23.4 If the prices of certain components/sub-assemblies/spare parts are not included, the Purchaser will load the offer with the cost of these in evaluation if goods/equipment/plant is functional. If the Purchaser considers that without these the goods/equipment is not functional, then the bid will be treated as incomplete and non-responsive.

23.5 To facilitate loading incomplete bids, the highest cost of such components offered by other Bidder/Suppliers or the estimated cost of such components in the opinion of the Purchaser or other Purchases similarly made based on past experience shall be considered for loading incomplete bids.

23.6 Since the bid is invited for the complete job of design, supply, installation, and commissioning of the equipment/plant, the incomplete or part bids submitted by any Bidder/Supplier may not be considered for evaluation and may be liable for rejection.

23.7 A bid determined as not substantially responsive will be rejected by the Purchaser and may not subsequently be made responsive by the Bidder/Supplier by correction of the nonconformity.

23.8 The Purchaser may waive any minor informality or nonconformity or irregularity in a bid, which does not constitute a material deviation, provided such waiver, does not prejudice, or affect the relative ranking of the Bidder/Supplier.

## **24. Evaluation and Comparison of Bids**

24.1 The Purchaser will evaluate and compare the bids previously determined to be substantially responsive, pursuant to Clause 21. No bid will be considered if the complete requirement covered under this work is not included in the bid. However, the discounts offered by the Bidder/Suppliers, if any, will be considered in the evaluation of bids so as to determine the bid offering the lowest evaluated cost for the Purchaser in deciding award of contract/s.

24.2 The Purchaser's evaluation of a bid will include and consider, in the case of goods manufactured in India or goods of foreign origin already located in India, sales and other similar taxes, which will be payable on the goods if a contract is awarded to the Bidder/Supplier. Also, applicable excise duty payable by the Purchaser will be added to the bid price for evaluation.

24.3 The comparison shall be of free delivery at site basis including unloading and inclusive of all taxes (sales, works contract etc.) and duties (customs, countervailing, excise etc.) of the goods offered from within India, such price to include all costs as well as duties and taxes paid or payable on components & raw material incorporated in the goods as well as taxes & duties payable on finished goods and the installation and commissioning costs as per the provisions in the technical specification.

24.4 The Purchaser's evaluation of a bid will consider, in addition to the bid price and the price of incidental services, the following factors, in the manner and to the extent indicated in this Clause 23 and in the Technical Specifications:

- Type of Technology offered by the Bidder.
- Heat transfer area and heat balance of the system offered.
- Impact of the Design offered by the Bidder on the Civil building.
- Utility and product losses day consumptions provided.
- Production cost shall be calculated by the Purchaser based on the data provided by the Bidder for their offered system. If it is found that any Bidder/Supplier for any reason indicates impractical or impossible data to arrive Production cost guarantees, such data shall be corrected, and all the calculations shall be based on the data furnished by the highest Bidder/Supplier for the purpose of comparison.
- Product losses and CIP consumptions shall also be a part of production cost.
- cost of production impact on the Purchaser with respect to individual Bidder's technology performance. Cost loading shall be done accordingly.
- Delivery schedule offered in the bid.
- The cost of components and service.
- The availability of spare parts and after-sales services for the equipment offered in the bid.
- Deviation in payment schedule from that specified in the Special Conditions of Contract
- The quality and adaptability of the equipment offered.
- The performance and productivity of the equipment offered

24.5 Refer Subsection: "Criteria for technical Evaluation of Bid" for further details

24.6 If it is found that any Bidder/Supplier for any reason indicates impractical or impossible data to arrive performance guarantees, such data shall be corrected, and all the calculations shall be based on the data furnished by the highest Bidder/Supplier for the purpose of comparison.

## **25. Contacting the Purchaser**

25.1 Subject to Clause 21, **no Bidder/Supplier shall contact the Purchaser** on any matter relating to its bid, from the time of the bid opening to the time the Contract is awarded.

25.2 Any effort by a Bidder/Supplier to influence the Purchaser in the Purchaser's bid evaluation, bid comparison or contract award decisions may result in the rejection of the Bidder/Supplier's bid.

## **26. Post-qualification**

26.1 In the absence of pre-qualification, the Purchaser will determine to its satisfaction whether the Bidder/Supplier selected as having submitted the lowest evaluated responsive bid is qualified to satisfactorily perform the Contract.

26.2 The determination will consider the Bidder/Supplier's financial, technical and production capabilities. It will be based upon an examination of the documentary evidence of the Bidder/Supplier's qualifications submitted by the Bidder/Supplier, pursuant to Clause 10 as well as such other information as the Purchaser deems necessary and appropriate including details of experience and records of past performance.

26.3 An affirmative determination will be a prerequisite for award of the Contract to the Bidder/Supplier. A negative determination will result in rejection of the Bidder/Supplier's bid, in which event; the Purchaser will proceed to the next lowest evaluated bid to make a similar determination of that Bidder/Supplier's capabilities to perform satisfactorily.

26.4 Subject to Clause 26, the Purchaser will award the contract to the successful Bidder/Supplier whose bid has been determined to be substantially responsive and has been determined as the lowest evaluated bid provided further that the Bidder/Supplier is determined to be qualified to perform the contract satisfactorily as per Clause 22 and 24.

## **27. Right to Vary Quantities at the Time of Award**

The Purchaser reserves the right at the time of award of Contract to increase or decrease by up to 15% (Fifteen percent) the quantity of goods and services specified in the Schedule of Requirements without any change in unit rates as specified in the price break – up or other terms and conditions.

## **28. Right to Accept any Bid and to Reject Any or All Bids**

**The Purchaser reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids at any time prior to award of Contract, without thereby incurring any liability to the affected Bidder/Supplier or Bidder/Suppliers or any obligation to inform the affected Bidder/Supplier or Bidder/Suppliers of the grounds for the Purchaser's action.**

## **29. Notification of Award**

29.1 Prior to expiration of the period of bid validity, the Purchaser may notify the successful Bidder/Supplier in writing by registered letter or by email or fax to be confirmed in writing by registered letter, that its bid has been accepted.

29.2 The notification of award will constitute the formation of the Contract.

29.3 Upon the successful Bidder/Supplier's acceptance of the Purchase Order and signing of the contract agreement, the Purchaser will promptly notify each unsuccessful Bidder/Supplier and will discharge its bid security.



### **30. Signing of Contract**

- 30.1 At the same time as the Purchaser notifies the successful Bidder/Supplier that its bid has been accepted, the Purchaser will send the Bidder/Supplier the Contract Form /Purchase Order incorporating all agreements between the parties.
- 30.2 Within 30 days of receipt of the Contract, the successful Bidder/Supplier shall return the duplicate copy of the Order duly signed and sealed in token of acceptance of the order to the Purchaser.

### **31. Performance Security**

- 31.1 the successful Bidder/Supplier shall furnish the performance security in accordance with the special conditions of Contract, in the Performance Security Form provided in the Bidding Document or another form acceptable to the Purchaser.

### **32. Import License (if required)**

For the goods of foreign origin, if any, offered on CIF basis, only EPCG license shall be arranged by Purchaser. Then after all custom clearance will be responsibility of bidder/supplier (like demurrage, late fees, custom clearance charges etc.)

### **33. Turn-key Contract**

All the Bidder/Suppliers should quote for the design, supply, installation, testing, and commissioning of equipment as detailed in this bidding document on turn-key basis within the scope specified in the technical specification. The Purchaser shall, however, be at liberty to award the contract for the part or whole of the work.

### **34. Break-up prices**

All the Bidder/Suppliers shall furnish the cost separately for the supply and installation/commissioning along with detailed cost break-up (item-wise), which will be applicable for progressive payments. Items and works for which no break-up price is furnished by the Bidder/Supplier will not be paid for by the Purchaser when supplied/executed and shall be deemed covered by other break-up prices. Such breakup cost should be based on ex-works cost and percentage of ex-works cost should be indicated separately for packing and forwarding, transportation, insurance and other incidental charges, erection, and commissioning on percentage basis for each item.

### **35. Delivery Schedule of items**

Bidder/Suppliers should submit a detailed item wise delivery schedule keeping in view the completion period of the contract. Such items shall be grouped under monthly delivery schedule with total value of such items. This will facilitate for ensuring the cash flow requirement for the project.

### Check List of Bid Submission

SN	Requirement	Tick ✓
1	Bid Form on your letterhead	
2	Supporting Documents for eligibility criteria as per Invitation bid	
3	Qualification Application and supporting	
4	Manufacturers' Authorization Form	
5	Technical Deviation Statement form	
6	Commercial Deviation Statement form (with commercial Bid)	
7	Bid Security (Earnest Money Deposit) & Tender purchase DD details	
8	Power-of-attorney for authorized signatory	
9	Turnover Certificate from Chartered accountant for financial years as mentioned in the IFB	
10	Purchase orders as proof of experience as per IFB	
11	Solvency certificate from Bank	
12	PAN card, GST certificate from government authorities	
13	P & IDs for the process and utilities	
14	Site layout and GA drawings for major Equipment	
15	Utility Consumption as per the format mentioned in the technical data section	
16	Process Time Schedule for compete process	
17	Load histograms for utilities	
18	Manpower requirement with qualification for operation & maintenance of the proposed plant (Section wise)	
19	Project Execution Bar Chart	

Please note that if any of the above-mentioned documents are not submitted, Bid shall be rejected technically.

**Section III**  
**General Conditions of Contract**

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## Definitions

- 1.1 In this Contract, the following terms shall be interpreted as indicated:
- 1.2 "The **Contract**" means the agreement entered into between the Purchaser and the Bidder/Supplier, including all attachments and appendices thereto and all documents incorporated by reference therein.
- 1.3 "The **Contract Price**" means the **price payable** to the Bidder/Supplier under the Contract for the full and proper performance of its contractual obligations.
- 1.4 "The **Goods**" means all of the equipment, machinery, and/or other materials, which the Bidder/Supplier is required to supply to the Purchaser under the Contract.
- 1.5 "**Services**" means services ancillary to the supply of the Goods, such as transportation and insurance, and any other incidental services, such as installation, commissioning, provision of technical assistance, training and other such obligations of the Bidder/Supplier covered under the Contract.
- 1.6 "The **Purchaser**" means the Organization purchasing the Goods and services and would include the term "**Owner**".
- 1.7 "The **Bidder/Supplier**" means the individual or firm supplying the Goods and services under this Contract would include also the terms "**contractor**" or "**Bidder/Supplier**".
- 1.8 **Engineer-in-charge** means the Engineer designated as such or other Engineer appointed from time to time by the Purchaser and notified in writing to the Bidder/Supplier to act as Engineer-in-charge for the purposes of contract.
- 1.9 "**Erection**" means installation of equipment as per installation drawing such as layouts, etc.
- 1.10 "**Pre-commissioning Testing**" means the mechanical trials and water trials to be conducted on the Plant by the Bidder. Pursuant to the completion of the "Pre-commissioning testing", Bidder shall notify Purchaser of its readiness to commence the "Commissioning".
- 1.11 "**Commissioning & Product Trials**" means conducting product trials and stabilizing plant operations. The raw materials /prerequisite services shall be made available within maximum 30 days after completion of Pre-commissioning Testing to commence the product trials or else Plant shall be deemed as commissioned and any Process Warranties given discharged. Upon completion of commissioning, Bidder shall notify the Purchasers of its readiness for commencing the "Acceptance Tests"
- 1.12 "**Acceptance Tests**" means conducting "Plant Performance Tests" as defined by the Bidder with support from the Purchaser in respect of utilities, manpower, raw materials consumables, and personnel.
- 1.13 "**Acceptance Certificate**" means the certificate issued by the Purchaser to the Bidder when Process Warranties are discharged or deemed discharged.
- 1.14 "**Process Warranties**" means the process warranties given by the Bidder in respect of the Plant.

## 2. Application

- 2.1 These General Conditions shall apply to the extent that provisions in other parts of the Contract do not supersede them.

## 3 Definition of Country of origin

- 3.1 For purpose of this Clause "**origin**" means the **place** where the Goods were mined, grown, or produced, or from which the Services are supplied. Goods are produced when, through manufacturing, processing, or substantial and major assembling of components, a commercially recognized new product results that is substantially different in basic characteristics or in purpose or utility from its components. The origin of Goods and Services is distinct from the nationality of the Bidder/Supplier.

#### **4 Standards**

4.1 The Goods supplied under this Contract shall conform to the standards mentioned in the Technical Specifications, and, when no applicable standard is mentioned, to the latest Indian Standards.

#### **5. Use of Contract Documents and Information**

5.1 The Bidder/Supplier **shall not**, without the Purchaser's prior written consent, **disclose the Contract**, or any provision thereof, or any specification, plan, drawing, pattern, sample, or information furnished by or on behalf of the Purchaser in connection therewith, to any person other than a person employed by the Bidder/Supplier in the performance of the Contract. Disclosure to any such employed person shall be made in confidence and shall extend only so far as may be necessary for purposes of such performance.

5.2 The Bidder/Supplier **shall not**, without the Purchaser's prior written consent, make use of any document or information except for purposes of performing the Contract.

5.3 Any document, other than the Contract itself, shall remain the property of the Purchaser and shall be returned (in all copies) to the Purchaser on completion of the Bidder/Supplier's performance under the Contract if so, required by the Purchaser.

#### **6 Patent Rights**

6.1 The Bidder/Supplier shall **indemnify the Purchaser** against all third-party claims of infringement of patent, trademark or industrial design rights arising from use of the Goods or any part thereof.

#### **7. Performance Security**

7.1 The Bidder/Supplier shall furnish performance security to the Purchaser in the amount specified in the Special Conditions of Contract.

7.2 The proceeds of the performance security shall be payable to the Purchaser as **compensation for any loss** resulting from the Bidder/Supplier's failure to complete its obligations under the Contract.

7.3 The **Performance Security** shall be denominated in **Indian Rupees** and shall be in one of the following forms:

- A bank guarantee issued by a Nationalized Bank/ Scheduled bank as mentioned in the tender Appendix -1 operating in India and in the form provided in the Bidding Document. Such bank guarantee shall be valid till the expiry of the warranty period.
- Demand Draft from a Nationalized Bank in favor of Purchaser payable at the address mentioned in the IFB.

7.4 The performance security will be discharged by the Purchaser and returned to the Bidder/Supplier not later than 30 days following the date of completion of the Bidder/Supplier's performance obligations, including any warranty obligations, under the Contract.

#### **8 Inspection and Tests**

8.1 The Purchaser or its representative shall have the **right to inspect** and/or test the Goods to confirm their conformity to the Contract. The Special Conditions of Contract and/or the Technical Specifications shall specify what inspections and tests the Purchaser requires and where they are to be conducted. The Purchaser shall notify the Bidder/Supplier in writing of the identity of any representatives, if retained for these purposes.

8.2 The inspections and tests may be conducted on the date of delivery and/or at the Good's final destination. Where conducted on the premises of the Bidder/Supplier or its subcontractors(s), all reasonable facilities and assistance including access to drawings and production data shall be furnished to the inspectors at no charge to the Purchaser. In case of any defects or deficiency notified by the Purchaser's inspection authority, the

Bidder/Supplier will rectify and make good the same without delay and not proceed with further processing of such item(s) of Goods without obtaining approval from the inspection authority.

- 8.3 Should any inspected or tested Goods fail to conform to the Specifications, the Purchaser may reject them, and the Bidder/Supplier shall either replace the rejected Goods or make all alterations necessary to meet specification requirements free of cost to the Purchaser.
- 8.4 The Purchaser's right to inspect, test and, where necessary, reject the Goods after the Goods' arrival at the destination shall in no way be limited or waived by reason of the Goods having previously been inspected, tested, and passed by the Purchaser or its representative prior to the Goods shipment from the country of origin.
- 8.5 Nothing in **this clause** shall in any way release the Bidder/Supplier from any warranty or other obligations under this Contract.

## **9 Packing and Marking**

- 9.1 The Bidder/Supplier shall provide such packing of the Goods as is required to prevent their damage or deterioration during transit to their final destination as indicated in the Contract. The packing shall be sufficient to withstand, without limitation, rough handling during transit and exposure to temperature, salt and precipitation during transit and open storage. Packing case size and weights shall take into consideration, where appropriate, the remoteness of the Goods' final destination and the absence of heavy handling facilities at all points in transit.
- 9.2 The packing, marking and documents within and outside the packages shall comply strictly with such special requirements as shall be expressly provided for in the Contract and, subject to **Clause 18**, in any subsequent instructions ordered by the Purchaser.
- 9.3 Each package shall be marked to indicate a) Name of the Bidder/Supplier, b) Details of items in the package, c) Name of the Consignee, d) Purchase Order Number, e) Gross, net and tare weights of the item, f) Destination.

## **10. Delivery and Documents**

- 10.1 Delivery of the goods shall be made by the Bidder/Supplier in accordance with the terms specified by the Purchaser in its Schedule of Requirements and the Special Conditions of Contract. For the purpose of the Contract, "**FOB**", "**C&F**", "**CIF**", "**FOR Destination**", "**Free delivery at site**" and other trade terms used to describe the obligations of the parties shall have the meanings as per the common trade practices.

## **11. Insurance**

- 11.1 The goods supplied under the Contract shall be fully insured in Indian Rupees against loss or damage incidental to manufacture or acquisition, transportation, storage and delivery in the manner specified in the Special Conditions of Contract. Where the Purchaser requires delivery of the Goods on free delivery at site basis; the Bidder/Supplier shall arrange and pay for marine insurance naming the Purchaser as the beneficiary. The Bidder/Supplier shall provide a copy of the insurance policy along with invoice to the Purchaser who will plan to extend the validity of the policy, if necessary. The Bidder/Supplier shall initiate and pursue claim till settlement and promptly plan for repair and/or replacement of any damaged item/s irrespective of settlement of claim by the underwriters.

## **12. Transportation**

- 12.1 The Bidder/Supplier is required under the Contract to deliver the Goods FOR destination, specified in the Schedule of Requirement. Transport of the Goods, up to the destination shall be arranged and paid for by the Bidder/Supplier and the cost thereof shall be included in the Contract Price. Where the Bidder/Supplier is required to effect delivery under any other terms, for example, by post or to another address in the source country, the Bidder/Supplier shall be required to meet all transport and storage expenses until delivery. In all the above cases, transportation of the Goods after delivery shall be the responsibility of the Purchaser.

### 13. Incidental Services

13.1 As specified in the Special Conditions of Contract, the Bidder/Supplier shall be required to provide any or all of the following services:

- Performance or supervision of on-site assembly and/ or start-up of the supplied Goods.
- Furnishing of tools required for assembly and/or maintenance of the supplied goods
- Furnishing of a detailed operations and maintenance manual for each appropriate unit of the supplied Goods; and manuals covering the operation and maintenance of automation software and control systems.
- Performance or supervision or maintenance and/or repair of the supplied Goods, for a period agreed by the parties, provided that this service shall not relieve the Bidder/Supplier of any warranty obligations under this Contract and
- Conduct of training of the Purchaser's personnel, at the Bidder/Supplier's plant and/or on-site, in assembly, start-up operation, maintenance and/or repair of the supplied Goods.

### 14. Spare Parts

14.1 As specified in the Special Conditions of contract, the Bidder/Supplier may be required to provide any or all of the following materials and notifications pertaining to spare parts manufactured or distributed by the Bidder/Supplier:

- Such spare parts as the Purchaser may decide to purchase from the Bidder/Supplier, provided that this decision shall not relieve the Bidder/Supplier of any warranty obligations under the Contract; and
- In the event of termination of production of the spare parts:
- Advance notification to the Purchaser of the pending termination, in sufficient time to permit the Purchaser to procure its needed requirements; and
- Following such termination, furnishing at no cost to the Purchaser, the soft copies, the blueprints, drawings, and specifications of the spare parts, if and when requested.

### 15. Warranty/Guarantee

15.1 The Bidder/Supplier warrants that the Goods and equipment supplied, installed, and commissioned under the Contract are new, unused, of the most recent or current models and incorporate all recent improvements in design and materials unless provided otherwise in the Contract. The Bidder/Supplier further warrants that the Goods supplied under this Contract shall have no defect arising from design, materials, or workmanship (except in so far as the design or material is required by the Purchaser's Specifications) or from any act or omission of the Bidder/Supplier, that may develop under normal use of the supplied Goods in the conditions obtaining in the country of final destination. The Bidder/Supplier also guarantees that the Goods supplied shall perform satisfactorily as per the designed/rated/installed capacity as provided for in the Contract. The warranty will not cover normal wear and tear of consumables and minor spares.

**15.2 This warranty/guarantee shall remain valid for not less than 12 months after the Goods or any portion thereof as the case may be, have been successfully commissioned and plant handed over to the Purchaser.**

15.3 The Purchaser shall promptly notify the Bidder/Supplier in writing of any claims arising under this warranty.

15.4 Upon receipt of such notice, the Bidder/Supplier shall, with all reasonable speed, repair or replace the defective Goods or parts thereof, without costs to the Purchaser other than, where applicable, the cost of inland delivery of the repaired or replaced Goods or parts from the port of entry to the final destination.

15.5 If the Bidder/Supplier, having been notified, fails to remedy the defect(s) within a reasonable period, the Purchaser may proceed to take such **remedial action** as may be necessary, at the **Bidder/Supplier's risk and**



**expense** and without prejudice to any other rights which the Purchaser may have against the Bidder/Supplier under the Contract.

15.6 This warranty/guarantee shall not cover any damage/s resulting from.

15.6.1 normal wear and tear or improper handling/operation by the Purchaser or his authorized representatives.

15.6.2 The equipment has been modified without the prior written approval of Bidder.

15.7 The Bidder/Supplier shall guarantee the complete installation for satisfactory performance for a minimum period of twelve months from the date of commissioning. The Bidder/Supplier at his own cost shall rectify any defect arising out of faulty installation or use of substandard material or workmanship.

## **16. Payment**

16.1 The method and conditions of payment to be made to the Bidder/Supplier under the Contract shall be specified in the Special Conditions of Contract.

16.2 The Bidder/Supplier's request(s) for payment shall be made to the Purchaser in writing, accompanied by an invoice describing, as appropriate, the Goods delivered and Services performed, and by shipping documents, submitted pursuant to Clause 10, and fulfillments of other obligations stipulated in the Contract.

16.3 Payments shall be made promptly by the Purchaser within forty-five (45) days of submission of an invoice/claim by the Bidder/Supplier.

## **17. Prices**

17.1 Prices charged by the Bidder/Supplier for Goods delivered and Services performed under the Contract shall not, with the exception of price adjustments authorized by the special conditions of the contract, vary from the prices quoted by the Bidder/Supplier in its bid and the Contract shall be on fixed price basis. Variation due to changes in statutory levies shall be acceptable within the contact period.

## **18. Change Orders**

18.1 The Purchaser may, at any time, by a written order given to the Bidder/Supplier make changes within the general scope of the Contract in any one or more of the following:

- Drawings, designs, or specifications, where Goods to be furnished under the Contract are to be specifically manufactured for the Purchaser
- The method of shipment or packing
- The place of delivery or
- The Services to be provided by the Bidder/Supplier.

18.2 If any such change causes an increase or decrease in the cost of, or the time required for, the Bidder/Supplier's performance of any part of the work under the Contract, whether changed or not changed by the order, an equitable adjustment shall be made in the Contract Price or delivery schedule, or both, and the Contract shall accordingly be amended. Any claims by the Bidder/Supplier for adjustment under this clause must be asserted within thirty (30) days from the date of the Bidder/Supplier's receipt of the Purchaser's change order.

## **19. Contract Amendment**

19.1 No variation in or modification of the terms of the Contract shall be made except by written amendment signed by the parties.

## **20. Assignment**

20.1 The Bidder/Supplier shall not assign, in whole or in part, its obligations to perform under the Contract, except with the Purchaser's prior written consent.

## **21. Sub-contracts**

21.1 The Bidder/Supplier shall notify the Purchaser in writing of all sub-contracts awarded under the Contract if not already specified in his bid. Such notification, in his original bid or later, shall not relieve the Bidder/Supplier from any liability or obligation under the Contract.

21.2 Sub-contracts must comply with the provisions of **Clause 5**.

## **22. Delays in the Bidder/Supplier's Performance**

22.1 Delivery of the Goods and performance of Services shall be made by the Bidder/Supplier in accordance with the time schedule specified by the Purchaser in its Schedule of Requirements.

22.2 An unexcused delay by the Bidder/Supplier in the performance of its delivery obligations shall render the Bidder/Supplier liable to any or all of the following sanctions:

- Forfeiture of its performance security,
- Imposition of liquidated damages, and/or
- Termination of the Contract for default

22.3 If at any time during performance of the Contract, the Bidder/Supplier or its subcontractor(s) should encounter conditions impeding timely delivery of the Goods and performance of Services, the Bidder/Supplier shall promptly notify the Purchaser in writing of the fact of the delay, its likely duration, and its cause(s). As soon as practicable after receipt of the Bidder/Supplier's notice, the Purchaser shall evaluate the situation and may at its discretion extend the Bidder/Supplier's time for performance, in which case the extension shall be ratified by the parties by amendment of the Contract.

## **23. Liquidated Damages**

23.1 Subject to **Clause 25**, if the Bidder/Supplier fails to deliver any or all of the Goods or perform the Services within the time period(s) specified in the Contract, the Purchaser shall, without prejudice to its other remedies under the Contract, deduct from the Contract Price, as liquidated damages as under:

**a. For the Supply Component:**

A sum equivalent to **0.5%** of the delivered price of the delayed goods (As per the price break up furnished by the bidder and accepted by the Purchaser, which the bidder fails to supply within the time period specified in the contract for each week of delay provided that such liquidated damage shall not be due where bidder has failed to deliver minor portion of good that does not delay the work and Purchaser has not incurred any resulting loss or damage.

**b. For the Erection and Commissioning Component:**

A sum equivalent to **0.5%** of the un – executed portion of each week of delay or part thereof beyond the time specified in the contract for the successful completion of the plant. The total amount so deducted as per above, shall not exceed **10%** of the Contract value. Once the maximum is reached, the Purchaser may consider termination of the Contract.

23.2 Any incremental taxes and levies on account of delay in performance of the Contract by the Bidder/Supplier shall be to the Bidder/Supplier's account.

23.3 It shall be the contractor's responsibility to protect the public and his employees, against accidents of fatal and non-fatal nature from any cause whatsoever. He shall indemnify PURCHASER against any claim for damages for injury and death to persons and property due to any accidents and shall, where the provisions of the Workmen's Compensation Act apply, take steps to ensure against any claims made thereunder.

## **24. Termination for Default**

- 24.1 The Purchaser may, without prejudice to any other remedy for breach of contract, by written notice of default sent to the Bidder/Supplier, terminate the Contract in whole or in part:
- If the Bidder/Supplier fails to deliver any or all of the Goods within the time period(s) specified in the Contract, or any extension thereof granted by the Purchaser pursuant to Clause 22 or
  - If the Bidder/Supplier fails to perform any other obligation(s) under the Contract.
- 24.2 In the event the Purchaser terminates the Contract in whole or in part, pursuant to **Clause 24**, the Purchaser may procure, upon such terms and in such manner, as it deems appropriate, Goods similar to those undelivered, and the Bidder/Supplier shall be liable to the Purchaser for any excess costs for such similar Goods. However, the Bidder/Supplier shall continue performance of the Contract to the extent not terminated.
- 24.3 Consequent to such termination of Contract, the Purchaser shall **recover the advance paid**, if any, to the Bidder/Supplier along with **interest @ 18% per annum compounded quarterly** on the last day of March, June, September, and December on the advance paid for the entire period for which the advance was retained by the Bidder/Supplier.

## **25. Force Majeure**

- 25.1 Nevertheless the provisions of Clauses 22, 23 and 24, the Bidder/Supplier shall not be liable for forfeiture of its performance security, liquidated damages, or termination for default, if and to the extent that, its delay in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure.
- 25.2 For purposes of this clause, "**Force Majeure**" means an event beyond the control of the Bidder/Supplier and not involving the Bidder/Supplier's fault or negligence and not foreseeable. Such events may include, but are not restricted to, acts of the Purchaser either in its sovereign or contractual capacity, wars or revolutions, fires, floods, epidemics, quarantine restrictions and freight embargoes.
- 25.3 If a Force Majeure situation arises, the Bidder/Supplier shall promptly notify the Purchaser in writing of such condition and the cause thereof. Unless otherwise directed by the Purchaser in writing, the Bidder/Supplier shall continue to perform its obligations under the Contract as far as is reasonably practical and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.

## **26. Termination for Insolvency**

- 26.1 The Purchaser may at any time terminate the Contract by giving written notice to the Bidder/Supplier, without compensation to the Bidder/Supplier, if:
- The Bidder/Supplier becomes bankrupt or otherwise insolvent,
  - The Bidder/Supplier being a Company is wound up voluntarily by the order of a Court receiver, liquidator or Manager appointed on behalf of the debenture holders or circumstances shall have arisen which entitle the court or debenture holders to appoint a receiver, liquidator or a Manager, provided that such termination will not prejudice or affect any right of action or remedy which has accrued or will accrue thereafter to the Purchaser.

## **27. Termination for Convenience**

- 27.1 The Purchaser, may by written notice sent to the Bidder/Supplier, terminate the Contract, in whole or in part, at any time for its convenience. The notice of termination shall specify that termination be for the Purchaser's convenience, the extent to which performance of work under the Contract is terminated, and the date upon which such termination becomes effective.

27.2 The Purchaser shall purchase the Goods that are complete and ready for dispatch within 30 days after the Bidder/Supplier's receipt of notice of termination at the Contract terms and prices. For the remaining Goods, the Purchaser may decide:

- To have any portion completed and delivered at the Contract terms and prices and/or
- To cancel the remainder and pay to the Bidder/Supplier an agreed amount for partially completed Goods and for materials and parts previously procured by the Bidder/Supplier.

Both Purchaser and Bidder shall mutually settle all terminations as per clause 24, 25, 26 and 27.

## **28. Resolution of Disputes**

28.1 The Purchaser and the Contractor shall make every effort to resolve amicably by direct informal negotiations any disagreement or dispute arising between them under/or in connection with the contract.

28.2 In case of dispute/ disagreement related to the quality of materials used, workmanship and interpretation of causes related to specification etc shall be resolved by negotiations and the say of the Managing Director, Purchaser shall be taken as final and binding on the Contractor. Such issues shall not be a subject matter of litigation of any nature.

## **29. Governing Language**

29.1 The Contract shall be written in the language of the bid, as specified by the Purchaser in the Instructions to Bidder/Suppliers. Subject to **Clause 30**, that language version of the Contract shall govern its interpretation. All correspondence and other documents pertaining to the Contract, which are exchanged by the parties, shall be written in that same language.

## **30. Applicable Law**

30.1 The Contract shall be interpreted in accordance with the laws of the **Union of India**.

## **31. Notices**

31.1 Any notice given by one party to the other pursuant to the Contract shall be sent in writing or by email and confirmed in writing to the address specified for that purpose in the Special Conditions of Contract.

31.2 A notice shall be effective when delivered or on the notice's effective date, whichever is later.

## **32. Taxes and Duties**

32.1 The **Bidder/Supplier** shall be **entirely responsible** for all taxes, duties, license fees, etc. incurred until delivery of the contracted Goods to and taking over of the works by the Purchaser. The onus of paying all the statutory levies as per the applicable tariff heads and norms shall be on the Bidder/Supplier.

## **33. Right to use defective equipment**

33.1 If after delivery, acceptance, and installation and within the guarantee and warranty period, the operation or use of the equipment proves to be unsatisfactory, the Purchaser shall have the right to continue to operate or use such equipment until rectification of defects, errors or omissions by repair or by partial or complete replacement is made without interfering with the Purchaser's operation.

## **34. Income Tax and Other Taxes**

34.1 The Bidder/Supplier shall be liable to pay all corporate taxes, income tax and other taxes that shall be levied according to the laws and regulations applicable from time to time and the price bid by the Bidder/Supplier shall

include all such taxes. Wherever the laws and regulations require deduction of such taxes at the source of payment, the Purchaser shall affect such deductions from the payment due to the Bidder/Supplier. The remittance of amounts so deducted and issuance of certificate for such deductions shall be made by the Purchaser as per the laws and regulations in force. Nothing in the Contract shall relieve the Bidder/Supplier from his responsibility to pay any tax that may be levied on income and profits made by the Bidder/Supplier in respect of the Contract. The Bidder/Supplier's staff, personnel and labour will be liable to pay personal income taxes in respect of such of their salaries and wages as are chargeable under the laws and regulations for the time being in force, and the Bidder/Supplier shall perform such duties in regard to such deductions thereof as may be imposed on him by such laws and regulations. The Purchaser shall not, in any way, be responsible for such payments by the Bidder/Suppliers' staff.

**35. Jurisdiction**

The Courts at Kolkata and courts of West Bengal State shall have exclusive jurisdiction to decide any disputes.



Managing Director  
W.B.L.D.C.Ltd.

**Section IV - Part I**  
**Special Conditions of Contract**

## Contents

1. Definitions
2. Equivalency of Standards and Codes
3. Performance Security
4. Inspection and Tests
5. Delivery and Documents
6. Insurance
7. Incidental services
8. Spare Parts
9. Losses during Trials
10. Warranty/Guarantee
11. Payment
12. Resolution of Disputes
13. Notices

The following special conditions of contract shall supplement the General conditions of contract. Whenever there is a conflict, the provisions herein shall prevail over those in the General conditions of contract. The corresponding clause number of the General conditions is indicated in parentheses:

**4.1 Definitions (Clause 1)**

4.1.1 The Bidder is (Name of Bidder).

**4.2 Equivalency of Standards and codes**

4.2.1 Wherever reference is made in the contract to the respective standards and codes in accordance with which goods and materials are to be furnished and work is to be performed or tested, the provisions of the latest current edition or revision of the relevant standards and codes in effect shall apply, unless otherwise expressly set forth in the contract. Where such standards and codes are national in character, or relate to a particular country or region, other authoritative standards and codes specified will be accepted subject to the Purchaser's prior review and written approval. Difference between the standards specified described in writing by the bidder and submitted to the bidder desires the Purchaser's approval. In the event the Purchaser determines that such proposed deviations do not ensure equal or higher quality, the bidder shall comply with the standards set forth in the documents.

**4.3 Performance Security (Clause 7)**

4.3.1 The Performance Security shall be in the amount of 10% of the contract price up to sixty days after the date of completion of performance obligations including warranty obligations.

**4.4 Inspection and tests (Clause 8)**

4.4.1 The inspection of the goods shall be carried out to check whether the goods are in conformity with the technical specifications attached to the purchase order form and shall be in line with the inspection/test procedures laid down in the schedule of specifications and the contract conditions.

**4.5 Delivery and Documents (Clause 10)**

4.5.1 For imported goods

Upon shipment, the Bidder shall notify the Purchaser and the Insurance Company by E mail or Fax the full details of the shipment including purchase order number, description of goods, quantity, the vessel, the bill of lading number and date, port of loading, date of shipment, port of discharge, etc. The bidder shall mail the following documents to the Purchaser, with a copy to the Insurance Company:

Original and seven copies of:

- i) the bidder's invoice showing purchase order no., goods description, quantity, unit price, total amount.
- ii) the negotiable, clean, on-board bill of lading marked freight prepaid and six copies of non-negotiable bill of lading.
- iii) packing list identifying contents of each package.
- iv) Insurance certificate.
- v) Manufacturer's/bidder's guarantee certificate.
- vi) Inspection certificate, issued by the nominated inspection agency and the bidder's factory inspection report; and
- vii) Certificate of origin.
- viii) The bidder's certificate certifying that the defects pointed out during inspection have been rectified.



The above documents shall be received by the Purchaser at least one week before arrival of the goods at the port and, if not received, the bidder will be responsible for any consequent expenses.

#### 4.5.2 For Domestic Goods

Original and seven copies of:

- ix) the bidder's invoice showing purchase order no., Goods description, quantity, unit price, total amount.
- x) Delivery note/packing list/lorry receipt.
- xi) Manufacturer's/Bidder's guarantee certificate.
- xii) Inspection Certificate issued by the nominated inspection agency, and the Bidder's factory inspection report.
- xiii) Certificate of origin.
- xiv) Insurance policy.
- xv) GST gate pass/octroi receipts, wherever applicable, duly sealed indicating payments made; and
- xvi) Any other document evidencing payment of statutory levies.

Note: The nomenclature used for the item description in the invoice/s, packing list/s and delivery note/s etc. should be identical to that used in the purchase order/contract. The dispatch particulars including name of transporter, LR no. and date should also be mentioned in the invoice/s.

#### 4.6 Insurance (clause 11)

4.6.1 The marine/transit insurance shall cover an amount equal to 110% of the FOR-destination value of the goods from "warehouse to warehouse" on "All Risks" basis including War Risks and Strike clauses valid for a period not less than 3 months after the date of arrival of Goods at final destination.

4.6.2 The insurance shall be for transit as well for storage of goods up to the completion of commissioning & Product trials.

#### 4.7 Incidental services (Clause 13)

4.7.1 The incidental services shall be provided as per the requirements outlined in the Schedule of Specifications and as covered under Clause 3.13. The cost shall be included in the contract price, if provided for in the scope of the scope of the Contract.

#### 4.8 Spare Parts (Clause 14)

4.8.1 Bidders shall carry sufficient inventories to assure ex-stock supply of consumable spares such as gaskets, plugs, washers, belts, etc. other spare parts and components shall be supplied as promptly as possible but, in any case, within one months of placement of order.

#### 4.9 Losses during Trial :( Clause 23)

Shall be as mentioned in the technical offer relevance subsection

#### 4.10 Warranty/Guarantee (Clause 15)

4.10.1 The warranty/guarantee shall be as per provision under clause 15 of GCC

#### **4.11**

#### **Payment (Clause16)**

##### **4.11.1**

Payment for supply, installation and commissioning contracts:

Any request for Advance Payment will not be entertained. However, in exceptional cases, advance amount up to 10% advance may be allowed against 110% Bank Guaranty

1. Bills to be produced in DUPLICATE.
2. The payment shall be made as per projected Performance Chart both Physical and Financial submitted by the Agency within 14 days of Issuing of Award of Contract based on Job completion period on approved Design/Lay-Out.
3. However, as per instruction of the authority from time to time, the successful bidder shall have to produce the BAR CHART in terms of % of completion of work and Physical progress of the work accordingly
4. Payment shall be made after executing the order satisfactory in all respect. However, no interest shall be paid to the firm, if the payment is delayed due to whatsoever reasons. The payment of bills shall be withheld in case of violation of any tender terms & conditions.

However, no interest shall be paid to the firm, if the payment is delayed due to whatsoever reasons. The payment of bills shall be withheld in case of violation of any tender terms & conditions.

Approve rate ( percentage BOQ on put to tender amount) based on Final Selection as per criteria including GST , labour Cess, all taxes and Charges . If any changes in GST and other Govt. Taxes as well as charges as per latest Govt. Circular occur during implementation period ( Job progressive period) , it will be taken juristically as per Govt rules as decided by the Tender Inviting Authority.

#### **4.12**

#### **Resolution of Disputes (Clause 3.28)**

##### **4.12.1**

All disputes or differences in respect of which the decisions not final and conclusive shall, on the initiative of either party, be referred to the receipt the dispute to arbitration, the Purchaser shall refer the dispute to arbitration, the Purchaser shall finalize a panel of three Arbitrators and intimate the same to the bidder. The bidder shall within fifteen days of receipt of this list select and confirm his acceptance to the appointment of one from the panel as Arbitrator. If the bidder fails to communicate his selection of name, within the stipulated period, the Purchaser shall within the stipulated period, the Purchaser shall without delay select one from the panel and appoint him as the sole Arbitrator. If the Purchaser fails to send such a panel within thirty days, as stipulated, the bidder shall send a similar panel to the Purchaser within fifteen days. The Purchaser shall then select one from the panel and appoint him as the sole Arbitrator within fifteen days. If the Purchaser fails to do so, the bidder shall communicate to the Purchaser the name of one from the panel who shall than be the sole Arbitrator. The appointment of sole Arbitrator so made shall be final and conclusive. The Arbitration shall be conducted in accordance with the provisions of the Indian Arbitration and Conciliation Act, 1960 and rules there under or any statutory modifications thereof for the time being in force. The Arbitration proceedings shall be held in Address mentioned in "Invitation for Bid" at the time as the sole Arbitrator may decide. The decision of the sole Arbitrator shall be final and binding upon the parties and the expenses of the Arbitrator shall be paid as may be determined by the Arbitrator.

Performance under the contract shall, if reasonably possible, continue during the Arbitration proceedings and payments due to the bidder by the Purchaser shall not be withheld, unless they are the subject of the Arbitration proceedings.

All awards for claims equivalent to Rupees thirty thousand or more shall be in writing and state the reasons for the amounts awarded.

Neither party is entitled to bring a claim to Arbitration if its Arbitrator has not been appointed within thirty days after expiration of the warranty/guarantee period.

#### **4.13**

#### **Notices (Clause 3.31)**

##### **4.13.1**

For the purpose of all the notices, the following shall be the address of the Purchaser and bidder.

**Purchaser** – Address as mentioned in Invitation for Bid

**Bidder** (To be filled in at the time of contract signature.)

**Section IV – Part II**  
**Special Conditions of Contract**  
**for**  
**General Erection & Commissioning**

## Contents

1. Sufficiency Of Tender
  2. Programme Of Installation & Commissioning
  3. Preparation of Drawings for Approval
  4. Superintendence, Team And Conduct
  5. Purchaser's Instructions
  6. Right Of The Purchaser
  7. Bidder/Supplier's Functions
  8. Variations
  9. Duties of the Bidder/Supplier Vis-a-Vis the Purchaser
  10. Supply Of Tools, Tackles And Materials
  11. Protection Of Plant
  12. Unloading, Transportation And Inspection
  13. Storage Of Equipment
  14. Approvals
  15. Review & Co-Ordination of Erection Work
  16. Extension of Time for Completion
- Table 1 List of Drawings required Submission

## **1. Sufficiency of Tender**

- 1.1 The Bidder/Supplier by bidding shall be deemed to have satisfied himself as to all the conditions and circumstances affecting the Contract Price, as to the possibility of executing the works as shown and described in the Contract, as to the general circumstances at the site of the works, as to the general labor position at site and to have determined the prices accordingly.

## **2. Programme of Installation & Commissioning**

- 2.1 As soon as practicable after the acceptance of the bid, the Bidder/Supplier shall submit to the Purchaser for his approval a comprehensive programme in the form of PERT network/ bar chart and any other form as may be required by the Purchaser showing the sequence of order in which the Bidder/Supplier proposes to carry out the works including the design, manufacture, delivery to site, erection and commissioning thereof. After submission to and approval by the Purchaser of such programme, the Bidder/Supplier shall adhere to the sequence of order and method stated therein. The submission to and approval by the Purchaser of such programme shall not relieve the Bidder/Supplier of any of his duties or responsibilities under the Contract. The programme approved by the Purchaser shall form the basis of evaluating the pace of all works to be performed by the Bidder/Supplier. The Bidder/Supplier shall update the PERT Network every month, submit it to the Purchaser and shall inform the Purchaser the progress on all the activities falling on schedule for the next reporting date.

## **3. Preparation of Drawings for Approval**

- 3.1 The Bidder/Supplier should visit the site to acquaint himself in respect of existing site conditions and to know the details/information required for understanding the nature and type of civil construction works involved in the project. The Bidder/Supplier shall submit to the Purchaser for approval:
- Within the time given in the specification or in the program, such drawings, samples, patterns and models as may be called for therein, and in numbers therein required.
  - During the progress of works and within such reasonable times as the Purchaser may require such drawings of the general arrangement and details of the works as the Purchaser may require.
- 3.2 Wherever necessary, the Bidder/Supplier would be provided with a set of architectural drawings for the buildings where the erection works would be carried out and also the equipment details/ drawings of various equipment handed over to the Bidder/Supplier by the Purchaser.
- 3.3 The specifications/ conditions concerning the submission of drawings by the Bidder/Supplier are detailed as under:
- 3.4 Within four weeks from the date of receipt of the order, Bidder/Supplier shall furnish a list of all necessary drawings, which the Bidder/Supplier shall submit for approval, identifying each drawing by a serial number and descriptive title and expected date of submission. A brief list of drawings is given in Table 1. This list shall be revised and extended if necessary, during the progress of work depending on the nature of the contract also.
- 3.5 The Purchaser shall signify his approval or disapproval of all drawings or such drawings that would affect progress of the contract as per the agreed programme.
- 3.6 The Purchaser shall issue, within four weeks of time in all circumstances, any drawing requested by the Bidder/Supplier and required to be provided by us. If the Bidder/Supplier suffers delay and/ or incurs costs due to delay on Purchaser's part in this regard, then the Purchaser shall take such delay into account in determining any extension of time to which the Bidder/Supplier is entitled under Clause 15 hereof and the Bidder/Supplier shall be paid the amount of such cost as shall be reasonable.

- 3.7 P&I Drawings, Plant Layout and GA Drawings submitted for approval shall be signed by responsible representative of Bidder/Supplier and shall be to any one of the following sizes in accordance with Indian Standards: “A0, A1, A2, A3 and A4”.
- 3.8 All drawings shall show the following particulars in the lower right-hand corner in addition to Bidder/Supplier’s name:
- Name of the Purchaser
  - Project Title
  - Title of drawing
  - Scale
  - Date of drawing
  - Drawing number
  - Space for drawing number
- 3.9 In addition to the information provided on drawings, each drawing shall carry a revision number, date of revision and brief description of revision carried out. Whenever any revision is carried out, correspondingly revision number must be updated.
- 3.10 All dimensions on drawings shall be in metric units.
- 3.11 Drawings (**three sets**) submitted by the Bidder/Supplier for approval will be checked, reviewed by the Purchaser, and comments, if any, on the same will be conveyed to the Bidder/Supplier. It is the responsibility of the Bidder/Supplier to incorporate correctly all the comments conveyed by the Purchaser on the Bidder/Supplier’s drawings. The drawings, which are approved with comments, are to be re-submitted to the Purchaser for purpose of records. Such drawings will not be checked/reviewed by the Purchaser to verify whether the Bidder/Supplier has incorporated all the comments. If the Bidder/Supplier is unable to incorporate any comments in the revised drawings, Bidder/Supplier shall clearly state in his forwarding letter such non-compliance along with the valid reasons.
- 3.12 Drawings prepared by the Bidder/Supplier and approved by the Purchaser shall be considered as a part of the specifications. However, the examination of the drawings by the Purchaser shall not relieve the Bidder/Supplier of his responsibility for engineering design, workmanship, and quality of materials, warranty obligations and satisfactory performance on installation covered under the contract.
- 3.13 If at any time before completion of the work, changes are made necessitating revision of approved drawings, the Bidder/Supplier shall make such revisions and proceed in the same routine as for the original approval.
- 3.14 Date of submission: In the event, the drawings submitted for approval require many revisions amounting to redrawing of the same, and then the date of submission of the revised drawings would be considered as the date of submission for approval.
- 3.15 The Bidder/Supplier shall furnish to the Purchaser before the works are taken over, Operating and Maintenance instructions together with Drawings of the works as completed, in sufficient detail to enable the Purchaser to maintain, dismantle, reassemble and adjust all parts of the works. Unless otherwise agreed, the works shall not be considered completed for the purposes of taking over until such instructions and drawings have been supplied to the Purchaser.

#### **4. Superintendence, Team and Conduct**

- 4.1 The Bidder/Supplier shall employ one or more competent representatives, whose name or names shall have previously been communicated in writing to the Purchaser by the Bidder/Supplier, to superintend the carrying out of the works on the site. The said representative or if more than one shall be employed, then one of such representatives shall be present on the site during all times, and any orders or instructions which the Purchaser may give to the said representative of the Bidder/Supplier shall be deemed to have given to the Bidder/Supplier. The said representative shall have full technical capabilities and complete administrative and financial powers to expeditiously and efficiently execute the work under the contract.
- 4.2 The Bidder/Supplier shall, execute the works with due care and diligence within the time for completion and employ Bidder/Supplier's team comprising qualified and experienced engineers together with adequate skilled, semi-skilled and unskilled workmen in the site for carrying out the works. The Bidder/Supplier shall ensure adequate workforce to keep the required pace at all times as per the schedule of completion. Bidder/Supplier shall also ensure availability of competent engineers during commissioning/start up, trial runs, Operation of the plant/equipment till handing over of the plant.
- 4.3 The Bidder/Supplier shall furnish the details of qualifications and experience of their senior supervisors and engineers assigned to the work site, including their experience in supervising erection and commissioning of plant and equipment of comparable capacity.
- 4.4 When the Bidder/Supplier or Bidder/Supplier's representative is not present on any part of the work where it may be desired to give directions in the event of emergencies, orders may be given by the Purchaser and shall be received and observed by the supervisors or foremen who may have charge of the particular part of the work in reference to which orders are given. Any such instructions, directions or notices given by the Purchaser shall be deemed given to the Bidder/Supplier.
- 4.5 The Bidder/Supplier shall furnish to the Purchaser a fortnightly labor force report showing by classifications the number of employees engaged in the work. The Bidder/Supplier's employment records shall include any reasonable information as may be required by the Purchaser. The Bidder/Supplier should also display necessary information as may be required by statutory regulations.
- 4.6 None of the Bidder/Supplier's supervisors, engineers, or laborers may be withdrawn from the work without notice to the purchaser and further no such withdrawals shall be made if in the opinion of the Purchaser, it will adversely affect the required pace of progress and/or the successful completion of the work.
- 4.7 The Purchaser shall be at liberty to object to any representative or person, skilled, semi-skilled or unskilled worker employed by the Bidder/Supplier in the execution of or otherwise about the works who shall, in the opinion of the Purchaser, misconduct himself or be incompetent, or negligent or unsuitable, and the Bidder/Supplier shall remove the person so objected to, upon receipt of notice in writing from the Purchaser and shall provide in that place a competent representative at Bidder/Supplier's own expense within a reasonable time.
- 4.8 In the execution of the works no persons other than the Bidder/Supplier, sub-Bidder/Supplier and their employees shall be allowed on the site except by the written permission of the Purchaser.

#### **5. Purchaser's Instructions**

- 5.1 The Purchaser may, in his absolute discretion, issue from time-to-time drawings and/ or instructions, directions and clarifications, which are collectively referred to as Purchaser's instructions in regard to:
  - Any additional drawing and clarifications to exhibit or illustrate details.

- Variations or modifications of the design, quality or quantity of work or the additions or omissions or substitution of any work.
- Any discrepancy in the drawings or between the schedule of quantities and/or specifications.
- Removal from the site of any material brought there by the Bidder/Supplier, which are unacceptable to the Purchaser and the substitution of any other material thereof.
- Removal and/or re-execution of any work erected by the Bidder/Supplier, which are unacceptable to the Purchaser.
- Dismissal from the work of any persons employed there upon who shall in the opinion of the Purchaser, misconduct him, or be incompetent or negligent.
- Opening for inspection of any work covered up.
- Amending and making good of any defects.

## **6. Right of the Purchaser**

### **6.1 Right to direct works**

- The Purchaser shall have the right to direct the way all works under this contract shall be conducted, in so far as it may be necessary to secure the safe and proper progress and specified quality of the works. All work shall be done, and all materials shall be furnished to the satisfaction and approval of the Purchaser.
- Whenever in the opinion of the Purchaser, the Bidder/Supplier has made marked departures from the schedule of completion or when circumstances or requirement force such a departure from the said schedule, the Purchaser, to ensure compliance with the schedule, shall direct the order, pace and method of conducting the work, which shall be adhered to by the Bidder/Supplier.
- If in the judgment of the Purchaser, it becomes necessary at any time to accelerate the overall pace of the plant erection work, the Bidder/Supplier, when directed by Purchaser, shall cease work at any point and transfer Bidder/Supplier's men to such other point or points and execute such works, as may be directed by the Purchaser and at the discretion of the Purchaser.

### **6.2 Right to order modifications of methods and equipment**

- If at any time the Bidder/Supplier's methods, materials or equipment appear to the Purchaser to be unsafe, inefficient, or inadequate for securing the safety of workmen or the public, the quality of work or the rate of progress required, the Purchaser may direct the Bidder/Supplier to ensure safety and increase their efficiency and adequacy and the Bidder/Supplier shall promptly comply with such directives. If at any time the Bidder/Supplier's working force and equipment are inadequate in the opinion of the Purchaser, for securing the necessary progress as stipulated, the Bidder/Supplier shall if so directed, increase the working force and equipment to such an extent as to give reasonable assurance of compliance with the schedule of completion. The absence of such demands from the Purchaser shall not relieve the Bidder/Supplier of Bidder/Supplier's obligations to secure the quality, the safe conducting of the work and the rate of progress required by the contract. The Bidder/Supplier alone shall be and remain liable and responsible for the safety, efficiency and adequacy of Bidder/Supplier's methods, materials, working force and equipment, irrespective of whether the Bidder/Supplier makes any changes because of any order or orders received from the Purchaser.

### **6.3 Right to inspect the work**

- The Purchaser's representative shall be given full assistance in the form of the necessary tools, instruments, equipment, and qualified operators to facilitate inspection.



- The Purchaser reserves the right to call for the original test certificates for all the materials used in the erection work.
- In the event the Purchaser's inspection reveals poor quality of work/materials, the Purchaser shall be at liberty to specify additional inspection procedures if required, to ascertain Bidder/Supplier's compliance with the specifications of erection work.
- Even though inspection is carried out by the Purchaser or Purchaser's representatives, such inspection shall not, however, relieve the Bidder/Supplier of any or all responsibilities as per the contract, nor prejudice any claim, right or privilege which the Purchaser may have because of the use of defective or unsatisfactory materials or bad workmanship.

## **7. Bidder/Supplier's Functions**

- 7.1 The Bidder/Supplier shall provide everything necessary for proper execution of the works, according to the drawings, schedule of quantities and specifications taken together whether the same may or may not be particularly shown or described therein, provided that the same can reasonably be inferred there from and if the Bidder/Supplier finds any discrepancy therein, Bidder/Supplier shall immediately refer the same to the Purchaser whose decision shall be final and binding on the Bidder/Supplier.
- 7.2 The Bidder/Supplier shall proceed with the work to be performed under this contract in the best and workman like manner by engaging qualified and efficient workers and finish the work in strict conformance with the drawings and specifications and any changes/modifications thereof made by the Purchaser.

## **8. Variations**

- 8.1 The Purchaser shall make any variation of the form, quality or quantity of the Works or any part thereof that may, in his opinion, be necessary and for that purpose, or if for any other reason it shall, in his opinion be desirable, he shall have power to order the Bidder/Supplier to do and the Bidder/Supplier shall do any of the following:
- Increase or decrease the quantity of any work included in the contract,
  - Omit any such work,
  - Change the character or quality or kind of any such work,
  - Change the levels, lines, position, and dimensions of any part of the works
  - Execute additional work of any kind necessary for the completion of the works and no such variation shall in any way vitiate or invalidate the contract, but the value, if any, of all such variations shall be considered in ascertaining the amount of the Contract price.
- 8.2 The Bidder/Supplier shall make no such variations without an order in writing of the Purchaser. Provided that no order in writing shall be required for increase or decrease in the quantity of any work where such increase or decrease is not the result of an order given under this clause but is the result of the quantities exceeding or being less than those stated in the Contract/Bill of Quantities. Provided also that if for any reason the Purchaser shall consider it desirable to give any such order verbally, the Bidder/Supplier shall comply with such order and any confirmation in writing of such verbal order given by the Purchaser, whether before or after the carrying out of the order, shall be deemed to be an order in writing within the meaning of this clause. Provided further that if the Bidder/Supplier shall within seven days confirm in writing to the Purchaser and the Purchaser shall not contradict such confirmation in writing within 14 days, it shall be deemed to be an order in writing by the Purchaser.
- 8.3 Not applicable

- 8.4 Provided that if the nature or amount of any omission or addition relative to the nature or amount of the whole of the works or to any part thereof shall be such that, in the opinion of the Purchaser, the rate or price contained in the contract for any item of the works is, by reason of such omission or addition, rendered unreasonable or inapplicable, then a suitable rate or price shall be agreed upon between the Purchaser and the Bidder/Supplier. In the event of disagreement, the Purchaser shall fix such other rate or price as shall, in his opinion, be reasonable and proper having regard to the circumstances.
- 8.5 Provided also that no increase or decrease mentioned above or variation of rate or price shall be made unless, as soon after the date of the order as is practicable and, in the case of extra or additional work, before the commencement of the work or as soon thereafter as is practicable, notice shall have been given in writing:
- By the Bidder/Supplier to the Purchaser of his intention to claim extra payment or a varied rate or price, or
  - By the Purchaser to the Bidder/Supplier of his intention to vary a rate or price
- 8.6 If, on certified completion of the whole of the works, it shall be found that a reduction or increase greater than 15 per cent of the sum named in the Letter of Acceptance results from the aggregate effect of all Variation Orders but not from any other cause, the amount of the contract price shall be adjusted by such sum as may be agreed between the Bidder/Supplier and the Purchaser or, failing agreement, fixed by the Purchaser having regard to all material and relevant factors, including the Bidder/Supplier's site and general overhead costs of the contract.
- 8.7 The Bidder/Supplier shall send to the Purchaser's representative once in every month an account giving particulars, as full and detailed as possible, of all claims for any additional payment to which the Bidder/Supplier may consider himself entitled and of all extra or additional work ordered by the Purchaser which he has executed during the preceding month.
- 8.8 No final or interim claim for payment for any such work or expense will be considered which has not been included in such particulars. Provided always that the Purchaser shall be entitled to authorize payment to be made for any such work or expense, notwithstanding the Bidder/Supplier's failure to comply with this condition, if the Bidder/Supplier has, at the earliest practicable opportunity, notified the Purchaser in writing that he intends to make a claim for such work.
- 8.9 The work shall be carried out as approved by the Purchaser or his authorized representative/s from time to time, keeping in view the overall schedule of completion of the project. The Bidder/Supplier's job schedule must not disturb or interfere with Purchaser's or the other Bidder/Supplier's schedules of day-to-day work. The Purchaser will provide all reasonable assistance for carrying out the jobs.
- 8.10 Night work will be permitted only with prior approval of the Purchaser. The Purchaser may also direct the Bidder/Supplier to operate extra shifts over and above normal day shift to ensure completion of contract as per schedule. Adequate lighting wherever required should be provided by the Bidder/Supplier at no extra cost. The Bidder/Supplier should employ qualified electricians and wiremen for these facilities. In case of Bidder/Supplier's failure to provide these facilities and personnel, the Purchaser has the right to arrange such facilities and personnel and to charge the cost thereof to the Bidder/Supplier.
- 8.11 In order to enable the Purchaser to arrange for insurance of all items received at the site including the items of supply covered under this contract, the Bidder/Supplier shall furnish necessary details of all the equipment immediately on its receipt at site, to the Purchaser. Any default on the part of the Bidder/Supplier due to which any item does not get covered under the insurance of the Purchaser; the consequential losses shall be charged to the Bidder/Supplier.

- 8.12 The Purchaser shall not be liable for or in respect of any damages or compensation payable at law in respect or in consequence of any accident or injury to any workman or other person in the employment of the Bidder/Supplier or any sub-Bidder/Supplier, save and except an accident or injury resulting from any act or default of the Purchaser, his agents, or servants. The Bidder/Supplier shall indemnify and keep indemnified the Purchaser against all such damages and compensation, save and except as aforesaid and against all claims, proceedings, costs, charges, and expenses whatsoever in respect thereof or in relation thereto.
- 8.13 The Bidder/Supplier shall ensure against such liability with an insurer approved by the Purchaser, which approval shall not be unreasonably withheld, and shall continue such insurance during the whole of the time that any persons are employed by him on the works shall, when required, produce to the Purchaser or Purchaser's representative such policy of insurance and the receipt for payment of the current premium. Provided always that, in respect of any persons employed by any sub-Bidder/Supplier, the Bidder/Supplier's obligations to ensure as aforesaid under this sub-clause shall be satisfied if the sub-Bidder/Supplier shall have insured against the liability in respect of such persons in such manner that the Purchaser is indemnified under the policy, but the Bidder/Supplier shall require such sub-Bidder/Supplier to produce to the Purchaser or Purchaser's representative, when required such policy of insurance and the receipt for the payment of the current premium.
- 8.14 Whenever proper execution of the work under the contract depends on the jobs carried out by some other Bidder/Supplier, the Bidder/Supplier should inspect all such erection and installation jobs and report to the Purchaser regarding any defects or discrepancies. The Bidder/Supplier's failure to do so shall constitute as acceptance of the other Bidder/Supplier's installation/jobs as fit and proper for reception of Bidder/Supplier's works except those defects which may develop after execution. Bidder/Supplier should also report any discrepancy between the executed work and the drawings. The Bidder/Supplier shall extend all necessary help/cooperation to other Bidder/Suppliers working at the site in the interest of the work.
- 8.15 Bidder/Supplier shall carryout final adjustments of foundations, leveling and dressing of foundation surfaces, bedding and grouting of anchor bolts, bedplates etc. required for seating of equipment in proper position. The Bidder/Supplier shall be responsible for the reference lines and proper alignment of the equipment. However, all civil works like making cutouts in walls, floors and ceilings for pipelines shall be done by the Purchaser. Adjustment & leveling are to be carried out by the Bidder/Supplier at no extra cost. The Purchaser shall arrange the necessary refilling/repairs of these cutouts and pockets. The Bidder/Supplier should arrange for laying the supports, cutouts, grouting of bolts, etc. When the civil works are in progress, so as to avoid refilling/repair works. The Purchaser at Bidder/Supplier's costs shall make the damages occurring to civil and other works good. For fixing of piping/equipment supports on wall/beams/roof floor etc., preferably anchor bolts shall be used by the Bidder/Supplier. Drilling of holes for fixing anchor bolts & supply of anchor bolts is in the scope of Bidder/Supplier without any extra cost.
- 8.16 The Bidder/Supplier shall keep a check on deliveries of the equipment covered in the scope of erection work and shall advise the Purchaser well in advance regarding possible hold-up in Bidder/Supplier's work due to the likely delay in delivery of such equipment/components to enable him to take remedial actions.

## **9. Duties of the Bidder/Supplier Vis-à-Vis the Purchaser**

- 9.1 The equipment and the items, if any, to be supplied by the Purchaser for erection, testing and commissioning shall be as listed in the contract.
- 9.2 Besides the utilities/ services as specified in battery limits, Purchaser shall also provide the following assistance/ facilities to the Bidder/Supplier for carrying out the installation work:
- Plant building ready for installation of equipment/items.

- Necessary temporary water for carrying out the installation shall be supplied at only one point within the project site by the Purchaser free of charge. All necessary distribution tapings from this point onwards shall be the Bidder/Supplier's responsibility.
  - Necessary temporary power for carrying out the installation shall be arranged by the Bidder/Supplier at Bidder/Supplier's own cost. The Purchaser on written request by the Bidder/Supplier will issue the necessary authorization letter.
- 9.3 If the power is provided to you, the recovery @1% of total installation charges will be deducted from the erection bill of the Bidder/Supplier. However, the Bidder/Supplier shall supply all the items such as energy meter, switchgear etc. required for getting temporary power. **(Not Applicable for This tender)**
- 9.4 The details of temporary water and power requirements shall be furnished one month in advance by the Bidder/Supplier to enable the Purchaser to make timely arrangement.
- 9.5 If the Bidder/Supplier suffers delay and/or incurs costs from failure on the part of the Purchaser to give possession of the civil works in accordance with the mutually agreed schedule, the Purchaser shall determine:
- Any extension of time to which the Bidder/Supplier is entitled under **clause 22 of GCC** (General Conditions of Contract) and
  - The amount of such costs, which shall be added to the contract price, and shall notify the Bidder/Supplier accordingly.

## 10. Supply of Tools, Tackles and Materials

- 10.1 The Bidder/Supplier shall, at his own expense, provide all the necessary equipment, tools and tackles, haulage power, consumables necessary for effective execution and completion of the works during erection and commissioning.

## 11. Protection of Plant

- 11.1 The Purchaser shall not be responsible or held liable for any damage to person or property consequent upon the use, misuse or failure of any erection tools and equipment used by the Bidder/Supplier or any of Bidder/Supplier's Sub-Bidder/Suppliers even though such tools and equipment may be furnished, rented, or loaned to the Bidder/Supplier or any of Bidder/Supplier's Sub-Bidder/Suppliers. The acceptance and/or use of any such tools and equipment by the Bidder/Supplier or Bidder/Supplier's Sub-Bidder/Supplier shall be construed to mean that the Bidder/Supplier accepts all responsibility for and agrees to indemnify and save the Purchaser from any and all claims for said damages resulting from the said use, misuse or failure of such tools and equipment.
- 11.2 The Bidder/Supplier and Bidder/Supplier's Sub-Bidder/Supplier shall be responsible, during the works, for protection of work, which has been completed by other Bidder/Suppliers. Necessary care must be taken to see that the Bidder/Supplier's men cause no damage to the same during the course of execution of the work.
- 11.3 All other works completed or in progress as well as machinery and equipment that are liable to be damaged by the Bidder/Supplier's work shall be protected by the Bidder/Supplier and protection shall remain and be maintained until the Purchaser directs its removal.
- 11.4 The Bidder/Supplier shall effectively protect from the effects of weather and from damages or defacement and shall cover appropriately, wherever required, all the works for their complete protection.
- 11.5 The Bidder/Supplier shall carry out the work without damage to any work and property adjacent to the area of Bidder/Supplier's work to whomsoever it may belong and without interference with the operation of existing machines or equipment.

- 11.6 Adequate lighting, guarding, and watching at and near all the storage handling, fabrication, pre-assembly and erection sites for properly carrying out the work and for safety and security shall be provided by the Bidder/Supplier at Bidder/Supplier's cost. The Bidder/Supplier should adequately light the work area during nighttime also. The Bidder/Supplier should also engage adequate electricians/wiremen, helper etc. to carry out and maintain these lighting facilities. If the Bidder/Supplier fails in this regard, the Purchaser may provide lighting facilities as he may deem necessary and charge the cost thereof to the Bidder/Supplier.
- 11.7 The Bidder/Supplier shall take full responsibility for the care of the works or any section or portions thereof until the date stated in the taking over certificate issued in respect thereof and in case any damage or loss shall happen to any portion of the works not taken over as aforesaid, from any cause whatsoever, the same shall be made good by and at the sole cost of the Bidder/Supplier and to the satisfaction of the Purchaser. The Bidder/Supplier shall also be liable for any loss of or damage to the works occasioned by the Bidder/Supplier or the Bidder/Supplier's Sub-Bidder/Supplier in the course of any operations carried out by the Bidder/Supplier or by the Bidder/Supplier's Sub-Bidder/Suppliers for the purpose of completing any outstanding work or complying with the Bidder/Supplier's obligations.

## **12. Unloading, Transportation and Inspection**

- 12.1 The Bidder/Supplier shall be required to unload all the materials/equipment from the carriers, those received at site after Bidder/Supplier's team arrives at site. Bidder/Supplier shall be paid extra for unloading of the equipment being supplied by the Purchaser whereas no extra payment for unloading of the equipment/piping shall be paid to Bidder/Supplier for the equipment being supplied by the Bidder/Supplier. The Bidder/Supplier shall plan in advance, based on the information received from the Purchaser, Bidder/Supplier's requirement of various tools, tackles, jacks, cranes, sleepers etc. required to unload the material/equipment promptly and efficiently. The Bidder/Supplier shall ensure that adequate and all measures necessary to avoid any damage whatsoever to the equipment at the time of unloading are taken.
- 12.2 Any demurrage/detention charges incurred due to the delay in unloading the material/equipment and releasing the carriers shall be charged to the Bidder/Supplier's account.
- 12.3 The Bidder/Supplier shall be responsible for the reception on site of all plant and Bidder/Supplier's equipment delivered for the purposes of the contract.
- 12.4 The Bidder/Supplier shall safely transport/shift the unloaded materials/equipment by the Bidder/Supplier to the storage area.
- 12.5 All the materials/equipment received by the Purchaser prior to arrival of the Bidder/Supplier at site shall be handed over to the Bidder/Supplier and there upon the Bidder/Supplier shall inspect the same and furnish the receipt to the Purchaser. The manner in which the inspection shall be carried out is enumerated below:
- 12.6 The materials/equipment would be carefully unpacked by opening the wooden cases/other modes of pickings as the case may be.
- 12.7 Detailed inventory of various items would be prepared clearly listing out the shortages, breakage/damages after checking the contents with respect to the Bidder/Supplier's packing list, the Purchaser's purchase order and approved equipment drawings. The Bidder/Supplier shall also check each & every equipment for any shortage/shortcoming that may eventually create difficulty at the time of installation or commissioning.
- 12.8 All the information and observations by the Bidder/Supplier shall be furnished in the form of 'INSPECTION REPORT' to the Purchaser with specific mention/suggestions which in the opinion of the Bidder/Supplier should be given due consideration and immediate necessary actions, to enable the Purchaser to arrange repair or replacement well in time and avoid delays due to non-availability of equipment and parts at the time of their actual need.

- 12.9 The inspection for all the equipment handed over to the Bidder/Supplier shall be completed within three week's period.
- 12.10 The protection, safety and security of the materials so taken over from the Purchaser shall be the responsibility of the Bidder/Supplier, until they are handed over to the Purchaser after erection, commissioning and testing as per the terms of the Contract.

### **13. Storage of Equipment**

- 13.1 The Bidder/Supplier shall be responsible for the proper storage and maintenance of all materials/equipment under Bidder/Supplier's custody. Bidder/Supplier shall take all required steps to carry out frequent inspection of equipment/materials stored as well as erected equipment until the same are taken over by the Purchaser. The following procedure shall apply for the same.
- 13.2 The Bidder/Supplier's inspector shall check stored and installed equipment/materials to observe signs of corrosion, damage to protective coating to parts, open ends in pipes, vessels and equipment, insulation resistance of electrical equipment etc. The Bidder/Supplier shall immediately arrange a coat of protective painting whenever required. A record of all observations made on equipment, defects noticed shall be promptly communicated to the Purchaser and Purchaser's advice taken regarding the repairs/rectification. The Bidder/Supplier shall there upon carry out such repairs/ rectification at Bidder/Supplier's own cost. In case the Bidder/Supplier is not competent to carry out such repairs/ rectification, the Purchaser reserves the right to get this done by other competent agencies at the Bidder/Supplier's responsibility and risk and the entire cost for the same shall be recovered from the Bidder/Supplier's bills.
- 13.3 The Bidder/Supplier's inspector shall also inspect and provide lubrication to the assembled equipment. The shafts of such equipment shall be periodically rotated to prevent rusting as well as to check freeness of the same.
- 13.4 The Inspector shall check for any signs of moisture or rusting in any equipment.
- 13.5 If the commissioning of equipment is delayed after installation of the equipment, the Bidder/Supplier shall carry out all protective measures suggested by the Purchaser during such period.
- 13.6 Adequate security measures shall be taken by the Bidder/Supplier to prevent theft and loss of materials handed over to the Bidder/Supplier by the Purchaser. The Bidder/Supplier shall carry out periodical inventory checks of the materials received, stored and installed by the Bidder/Supplier and any loss noticed shall be immediately reported to the Purchaser. The Bidder/Supplier shall maintain a proper record of these inventories. The Bidder/Supplier should not sell, assign, mortgage, hypothecate or remove equipment or materials which has been installed or which may be necessary for completion of the work without the written consent of the Purchaser.
- 13.7 Suitable grease recommended for protection of surfaces against rusting (refined from petroleum oil with lanolin minimum (70 °C) and water in traces) shall be applied over all equipment as required once in every six months.
- 13.8 All equipment shall be stored inside a closed shed or in the open depending upon whether they are of indoor or outdoor design. The space heaters were provided into the electrical equipment shall be kept connected with power supply irrespective of their type of storage. Where space heaters are not provided adequate heating with bulb is recommended. For transformers heating of oil shall be done by giving 440 V supply and short-circuiting the LT terminals. Frequent checks on insulation resistance are essential for all electrical equipment and record of the inspection reports and mugger readings shall be maintained equipment wise. Such records shall be presented to the Purchaser whenever demanded.

- 13.9 All the necessary items/goods required for the Bidder/Supplier as described above shall arrange protection and such cost shall be included in the Contract price.

#### **14. Approvals**

- 14.1 The Bidder/Supplier shall obtain the necessary approvals of the Factory Inspector, Boiler Inspector, Electrical Inspector, Weights & Measures Inspector, Explosive Inspector and any other state and local authorities as may be required and the cost of obtaining such approvals shall be included in the contract price.
- 14.2 The Bidder/Supplier will furnish all the necessary details, drawings, and submission of application and proofreads to the Purchaser for verification/ signature. The Bidder/Supplier on behalf of the Purchaser shall submit the necessary application duly filled-in, together with the prescribed fees to the appropriate authorities. However, all the actual statutory prescribed fees paid by the Bidder/Supplier shall be reimbursed by the Purchaser upon production of the receipt/vouchers.
- 14.3 Wherever necessary or required, the Bidder/Supplier shall furnish the necessary test and/or inspection **certificates** etc. from the appropriate authorities as per **IBR, IER and other statutory regulations** and the cost for obtaining these certificates shall be included in the contract price.

#### **15. Review & Co-ordination of Erection Work**

- 15.1 The Bidder/Supplier shall depute **senior and competent personnel** to attend the site co-ordination meetings that would generally be held at **the site at regular interval**. The Bidder/Supplier shall take necessary action to implement the decisions arrived at such meetings and shall also update the erection schedule.

#### **16. Extension of Time for Completion**

- 16.1 Should the amount of **extra or additional work** of any kind or any cause of delay referred to in these conditions, or exceptional adverse climatic conditions, or other special circumstances of any kind whatsoever which may occur, other than through a default of the Bidder/Supplier, be such as fairly to entitle the Bidder/Supplier to an extension of time for the completion of the works, the Purchaser shall determine the amount of such extension and shall notify the Bidder/Supplier accordingly. Provided that the Purchaser is not bound to take into account any extra or additional work or other special circumstances unless the Bidder/Supplier has within **twenty eight days** after such work has been commenced, or such circumstances have arisen, or as soon thereafter as is practicable, submitted to the Purchaser full and detailed particulars of any **extension of time** to which he may consider himself entitled in order that such submission may be investigated at the time.

**Table 1**  
**List of Drawings required Submission (Detailed Engineering)**

SN	Drawings
1	Equipment drawings for fabricated items.
2	Equipment layout & Civil Foundation Details for production and service blocks.
3	Flow diagrams for PROCESS/ CLEANING and various services.
4	Service piping layouts in production and service blocks.
5	SS piping layout in production blocks, WHEREVER REQUIRED.
6	Electrical cable, conduit/ cable tray layout.
7	Standard Installation Drawings for Equipment.
8	Other miscellaneous drawings as required for erection work.



**Section IV – Part III  
Special Conditions of Contract  
for  
Mechanical Works**

# Contents

1. Scope
2. General Installation
3. Service Piping Installation
4. Special Instructions And Specifications
5. Insulation of Piping and Equipment
6. Interconnections of Services
7. Guidelines For Expansion Work
8. Cleaning Chemicals and Lubricants
9. Testing, Commissioning and Start-Up
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11. Painting
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13. Code of Practice for Painting Service Pipe Lines
  - Table 1 Painting of Equipment & Structural Work
  - Table 2 Colour Code For Pipelines as per BIS 2379-1963
  - Table 3 Testing Pressures for Various Pipelines
  - Table 4 Makes of Bought Out Items

## **1. Scope**

- 1.1 General installation i.e., positioning and installing all the production, miscellaneous and service equipment as per approved layout drawings and as per the contract.
- 1.2 Supply and installation of structural platforms and tables.
- 1.3 Supply and installation of all service and product piping including ancillary items.
- 1.4 Insulation and cladding of piping, equipment including supply of materials.
- 1.5 Interconnections of services and Electrical with equipment.
- 1.6 Guideline for expansion work.
- 1.7 Clean up of work site.
- 1.8 Supply of all cleaning chemicals and lubricants.
- 1.9 Testing, commissioning, and start-up.
- 1.10 Painting including supply of paints as approved by the Purchaser.
- 1.11 Training of personnel.
- 1.12 Detailed specifications are given in the subsequent clauses.

## **2. General Installation**

### **2.1 Positioning of Equipment**

- The work involves preparation of access for moving of the plant and equipment including their fittings from the work site godown or from the place within the site where they have been unloaded, to the place of erection, de-crating and placing on the foundation wherever required. The Purchaser shall arrange all the civil foundations as per the manufacturer/Bidder/Supplier's drawings. The Bidder/Supplier shall place the equipment and carry out final adjustment of the foundations including alignment and dressing of foundation surface, embedding and grouting of anchor bolts and bedplates. The Bidder/Supplier shall be responsible for obtaining correct reference lines for the purpose of fixing the alignment of various equipment from master benchmarks provided. Tolerances shall be as specified in equipment manufacturer's drawings or as stipulated by the Purchaser's Engineer. No equipment shall be permanently bolted down to foundations or structure until the Bidder/Supplier has checked the alignment and witnessed by the Purchaser. The Bidder/Supplier shall carry out minor alterations in the anchor bolts, pockets etc., at no extra cost and set the equipment properly as per approved layout, drawings, and manufacturer's instructions. The Bidder/Supplier shall supply all the necessary foundation/anchor bolts and bedplates if required without extra cost if these have not been provided with main equipment.
- The Bidder/Supplier shall supply, fix, and maintain, at his own cost, during the erection work, all the necessary centering, scaffolding, staging required not only for proper execution and protection of the said work but also for protection of the surrounding plant and equipment. The Bidder/Supplier shall take out and remove any or all such centering, scaffolding, staging planking etc., as occasion shall require or when ordered to do so and shall fully reinstate and make good all things disturbed during execution of the work, to the satisfaction of the Purchaser. The Bidder/Supplier shall be paid no additional amount for the above.

### **2.2 Structural Platforms and Tables**

- Structural platforms shall be required to provide access for various equipment. Tables shall be required for handling products. These platforms and tables shall be fabricated keeping stability and other functional as well as aesthetic requirements into consideration as approved by the Purchaser. The payment shall be made based on the actual weight executed and the unit rates agreed upon or as per provisions made in

the contract for such items. However, bidder shall provide the quantity of structural /platform/structural support/ladder/pipe bridge/pipe support etc. and shall be included in the bid.

### 3. Service Piping Installation

#### 3.1 General Guidelines

- All piping systems shall comply with the **latest editions** of the following regulations wherever applicable:
  - Indian **Boiler** Regulations
  - Regulations of **explosives** inspectorate
  - All applicable Indian Standards
  - All applicable State Government/ Central Government Laws/ Acts

#### 3.2 Scope of Supply

- The Bidder/Supplier shall supply all piping materials like pipes, fittings, flanges, measuring instruments and all other items as shown in the P&I diagram/specifications and schedule of quantities. All the pipes & fittings and insulation material etc. should be of class and make as approved by the Purchaser. The Bidder/Supplier, for the class and make of all materials, must obtain prior approval of the Purchaser. The Bidder/Supplier should furnish the details of makes selected by him, in the pro forma given in Table 5.

#### 3.3 Scope of Piping Erection

- The scope of erection for piping, includes all system covered in the flow diagrams and specifications. The Bidder/Supplier's work commences/ terminates at the pipe connections with valves or flanges as specified in flow diagrams/ battery limits.
- The Bidder/Supplier shall also install necessary piping and any specialties furnished with or for equipment such as relief valves, built-in-bypass, primary elements for flow measurements, control valves and on-line metering equipment.
- The Bidder/Supplier shall perform necessary internal machining of pipes for installing orifices, flow nozzles, control valves etc. The Bidder/Supplier shall install all pipes, valves and specialties being procured from other sources.

#### 3.4 Testing of Piping

- The Bidder/Supplier shall test all piping systems including valves and specialties and instruments as per procedure mentioned in Table 4.
- All piping shall be **internally cleaned and flushed** by the Bidder/Supplier after erection in a manner suited to the service and as directed by the Purchaser.
- For **hydrostatic testing and water flushing**, the Bidder/Supplier shall furnish necessary pumps, equipment, instruments and piping etc.

#### 3.5 Other Guidelines

- **Color code** shall be used to identify pipe material. The Bidder/Supplier shall be able to identify on request all random piping prior to field fabrication.
- The Bidder/Supplier shall be responsible for the **quality of welding** done by them and shall conduct tests to determine the suitability of the welding procedure by him.

- All piping supports, guides, anchors, hangers, rollers with structural framework shall be supplied and erected by the Bidder/Supplier. The kind of pipe supports like CI clamps, wooden saddles, roller supports, and support framework shall be as per the design approved by the Purchaser prior to taking up the work.
- All piping shall be suspended, guided, and anchored with due regard to general requirements and to avoid interference with other pipes, hangers, electrical conduits and their supports, structural members, and equipment and to accommodate insulation and conform to buildings structural limitations. It is the responsibility to the piping Bidder/Supplier to avoid all interference while locating hangers and supports.
- Anchors and/or guides for pipelines or for other purposes shall be furnished, when specified, for holding the pipeline in position for alignment. Hangers shall be designed fabricated and assembled in such a manner that any movement of the support pipes cannot disengage them.
- All piping shall be **wire brushed** and **purged with air blast** to remove all rust, mill scale from inner surface. The method of cleaning shall be such that no material is left on the inner or on outer surfaces, which will affect the serviceability of the pipes.
- Effective precautions such as capping, and sealing shall be taken to protect all pipe ends against ingress of dirt and damage during transit or storage. The outside of the steel pipes (black) shall be painted with two coats of **red oxide paint** or as directed by the Purchaser.

#### 4. Special Instructions and Specifications

##### 4.1 Steam Piping

- Steam piping work can be classified into **two categories**:
  - **High-pressure** steam piping when the working pressure of steam is **more than 3.1 kg/cm<sup>2</sup> (50 psi)**.
  - **Low-pressure** steam piping when the working pressure of steam is **up to 3.1 kg/cm<sup>2</sup> (50 psi)**.
- All the pipes and fittings used for high pressure steam piping work should conform to **IBR** and they should be IBR certified and also to be **identified with number and mark** showing that they are tested by the Boiler Inspector and supported with duly **authentic certificates** to this effect. ALL HIGH-PRESSURE STEAM PIPES SHALL BE **SEAMLESS TYPE, SCHEDULE 40**.
- The high-pressure steam piping after installation should be hydraulically tested in presence of the Boiler Inspector for his approval.
- The high-pressure steam piping work should also include fabrication and installation of **pressure reducing stations** strictly conforming to **IBR**.

##### 4.2 Other Piping

- ALL THE PIPING FOR CHILLED WATER, GLYCOL, AMMONIA, SOFT AND RAW WATER, H.P. AND L.P. STEAM, AIR AND FURNACE OIL/ LSHS PIPING SHALL GENERALLY BE OF **WELDED CONSTRUCTION**. Whenever welding is done for pipes of smaller size special care should be exercised to avoid clogging of flow area with the welding material.

#### 5. Insulation of Piping and Equipment

##### 5.1 Cold Insulation of Chilled Water, Glycol and Ammonia Pipeline

- All the chilled water, glycol & ammonia pipelines shall be insulated by **PUF** pipe sections. The insulation shall be carried out in the **following manner**:
- Before starting insulation work all pipelines shall be **tested** as specified.
- The surface of the pipes to be insulated should be properly **cleaned**.

- **Hot bitumen** of **85/40** or **85/25** conforming to **IS 702** should be applied uniformly @ **1.5 kg/m<sup>2</sup>** on the surface of the pipes.
- A similar layer of **bitumen** should be applied on the **inner surface** and on the **edges** of the **insulation sections**.
- The sections should then be stuck to the coated pipes with **joints staggered**. Adjacent sections should be tightly pressed together. All **joints** should be properly **sealed** with bitumen.
- A thick **vapor seal** with **hot bitumen @ 2.5 kg/m<sup>2</sup>** should be applied uniformly on the outer surfaces of the pipe sections and allowed to dry.
- In case the insulation **sweats** or the specified/required insulation properties are not attained, the entire insulation in such region shall be **redone** with fresh material, entirely at the **Bidder/Supplier's cost**.
- The **thickness** of insulation shall be as required.

## 5.2 Insulation of Chilled Water Tank

- The surfaces shall be **cleaned** with the help of brushes to remove any loose particles.
- A coat of **bitumen** of **85/40** or **85/25** conforming to **IS 702 @1.0 kg/m<sup>2</sup>** shall be applied over the **flooring** and **walkathon sheets** shall be press-laid to act as a **vapor barrier**.
- Bitumen shall then be applied on the walkathon sheets and one side and edges of the insulation slabs to ensure total rate of **2.00 kg/m<sup>2</sup>** between contacting surfaces. The slabs shall then be fixed in position, making sure that there shall be **no joints between slabs**.
- For **double layers** insulation bitumen shall again be applied on all contacting surfaces to ensure a total rate of **1.5 kg/m<sup>2</sup>** between contacting surfaces.
- A coat of bitumen at **1.5 kg/m<sup>2</sup>** shall be applied over the insulation surfaces.

## 5.3 Hot Insulation of Steam, Condensate & Hot Water Pipelines

- All the steam and hot water pipelines shall be insulated with **mineral wool** or equivalent of specified thickness. The insulation shall be carried out in the **following manner** and should be supplied in the form of properly required sizes.
- **Clean** the surfaces to be insulated. Apply a **coat of red oxide primer** and fix glass wool/mineral wool of specified thickness, tightly to the pipes, **butting all joints** and **tie with lacing wire**.
- It should then be covered with GI wire netting of 20 mm x 24 SWG.
- In case the insulation does not have the desired insulation properties, the entire insulation will have to be **redone** at the **Bidder/Supplier's cost** to give the desired results.
- In case of **condensate return piping** all the steps mentioned above shall be executed except that **thickness** of the insulation shall be **25 mm**.

## 5.4 Aluminium/ GI Cladding

- The chilled water, glycol, ammonia, water, steam & hot water lines after insulations may be **covered by/GI cladding or cement plaster**. The payment will be made as per the executed items.
- Aluminium cladding will be done with 22-gauge aluminium sheet with proper grooves and overlaps and screwed in position with 12 mm self-tapping parker screws.
- **GI sheet cladding** will be done with **22-gauge** sheet with proper **grooves** and **overlaps** and **screwed** in position with **12 mm self-tapping parker screws**. The GI sheet cladding will finally be **painting 2 (coats)** by approved shade and quality of paint.

## 6. Interconnections of Services

- 6.1 The Bidder/Supplier shall lay service piping and provide connections with the equipment complying strictly with the equipment manufacturers' instructions. The Bidder/Supplier shall also carry out all the interconnecting service piping with the various items of plant/system. The work shall be complete with **capillary piping** if required and **connections with instruments and controls** supplied with the equipment.
- 6.2 The Bidder/Supplier shall also carry out **electrical connections** for equipment with the control panels including equipment lighting as per the wiring diagrams of the equipment Bidder/Suppliers. Connection shall be made for small electrically operated devices on equipment installed as accessories to or assembled with equipment. Connections regarding instruments, float switches, limit switches, pressure switches, thermostats and other miscellaneous equipment shall be done as per manufacturers' drawings & instructions.

## 7. Guidelines for Expansion Work

### 7.1 Shutdowns

- Plant shutdown shall be required for making **tapings/ interconnections** of the new equipment/ piping, to be installed under expansion, with the existing equipment/piping. These shutdowns should be **planned** carefully well in advance to enable the Purchaser to take suitable actions for **ensuring normal Plant operations**. The details of shutdowns, the numbers and duration should be worked out and intimated to the Purchaser for approval. The Bidder/Supplier should ensure completion of all the necessary works well within the allowed time so that no inconvenience is caused in regular operation and working of the existing plant.

### 7.2 Cleanliness

- Wherever the Bidder/Supplier is required to work in existing plant area he should take due care and extra precautions to ensure absolute cleanliness and minimum hindrance for proper working of the existing plant.

### 7.3 Change over

- The programmers for changeover/modification from existing plant system to new plant system should be prepared by the Bidder/Supplier and should be got approved by the Purchaser.

### 7.4 not applicable

### 7.5 Clean Up of Works Site

- All soils, filth or other matters of an offensive nature taken out of any trench, drain or other places shall not be deposited on the surfaces, but shall at once be carted away by the Bidder/Supplier from the site of work for proper disposal.
- The Bidder/Supplier shall not store or place the equipment, materials or erection tools on the drive ways and passages and shall take care that his work in no way restricts or impedes traffic or passage of men and materials during erection, the Bidder/Supplier shall without any additional payment, at all-time keep the working and storage area used by him free from accumulation of dust or combustible materials, waste materials rubbish packing, wooden planks to avoid fire hazards and hindrance to other works.
- If the Bidder/Supplier fails to comply with these requirements in spite of written instructions from the Purchaser, the Purchaser will proceed to clear these areas and the expenses incurred by the Purchaser in this regard shall be payable by the Bidder/Supplier. Before completion of the work, the Bidder/Supplier shall remove or dispose of in a satisfactory manner all scaffolding, temporary structures, waste and debris and leave the premises in a condition satisfactory to the Purchaser. Any packing materials received with the equipment shall remain as the property of the Purchaser and may be used by the Bidder/Supplier on

payment of standard charges to the Purchaser and with prior approval of the Purchaser. At the completion of his work and before final payment, the Bidder/Supplier shall remove and shall restore the site to neat workman like conditions at his cost.

## **8. Cleaning Chemicals and Lubricants**

- 8.1 The necessary quantities of cleaning chemicals, lubricants etc., required for the installation, commissioning, testing, and start-up of all the equipment till handing over are to be supplied the Bidder/Supplier and nothing extra would be paid for these.

## **9. Testing, Commissioning and Start-up**

- 9.1 The Bidder/Supplier shall operate, maintain and give satisfactory trial run of the plant for the design product satisfactorily for a maximum period of one week or as mutually agreed by Bidder/Supplier/Purchaser/Purchaser of the plant at the rated output. The Bidder/Supplier should carry out all rectification of damages/defects and routine troubleshooting during commissioning with the help of Purchaser's staff.

- 9.2 During this period, Bidder/Supplier shall incorporate/execute necessary minor modifications during the trial period for maximizing operational efficiency. The Bidder/Supplier should also execute minor modifications as may be suggested by the manufacturer/Purchaser, if required. The Bidder/Supplier shall suggest recommended log sheet proofread for recording necessary operating data and pass it on to the Purchaser in proof of satisfactory rated output and performance of the equipment/plant.

- 9.3 The **commissioning** shall also **include**, for all the equipment, the **following**:

- Field disassembly and assembly
- Clean out of lubrication system including chemical cleaning wherever required.
- Circulation of lubricant to check flow.
- Clean out and check out of all the service lines.
- Check out and commissioning of instruments, equipment and plants, filtering of transformer and other oils so that if deteriorated, they shall attain the required properties/standards, specified tests in this regard must be carried out by approved authorities and their satisfactory reports submitted to the Purchaser before start-up.
- Recharging or make-up filling of lubricant oil up to the desired level in the lubrication system of individual machine.
- Operation in empty condition to check general operation details wherever required and wherever possible.
- Closed loop dynamic testing with water wherever required.
- Operation under load and gradual load increase to attain maximum rated output.

## **10. Trouble shooting during the trial period**

- 10.1 The Bidder/Supplier shall demonstrate proper working of all mechanical and electrical controls; safety and protective device, in presence of the Purchaser's engineer and the same should be duly recorded.

- 10.2 After conducting testing, in case a particular equipment is not working properly or not giving rated output the Bidder/Supplier will furnish a detailed report to the Purchaser stating therein the detailed account on the performance of the equipment with possible reasons for improper or not working of the same.



- 10.3 The Purchaser after receipt of report from the Bidder/Supplier would take up the matter with the manufacturers and if required would invite the representative of original manufacturers. In case the Purchaser considers that the non-performance of equipment is only due to inexperience of the Bidder/Supplier, then the charges incurred for the manufacturer's representative visit would be debited to the Bidder/Supplier's account.
- 10.4 Further, before the commencement of testing or commissioning, the Purchaser reserves the right to invite the **original manufacturer's representative** at the cost of the Bidder/Supplier for start-up help, assist and guide the Bidder/Supplier during commissioning in the following cases:
- The Bidder/Supplier has **no previous experience** of commissioning and start-up of the similar equipment.
  - The Purchaser is of the opinion that the **Bidder/Supplier is not capable** to commission and start-up of certain specific equipment.
- 10.5 However, in either of the cases the manufacturer's representatives would be called with prior information to the Bidder/Supplier and the Bidder/Supplier will have to extend all co-operation to such representatives in good spirit and in the interest of the work.
- 10.6 After satisfactory commissioning and start-up the Bidder/Supplier shall keep his representatives under whose **supervision the Purchaser's staff shall be operating and maintaining** the plant and equipment for a **minimum period of one month**. The Bidder/Supplier's representatives should be present at all times during the running and operation of plant and equipment. During this period the Bidder/Supplier shall ensure proper working of complete plant and equipment and attend any works required to be done and shall also take complete responsibility for proper operation and maintenance of the complete plant and equipment.

## 11. Painting

- 11.1 All the equipment/ machineries like motors, pumps, HT/ LT panel, transformer, switch boards, starters, junction boxes, isolators, storage tanks, supporting structures, pipe supports and MS/ GI pipes and all exposed and visible iron parts included in the scope of erection/ commissioning shall be given **double coat of paint of approved shade over a double coat of anticorrosive primer** wherever necessary irrespective of the condition of original paint of equipment/ machineries/ structures/ supports. All surfaces wherever required must be properly **cleaned from scale, dirt, and grease** prior to painting. **Spray painting** must preferably be used on all the equipment/ machineries and wherever practicable. Suitable and necessary **cleaning/ wiping** of sight/ dial glasses, other non-metallic parts, flooring, walls, and other surfaces which have been spoiled by paint during painting must also be carried out by the Bidder/Supplier.
- 11.2 **Lettering and other markings**, including capacity and flow direction markings, shall also be carried out by the Bidder/Supplier on the tanks, pipelines, starters, motors, isolators and wherever else necessary, as directed and as per the standard practice of installation. **ISI colour codes** and colour charts as mentioned in Table 3 & Table 2 must be adhered to.
- 11.3 Supply of all paints and all other materials required is included in the scope of supply of the Bidder/Supplier under this contract/order.

## 12. Training of Personnel

- 12.1 The Bidder/Supplier for operating the plant as may be deputed by the Purchaser shall train necessary staff. The personnel will be associated for the training during the installation; testing, commissioning and start-up period and the training tenure shall be extended for a minimum period of one month from the date of commissioning and start-up.

### 13. Code of Practice for Painting Service Pipelines

#### 13.1 On Non-insulated Pipeline & Insulated Pipeline without Aluminium Cladding

- Ground colour to be applied throughout the length of the pipeline.
- Colour bands to be applied near every valve and branch connection as well as in every room near the entry.
- The 1st band should be 4" wide and the second band should be 1" wide.
- On the 1st band a white arrow to be put to indicate the direction of flow.
- The arrows should be put on the bottom of the pipelines so that the same are visible from below in case of horizontal bank of pipes and on sides in case of vertical bank of pipes.
- The valves should be painted with the same colour as the ground colour of the pipeline.

#### 13.2 On Insulated Pipeline with Aluminium Cladding

- Ground colour to be applied in a length of 500 mm of the pipe all round near every valve and branch connections as well as in every room near the entry. The complete length of the pipeline should not be painted.
- **Colour bands** should be applied in the **middle** of every ground colour strip. The **1st colour** band should be **4"** wide and the **second** band should be **1"** wide.
- On the **1st band** a **white arrow** is to be put to indicate the **direction of flow** of the fluid.
- The **arrows** should be put on the **bottom** of the pipelines, so that the same are visible from below in case of **horizontal** bank of pipes and on **sides** in case of **vertical** bank of pipes.
- The valves should be painted with the same colour as the ground colour.
- The **ground colours** and the colours of the **1st** and **2nd** colour **bands** have been indicated on the **enclosed list** for the pipelines carrying various types of fluids and gases. The list also indicates the shade nos. of the colours to be used. In case the exact shade is not available, the nearest possible shade in the same colour may be selected.
- Only **synthetic enamel paint** should be used for the painting and band markings on the pipelines, and it should be ensured that the finish should be **glossy**.
- Where no colour bands have been recommended, only the ground colour is to be applied as per the above procedure. If only one colour band is recommended the same should be 4" wide and applied on the ground colour. In case of 2 nos. colour bands, the 1st band should be 4" wide and second band 1" wide and should be applied on the ground colour.
- To avoid mixing of colours, it is recommended to apply the bands only after the ground colour paint is dry and subsequently to apply the arrow only after the 1st band paint is dry.

**Table 1**  
**Painting of Equipment & Structural Work**

<b>SN</b>	<b>Item</b>	<b>Painting Shade</b>
1	All Milk Storage Tanks	No Painting. SS 304 only to be used as outer
2	All M.S. platforms/pipe supports/ pipe bridges and any other structures	Dark admiral grey shade No.632 of ISI
3	Water Pumps, Geared Motor of tanks and vats.	Original colour
4	HT & LT panels	Original colour
5	LT distribution switchboards	Dark admiral grey
6	Boiler Chimney, Powder Plant Chimney, & Generator Exhaust	High temperature resistant Aluminium Paint
7	Refrigeration Compressor, air Compressor	Original colour
8	Air Handling Units of Cold Store, Deep Freeze, Butter Packing, Machine room & Laboratory including Ducting	Aluminium Paint
9	Refrigeration Plant Receiver	Dark Red
10	Atmospheric Condensers	Bitumen Paint

**Table 2**  
**Colour Code for Pipelines as per BIS 2379-1963**

SN	Services	Ground Colour	First Band	Second Band
1	Cooling Water	Sea Green 217	French Blue 166	-
2	Boiler Feed Water		-	-
3	Condensate		Light Brown 410	-
4	Hot Water		Light Brown 410	-
5	Drinking Water		French Blue 166	Signal Red 37
6	Treated Water		Light Orange 557	-
7	Cold Water		French Blue 166	Canary Yellow
8	Untreated Water		White	
9	Compressed Air	Sky Blue 101		
10	Vacuum		Black	
11	Steam	Silver Grey 628		
12	Diesel	Light Brown 410	Brilliant 221	
13	Lubricating Oil		Light Grey 631	
14	Drainage	Black		
15	Ammonia	Signal Red 537		

**Table 3**  
**Testing Pressures for Various Pipelines**

Sr No	Name	Test Pressure kg/cm <sup>2</sup>	Test medium	Duration of Test (Hour)	Allowable pressure Drop (kg/cm <sup>2</sup> )
1	H.P. Steam pipelines	27	Water	1/2	0
2	L.P. Steam pipelines	8	Water	1/2	0

3	Water pipelines <sup>1</sup>	8	Water	1/2	0
4	Furnace oil/ LSHS	16	Water	½	0
5	SS pipes for dairy	6	Water	1/2	0
6	Air	12	Air	8	0.1
7	Ammonia pipelines				
7a	Suction	16	N2	24	0.2
7b	Discharge	24	N2	24	0.2
7c	Vacuum Test of Ammonia Lines	Absolute Zero	Vacuum	48	NIL
Engineer-in-charge shall provide water at available supply point from which the Bidder shall connect temporary piping for testing water.					
<b>Table 4 Makes of Bought Out Items</b>					
<b>SN</b>	<b>Items</b>				<b>Makes</b>
1	Steam piping				
1a	MS C class pipes (Seamless)				
1b	Cast steel globe valves				
1c	Bronze globe valves				
1d	Non-return valves				
1e	Pressure reducing valves, safety valves, expansion joints and other steam fittings.				
1f	Pressure & temperature gauges				
2	Furnace oil piping/ air piping				
2a	MS C class pipes (seamless/ ERW as approved)				
2b	Cast steel globe/bronze globe/ Gun metal gate valve				

<sup>1</sup> Soft, Raw, Chilled and Glycol

	2c	Pressure gauges	
	3	Water piping	
	3a	GI `B' class pipe	
	3b	CI globe valve	
	3c	Gun metal gate valve	
	3d	Gun metal globe valves/ strainers/ non return valves	
	3e	Water pump	
	4	Insulation materials	
	4a	Expanded polystyrene	
	4b	Glass/ mineral wool	
	Please select reputed established makes only. Actual supply shall be based on makes approved by purchaser.		

**Section IV – Part IV  
Special Conditions of Contract  
for  
Electrical Works**

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## **1. Scope**

- 1.1 The intent of this specification is to define the requirements for the installation, testing and commissioning of the electrical system like high-tension switchyard with accessories and equipment, transformers, HT. Panels, oil circuit breakers, LT. panels and power control centres, distribution boards, capacitor banks & panels, power & control cables, remote push button stations, motors, earthing network, etc. Requirement of a particular project shall be as specified in schedule of quantities/approved drawings or as per the battery limits fixed in the contract.

## **2. Standards**

- 2.1 The work shall be carried out in the best workmanship in conformity with this specification, the relevant specification/codes of practice of the Bureau of Indian Standards, approved drawings and the instructions issued by the Engineer-in-charge or his authorized representative, from time to time. Some of the relevant Bureau of Indian Standards is listed in Table 1.
- 2.2 In addition to these standards, all works shall also confirm to the requirements of the followings:
- Indian Electricity Act and Rules framed thereunder.
  - Fire Insurance Regulations.
  - Regulations lay down by the Chief Electrical Inspector of the State/State Electricity Board.
  - Regulations lay down by the Factory Inspector of the State.
  - Any other regulations lay down by the local authorities.
  - Installation & operating manuals of original manufacturers of equipment.

## **3. Equipment and Accessories Specifications**

- 3.1 This defines specifications and requirements mainly for the equipment and accessories which are generally supplied by the erection agency and do not cover the specification of main electrical equipment such as Transformers, HT and LT panels, switchboards, and motors etc. which may be supplied by the Owner.
- 3.2 All materials, fittings, and appliances to be supplied by the Bidder/Supplier shall be of best quality and shall conform to the specification given hereunder. The equipment shall be manufactured in accordance with current Bureau of Indian Standard Specifications wherever they exist or with the BS or NEMA specifications, if no such BIS are available. In the absence of any specification, the materials shall be as approved by the Owner or his authorized representative.
- 3.3 All similar materials and removable parts shall be uniform and interchangeable with one another.
- 3.4 You must furnish makes of bought out items.

## **4. Power Cables (HT)**

- 4.1 Specifications as per Section V Sub-Section 6

## **5. Power Cables (LT)**

- 5.1 Specifications as per Section V Sub-Section 6

## **6. Control Cables**

- 6.1 Specifications as per Section V Sub-Section 6

## **7. Cable Trays**

- 7.1 Specifications as per Section V Sub-Section 6

## **8. Cable Glands**

- 8.1 These shall be provided at both ends of armoured/ unarmoured electrical cables. Cable glands to be manufactured as per performance requirements of BS 6121 amended as on date, with BRASS material accurately machined and NICKEL finish. Single compression cable glands to be complete with checkout, gland body, 3 nose metal washers, and outer seal rubber ring and compression nut. Double compression glands to be complete with checkout, gland body, neoprene outer ring, Armour clamping cone, Armour clamping ring, Armour clamping nut, neoprene outer ring, skid washer & outer seal nut. Sample of cable gland to be got approved from the Site In charge before supply. For instruments MOC of cable gland shall be polyamide.

## **9. Cable Connectors**

- 9.1 Cable connectors, lugs/sockets, shall be of copper/Aluminium alloy, suitably tinned, soldering less, crimping type. These shall be suitable for the cable being connected and type of function (such as power, control, or connection to instruments, etc.)

## **10. Cable Route Markers**

- 10.1 These shall be galvanized Cast Iron plate with marking (LT/HT) diameter 150 mm with 600 mm long 25x25 mm MS. angle riveted/bolted with this plate. Sample to be got approved before use.

## **11. Cable Indicators**

- 11.1 Individual symbols / numbers printed on yellow strips of glossy PVC should be used for cable indicator.

## **12. Pipes for Cables**

- 12.1 For lying of cables under floor, G.I. class 'A' pipes shall be used. MS. conduits are not acceptable for this purpose. For laying cable in air whereas cable trays are not being used, MS 'B' class pipe shall be used. Size of pipe shall depend upon the overall outer diameter of cable to be drawn through pipe. To determine the size of pipe, assume that 40% area of pipe shall be free after drawing of cable. In dairy's process area and powder plant wherever required SS-304 pipe, 1.6 mm thick shall be used.

## **13. Motor Isolators**

- 13.1 These shall be in Aluminium cast housing, completely dust, vermin and weatherproof (IP 55), suitable for 30/25 A, 415 volts, 50 Hz with rotary type switch complete with cable gland for incoming and outgoing cables. For dairy's process area and powder plant SS-304 motor isolator shall be used. Final finish of housing to be buffer mirror for SS and powder coated Gray for Aluminium housing. Sample to be got approved before supply.

## **14. Control Junction Box**

- 14.1 These shall be in Aluminium cast housing, completely dust, vermin and weatherproof (IP 55). For dairy's process area and powder plant SS-304 junction box shall be used. Final finish of housing to be buffer mirror for SS and powder coated Gray for Aluminium housing. Sample to be got approved before use.

## **15. Remote Push Button Stations**

- 15.1 These shall be used for remote OFF for motors, away from MCC. These shall be suitable for surface/structure mounting in Cast Aluminium housing having IP-55 class of protection i.e., completely weatherproof. For dairy's process area and powder plant SS-304 push button shall be used. Final finish of housing to be buffer mirror for SS and powder coated gray for Aluminum housing. Sample to be got approved before supply.
- 15.2 Riveted type bi-color plastic nameplate to be provided for each feeder.
- 15.3 For outdoor installation suitable canopy to be provided.

## **16. Erection of Equipment**

16.1 The cases containing the equipment (being supplied by the Purchaser shall be handed over to the Bidder/Supplier. The Bidder/Supplier shall make his own arrangements for safe transportation of all the items to the erection site and also carry out complete loading/unloading during transportation. Equipment shall not be removed from packing cases unless the floor has been made ready for installing them. The cases shall be opened in presence of the Engineer-in-charge or his authorized representative. These empty packing cases shall be returned to the storage space identified by engineer in charge and any document if found with the equipment shall be handed over to the Engineer-in- charge. Any damage or shortage noticed shall be reported to the Engineer-in-charge in writing immediately after opening of packing cases.

## **17. Power Control Centers, Distribution Boards, Control Panels & Bus Ducts**

- 17.1 Erection: The manufacturers shall deliver electrical panels and bus duct in convenient shipping section. The Bidder/Supplier shall be responsible for final assembly and inter-connection of bus bars/wiring. The Bidder/Supplier shall grout foundation channel in the flooring. Switchgears shall be aligned and leveled on their base channels and bolted or tack welded to them as per the instructions of the Engineer-in-charge. The earth bus shall be made continuous throughout the length. Loosely supplied relays and instruments shall be mounted and connected on the switchgears. The contacts of the draw out circuit breakers shall be checked for proper alignment and inter-changeability.
- 17.2 After erection the switchboard shall be inspected for dust and vermin proofness. Any hole, which might allow dust or vermin etc. to enter the panel, shall be plugged suitably at no extra cost.
- 17.3 If the instrument transformers are supplied separately, they shall be erected as per the direction of the Engineer-in-charge. The Bidder/Supplier shall fix the cable glands after drilling the bottom top plates of all switchboards with suitable holes at no extra cost.
- 17.4 Range of overload relays/timers etc. shall be checked with requirement of motor/systems actually to be connected at site and if the same is under-sized/oversized, it shall be brought to the notice of Engineer-in-charge, who shall arrange procurement of correct rated components. However, the Bidder/Supplier shall not charge anything extra for Labour for such replacements.
- 17.5 The bus duct shall be suitably supported between switchgear and transformer. The opening in the wall where the duct enters the switchgear room shall be sealed to avoid rainwater entry. The foundation of the switchgear shall be raised suitably for minor adjustment to ensure proper alignment and connection of the bus duct at no extra cost. Expansion joints, flexible connection, etc. supplied by the manufacturer of the bus duct shall be properly connected.
- 17.6 Testing: Before electrical panel is energized, the insulation resistance of each bus shall be measured from phase to ground. Measurement shall be repeated with circuit breakers in operating positions and contact open. Before switchgear is energized, the insulation resistance of all DC control circuits shall be measured from line to ground. Tests shall be performed on all circuit breakers during erection as per Table 2.
- 17.7 Contact alignment and wipe shall be checked and adjusted where necessary in accordance with the breaker manufacturer's instructions. Each circuit breaker shall be drawn out of its cubicle, closed manually and its insulation resistance measured from phase to phase and phase to ground. All adjustable direct acting trip devices shall be set using values given by the Engineer-in-charge / manufacturer. The dielectric strength of insulating oil wherever applicable shall be checked. Before switchgear is energized tests shall be performed on each circuit breaker in its test position as per Table.

- 17.8 Close and trip the circuit breaker from its local control switch, push button or operating handle. Switchgear control bus may be energized to permit test operation of circuit breaker with AC closing with prior permission of the Engineer-in-charge.
- 17.9 Carry out tripping test of the electrically operated circuit breaker by operating mechanical trip device. Test operation of circuit breakers latch, check carriage limit switch if provided. Test proper operation of lockout device in the closing circuit, wherever provided by simulating conditions that would causes a lockout to occur. Trip breaker either manually or by applying current or voltage to each of its associated protective relays. Before switchgear is energized, the test covered above shall be repeated with each breaker in its normal operating position.
- 17.10 Capacitor banks in capacitor control panel shall be tested as per manufacturer's instructions. In addition, test for output and/or capacitance, insulation resistance test and test for efficiency of discharge device shall be carried out.
- 17.11 All electrical equipment alarms shall be tested for proper operation by causing alarms to sound under simulated abnormal conditions.
- 17.12 The Bidder/Supplier shall arrange testing and calibrations of relays. The testing equipment including primary and secondary injection sets (if required) etc. shall also have to be arranged by the Bidder/Supplier. Payment for above work shall be deemed to have been included in the erection of switch boards/ control panels.

## **18. Sealed Maintenance Free Batteries & Battery Charger**

- 18.1 Batteries shall be erected on stands and insulators supplied by the manufacturer of the batteries. Interconnections shall be made with leads supplied by the manufacturer. Filling of electrolyte (supplied by the manufacturers), charging, discharging, and recharging shall be carried out under the supervision of the Engineer-in-charge or his authorized representative. The Bidder/Supplier under the supervision of the Engineer-in-charge or his authorized representative will carry out erection of battery charger and DC board. The Bidder/Supplier shall also offer such facilities as may be required for carrying out tests on the complete battery charger and DC board/AC board.
- 18.2 Battery charger shall be tested for proper operation and to verify the charger delivers its maximum rated output. The Bidder/Supplier shall supply skilled/unskilled Labour for carrying out the test by the engineer-in-charge. Batteries shall be given a boost charge in accordance with the manufacturer's instructions and adjusted for float operation before being placed for regular service.

## **19. Erection and Testing of Motors**

- 19.1 Erection and coupling of motors with machines will be done under the mechanical erection. However, earthing, cable termination, testing and commissioning are covered under this section. Before starting, the alignment and coupling of motors with machines and the insulation resistance of the motors will be measured and recorded by the Bidder/Supplier. The direction of the rotation of the motor shall also be checked before the driven equipment is finally coupled. Motor bearings are to be checked and rectified including supply and changing of grease if required, checking of fans coupling with bodies etc. The Bidder/Supplier shall take adequate precaution and care while executing the work. For all damage due to negligence etc. the Bidder/Supplier shall be responsible to replace/repair at his own cost.
- 19.2 Before connecting power cables to motors the insulation resistance of all motor windings shall be measured. Measurement shall be repeated after power cable terminations are completed and before first charging.
- 19.3 **Motors** shall be **operationally tested** together with the **starting gear** and **auxiliary apparatus** such as push-button stations, the contractors, level and pressure controls, signal and alarm apparatus, power and control circuits etc.

- 19.4 Check the anti-condensation heater and its circuit (if installed).
- 19.5 Check the setting of the thermal overload protection / single phase prevent or. Testing of these devices is to be done wherever required as per the instructions of the Engineer-in-charge?
- 19.6 **Run all motors uncoupled for a maximum period of 4 hours** before the driven equipment is placed in regular service. Fill up Test Certificate as per Table 3.
- 19.7 All outdoor-installed motors must be shrouded with cover made out of 14-gauge GI sheet with lifting hook and louvers as approved by Purchaser.

## **20. Installation of Cable Network**

- 20.1 Cable network shall include power, control and lighting cables which shall be laid in underground trenches, home pipes, open trenches, cable trays, GI pipes, or on building structure surfaces as detailed in the relevant drawings, cable schedules or as per the Engineer-in-charge's instructions. Supply and installation of cable trays, GI pipes/ conduits, cable gland sockets at both ends, isolators, junction boxes, remote push buttons stations, etc. shall be under the scope of the Bidder/Supplier. For selection of cable size please refer to Table 5.

## **21. General Requirements for Handling of Cables**

- 21.1 Before laying cables, these shall be tested for physical damage, continuity absence of cross phasing, insulation resistance to earth and between conductors. Insulation resistance tests shall be carried out with 500/1000-volt Meggar.
- 21.2 The cables shall be supplied at site, wound on wooden drum as far as possible. For smaller length and sizes, cables in properly coiled form can be accepted. The cables shall lie by mounting the drum of the cable on drum carriage. Where the carriage is not available, the drum shall be mounted on a properly supported axle, and the cable laid out from the top of the drum. In no case the cable will be rolled on, as it produces kinks, which may damage the conductor.
- 21.3 Sharp bending and kinking of cables shall be avoided. The bending radius for PVC insulated and sheath armoured cable shall not be less than 10 D Where 'D' is overall diameter of the cable.
- 21.4 While drawing cables through GI pipes, conduits, RCC pipe, ensure that size of pipe is such that, after drawing cables, 40 % area is free. After drawing cable, the end of pipe shall be sealed with cotton/bituminous compound.
- 21.5 High voltage (11 kV and above), medium voltage (230 V and above) and other control cables shall be separated from each other by adequate spacing or running through independent pipes/trays.
- 21.6 Armoured cables shall never be concealed in walls/floors/roads without GI pipes, conduits RCC pipes.
- 21.7 Joints in the cable throughout its length of lying shall be avoided as far as possible and if unavoidable, prior approval of site engineer shall be taken. If allowed, proper straight through epoxy resin type joint shall be made, without any additional cost.
- 21.8 A minimum loop of 3 M shall be provided on both ends of the cable, or after every 50 M of uncounted length of cable and on both ends of straight through cable joint. This additional length shall be used for fresh termination in future. Cable for this loop shall be paid for supply and lying.
- 21.9 Cable shall be neatly arranged in the trenches/trays in such a manner so that crises crossing is avoided, and final take off to the motor/switchgear is facilitated. Arrangement of cables within the trenches/trays shall be the responsibility of the Bidder/Supplier.
- 21.10 All cable routes shall be carefully measured, and cable cut to the required lengths and undue wastage of cables to be avoided. The routes indicated in the drawings are indicative only and the same may be rechecked with

the Engineer-in-charge before cutting of cables. While selecting cable routes, interference with structures, foundations, pipeline, future expansion of buildings, etc. should be avoided.

- 21.11 All temporary ends of cables must be protected against dirt and moisture to prevent damage to the insulation. For this purpose, ends of all PVC insulated cables shall be taped with an approved PVC or rubber insulating tape. Use of friction type or other fabric type tape is not permitted. Lead sheathed cables shall be plumbed with lead alloy.
- 21.12 Wherever cable rises from underground/concrete trenches to motors/switchgears/push buttons, these shall be taken in G.I./MS pipes of suitable size, for mechanical protection upto 300 mm distance of concerned cable gland or as instructed by the Engineer-in-charge.
- 21.13 Where cables pass through foundation/walls of other underground structures, the necessary ducts or openings will be provided in advance for the same. However, should it become necessary to cut holes in existing foundations or structures the electrical Bidder/Supplier shall determine their location and obtain approval of the Engineer-in-charge before cutting is done.

## **22. Laying of Cables (Underground System)**

- 22.1 Cables shall be so laid in ground that these will not interfere with other underground structures. All water pipes, sewage lines or other structures, which become exposed by excavation, shall be properly supported and protection from injury until the filling has been rammed solidly in places under and around them. Any telephone or other cables coming in the way are to be properly shielded diverted as directed by the Owner.
- 22.2 Cables shall be laid at minimum depth of 750 mm in case of LT & 1200 mm in case of HT, from ground level. Excavation will be generally in ordinary alluvial soil. The width of the trench shall be sufficient for lying of required number of cables.
- 22.3 Sand bedding 75 mm thick shall be made below and above the cables. A layer of bricks (full size) shall be laid on the edge, above sand bedding on the sides of cables and a flat brick to cover cable completely. More than one cable can be laid in the same trench by providing a brick on edge between two cables. However, the relating location of cables in trench shall be maintained till termination. The surface of the ground after back filling the earth shall be made good so as to conform in all respects to the surrounded ground and to the entire satisfaction to the Engineer-in-charge.
- 22.4 For all underground cables, route markers should be used
- 22.5 Separate cable route markers should be used for LT, HT and telephone cables.
- 22.6 Route markers should be grounded in ground with 1:2:4 cement concrete pedestal size 230 x 230 x 300 mm.
- 22.7 Cable markers should be installed at an interval not exceeding 50 M along the straight routes of cables at a distance of 0.5 M away from center of cable with the arrow marked on the cable markers plate indicating the location of cable. Cable markers should also be used to identify change in direction of cable route and for location of every joint in underground cable.
- 22.8 RCC Hume pipe for crossing road in cable laying shall be provided by Owner. No deduction shall be made for cable lying in home pipe for not providing bricks, sand, and excavation. RCC home pipe at the ends shall be sealed by bituminous compound after laying and testing of cable by electrical Bidder/Supplier without any extra charge.

## **23. Laying of Cables under Floors**

- 23.1 GI class a pipe shall be used for lying of outgoing cables under floors from distribution boards to motors, isolators/junction boxes of motors, starter of motors and push button stations. Preferably one cable shall be

drawn through one pipe. Size of pipe shall be such that after drawing of cable 40 % area is free. If length of pipe is more than 30 M, free area may be increased to 50 %.

- 23.2 Use of elbows is not allowed at all, and number of bends shall be kept minimum. Instead of using bends with sockets, pipe-bending machine shall be used for making long smooth bends at site.
- 23.3 Ends of pipe shall be sealed temporarily while laying with cotton/ jute/ rubber stopper etc. to avoid entry of building material.
- 23.4 Exact location of equipment motor/ isolator/ push buttons etc. shall be ascertained prior to lying of pipe.

#### **24. Laying of Cable in Masonry Trenches**

- 24.1 Masonry/ concrete trenches for lying of cable shall be provided by Owner. However, steel members such as MS angles/ flats etc. shall be provided & grouted by electrical Bidder/Supplier to support the cables without any extra charge. Cables shall be clamped to these supports with Aluminium saddles/ clamps. More than one tier of cables can be provided in the same trench if the number of cables is more. If required cable trays can also be provided in trenches.
- 24.2 Entry of cables in trenches shall be sealed with bituminous MASTIC compound to stop entry of water in trenches.

#### **25. Laying of Cables in Cable Trays**

- 25.1 Cable trays and supporting steel members such as MS angle/ channel/ flats etc. shall be provided and fixed by the Bidder/Supplier.
- 25.2 Cables shall be fixed in cable trays in single tier formation and cables shall be clamped with Aluminium flat clamps and galvanized bolts/unit.
- 25.3 Earthing flat/ wire can also be laid in cable tray along with cables.
- 25.4 After lying of cables minimum 20 % area shall be spare.

#### **26. Laying of Cables on Building Surface/ Structure**

- 26.1 Such type of cable lying shall be avoided as far as possible and will be allowed only for individual cables or small group of cables, which run along structure.
- 26.2 Cables shall be rigidly supported on structural steel/masonry using individual cast/malleable iron galvanized saddles and these supports shall be approximately 400 to 500 mm for cables upto 25 mm overall diameter and maximum 1000 mm for cables larger than 25 mm. Unsightly sagging of cables shall be revenged. Only/GI clamps with GI bolts/nuts shall be used.
- 26.3 If drilling of steel structure must be resorted to, approval must be secured from the Engineer-in-charge and steel must be drilled where the minimum weakening of the structure will result.

#### **27. Termination & Jointing of Cables**

- 27.1 Use of Glands: All PVC cable upto 1.1 kV grade, Armoured or Unarmored shall be terminated at the equipment/junction box/ isolators/push buttons/control accessories, etc. by means of suitable size single/double compression type cable glands. Armor of cable shall be connected to earth point. The Bidder/Supplier shall drill holes for fixing glands wherever necessary. Wherever threaded cable gland is to be screwed into threaded opening of different size, suitable galvanized threaded reducing bushing shall be used for approved type.
- 27.2 In case of termination of cables at the bottom of the panel over a cable trench having no access from the bottom, a close fit holes should be drilled in the bottom plate for all the cables in one line, then bottom plate



should be split in two parts along the center line of holes. After installation of bottom plate and cables with glands, it shall be sealed with cold sealing compound.

- 27.3 Use of Lugs/ Sockets: All cable leads shall be terminated at the equipment terminals, by means of crimped type solder less connectors unless the terminals at the equipment ends are suitable for direct connecting without lugs/sockets.
- 27.4 The following is the recommended procedure for crimped joints and the same shall be followed:
- Strip off the insulation of the cable end with every precaution, not to sever or damage any strand. All insulation to be removed from the stripped portion of the conductor and ends of the insulation should be clean and square.
  - The cable should be kept clean as far as possible before assembling it with the terminal/socket. For preventing the ingress of moisture and possibility of re-oxidation after crimping of the aluminum conductors, the socket should be fitted with corrosion inhibiting compound. This compound should also be applied over the stripped portion of the conductor and the palm surface of socket.
  - Correct size and type of socket/ ferrule/ lug should be selected depending on size of conductor and type of connection to be made. Make the crimped joint by suitable crimping tool. If after crimping the conductor in socket/ lug, some portion of the conductor remains without insulation the same should be covered sufficiently with PVC tape.

## **28. Dressing of Cable inside the Equipment**

- 28.1 After fixing of cable glands, the individual cores of cable shall be dressed and taken along the cableways (if provided) or shall be fixed to the panels with polyethylene straps. Cable shall be dressed in such a manner that small loop of each core is available inside the panel.
- 28.2 For motors of 20 HP and above, terminal box if found not suitable for proper dressing of Aluminium cables, the Bidder/Supplier shall modify the same without any additional cost. Cables inside the equipment shall be measured and paid for.

## **29. Identification of Cables/ Wires/ Cores**

- 29.1 Power cables shall be identified with red, yellow & blue PVC tapes for trip circuits identification, additional red ferrules shall be used only in the particular cores of control cable at the termination points in the switchgear/control panels and control switches.
- 29.2 In case of control cables all cores shall be identified at both ends by their wire numbers by means of PVC ferrules or self-sticking cable markers, wire numbers shall be as per schematic/connection drawing. For power circuit also wire numbers shall be provided if required as per the drawings of switchgear manufacturer.

## **30. Cable between Isolators/ Junction box & Motors/ Controls**

- 30.1 Wherever possible Copper cables with glands shall be used between isolator/junction box (installed near motor/controls) and motors/controls. If terminal box of the motor or control switch is not suitable for accepting armoured cable or it is difficult to lay, copper conductor, multi-core, Unarmoured flexible cable in PVC flexible conduit steel (reinforced) with flexible conduit glands shall be used.

## **31. Testing of Cables**

- 31.1 Before energizing, the insulation resistance of every circuit shall be measured from phase to phase and from phase to ground. This requires 3 measurements if one side is grounded and 6 measurements for 3 phase circuits.

- 31.2 Where splices or terminations are required in circuits rated above 650 volts, measure insulation resistance of each length of cable before splicing and/or terminating. Report measurements after splices and/or terminations are complete.
- 31.3 DC High Voltage test shall be made after installation on all 1100 Volts grade cables in which straight through joints have been made and all cables above 1100 V grade.
- 31.4 For record purposes test data shall include the measured values of leakage current versus time. The DC High Voltage test shall be performed as detailed below:
- 31.5 Cables shall be installed in final position with the entire straight through joints complete. Terminations shall be kept unfinished so that motors, switchgear, transformer etc. are not subjected to test voltage.
- 31.6 The test voltage and duration shall be as per relevant codes and practices of Indian Standards Institution. Fill up the Test Certificate as per Table 4.

### **32. Earthing Network**

- 32.1 The entire earthing installation shall be done in accordance with the earthing drawings, specification, and instructions of the Engineer-in-charge. The entire earthing system shall fully comply with the Indian Electricity Act and Rules framed thereunder. The Bidder/Supplier shall carry out any changes desired by the electrical inspector or the Owner to make the installation conform to the Indian Electricity Rules, at no extra cost. The exact location of the earth pits, earth electrode and conductors and earthing points of the equipment shall be determined at site, in consultation with the Engineer-in-charge. Any change in the methods, routing, size of conductor etc. shall be subject to approval of the owner/engineer-in-charge before execution.

### **33. Earth Pit with Electrode**

- 33.1 Plate or pipe type earth electrode with earth pit shall be provided for this work unless otherwise advised by the Engineer-in-charge due to typical site conditions. Earthing electrode and pit shall be as per IS: 3043-1966 (code of practices for Earthing). All earth electrodes shall preferably be driven to a sufficient depth to reach permanent moist soil.
- 33.2 Prior approval of the engineer-in-charge shall be taken for selecting type of earth electrode (pipe or plate).
- 33.3 Earth pit center shall be at a minimum distance of 2 m from nearest building, unless otherwise advised. The minimum 3 m distance shall be maintained between centers of 2 earth pits.

### **34. Earth Bus, Earthing Lead & Earth Wire/ Strip**

- 34.1 All electrical equipment is to be doubly earthed by connecting two-earth strip/ wire conductor from the frame of the equipment to an earthing pit/ main earthing ring. The earthing ring will be connected via links to several earth electrodes. The cable Armoured will be earthed through the cable glands. Conductor size for connection to various equipment shall be as specified in the drawing or as instructed by the Engineer-in-charge. However, the length of the branch leads from equipment to earthing grid/ ring shall not be more than 10 to 15 meters.
- 34.2 All hardware for earthing installation shall be hot dip galvanized. Spring washers shall be used for all earthing connections of equipment having vibrations.
- 34.3 Size of earthing lead/ wire shall be as specified in schedule of quantities/ drawings. Table 6 may be considered as general guidelines.
- 34.4 When earthing wire is to be drawn under floor/in underground, Aluminium wire 10 mm dial. With PVC insulation shall be used. Instead of GI wire, PVC insulated copper conductor wires can also be used.

- 34.5 However, while deciding type & size of earth lead, the resistance between the earthing system and the general mass of the earth shall be as per IS code of practice. The earth loop impedance to any point in the electrical system shall not be in excess of 1.0 ohms in order to ensure satisfactory operation of protective devices.
- 34.6 G.I. wire/ Aluminium wire shall be connected to the equipment by providing crimping type socket/ lug.
- 34.7 Wherever earthing strip to be provided in cable tray, it shall be suitably bolted on cable tray and electrically bonded to the cable tray at regular interval.
- 34.8 Excavating & refilling of earth, necessary for laying underground earth bus loops shall be the responsibility of the Bidder/Supplier.
- 34.9 Wherever earth leads/ strips/ wire is laid in cable trenches, these shall be firmly and suitably cleared to the walls/ supporting steel structure on which cable is clamped.
- 34.10 The neutral of the transformer shall be connected to earth pit independently and earth pit shall have copper earth plate.
- 34.11 Long runs of GI strip shall be connected at each end with lap type welding to ensure continuity.

### **35. Two/Four Pole Structure**

- 35.1 **ISMB 200 x 100 mm** to be grounded in **concrete 1:2:4** for at least **1/5th length** i.e., **2 meters** size of concrete **pedestal 500 x 500 mm**. All necessary civil works such as excavation, centering, concreting, and back filling is included in Bidder/Supplier's scope of work.
- 35.2 Interconnecting by Aluminium conductor jumpers with connectors/ PG clamps etc.
- 35.3 Installation, testing and commissioning of complete two/four pole structure including ISMB & cross channels, G.O. switch, insulators and other items mentioned under equipment supply for two-pole structure.
- 35.4 Complete structure to be provided with two coats of Aluminium paint.

### **36. Erection Procedure Guidelines of Instrumentation & Control System**

The erection of Instrumentation & Control System shall be carried out generally conforming to General Technical Standards as described herein. However, the Bidder shall select and adopt methods and procedures for equipment erection to suit the nature of equipment and erection work, involved according to the best modern practice and his own experience.

Shop tests as well as Site tests shall be performed to ensure that all equipment / sub-systems / systems furnished are manufactured and tested conforming to the requirements of the specification and approved Quality Assurance Program.

All assembly and erection procedures adopted by the bidder shall be open for inspection and approval by the Client. Acceptance of erection procedures shall not in any way relieve the bidder of his responsibility for proper erection of the equipment.

Transmitters, converters and pressure & temperature switches shall generally be installed on Instrument Stands made of 2" SS pipes located at convenient points. Level transmitters shall normally be flanged for direct mounting in the tank / equipment.

Temperature / Pressure Stub on equipment and pipelines shall preferably be of same material or higher grade of material

Suitable Root Valves shall be provided with every tap-off point.

Installation of Pressure and Differential Pressure Transmitter shall be as per standard engineering practice incorporating Drain Valves, Isolation Valves, 2/3-Valve Manifold, Syphon etc. as applicable.

For instrument air, SS. Pipe shall be used for air distribution from Battery Limit to the designated point of use. Take-off connections to instruments / actuators shall be with suitable size nipples and shut-off valves. Individual air supply shall be provided by 6 mm OD PU tube through an isolating needle valve and air filter regulator.

Perforated Aluminum Trays (minimum 2 mm thick) shall be utilized for routing of signal tubing / cables in field. All cables / tubes in the supporting trays / channels shall be tagged properly. The loading of the cable trays shall not exceed 60 % of the available space. Proper gap between the electrical trays, as per the voltage level, shall be maintained in the cable tray layout. Tray numbers shall be provided at suitable intervals.

Rigid and flexible conduits along with necessary fittings shall be used for cable laying from instrument to JB or instrument to trays etc.

**Table 1 Bureau Indian Standards (BIS)**

<b>SN</b>	<b>Description</b>	<b>BIS</b>
1	PVC insulated cables (light duty) for working voltage upto 1100 volts	694-1977 Part I & II
2	PVC insulated cables (heavy duty) for voltage upto 1100 volts	1554-1976 Part I
3	-- Do -- for voltage 3.3 kV to 11 kV	1554-1976 Part II
4	Specification for polyethylene insulated PVC sheathed heavy duty electric cables, voltage not exceeding 1100 V	5959-1970 Part I
5	-- Do -- voltage 3.3 kV to 11 kV	5959-1970 Part II
6	Guide for marking of insulated conductors	5578-1970
7	Code of practice for installation and maintenance of paper insulated power cables	1255-1967
8	Code of practice for earthing	3043-1966
9	Guide for safety procedures and practices in electrical work	5216-1969
10	Code of practice for installation and maintenance of AC induction motor starters	5214-1969
11	Code of practice for installation and maintenance of induction motors	900-1965
12	Code of practice for installation and maintenance of switchgears	372-1975
13	Code of practice for installation and maintenance of transformers	1886-1967
14	Code of practice for electrical wiring installation, voltage not exceeding 650 V	732-1963
15	Code of practice for electrical wiring installation (system voltage exceeding 650V)	2274-1963
16	Guide for testing three phase induction motor	4029-1967

<b>Table 2 Pro forma for PCC, DB, Motor Control Centres Test</b>		
<b>SN</b>	<b>Test</b>	<b>Report</b>
1	Circuit (Breaker/Bidder/Supplier Module Designation/Bus Number)	
2	<b>Insulation resistance</b> (Contacts open, breaker Racked in position)	
a.	Between each Phase & Bus ( <b>Mega Ohm</b> )	
b.	Between each phase and earth ( <b>Mega Ohm</b> )	
c.	DC and AC control & auxiliary circuits ( <b>Mega Ohm</b> )	
d.	Between each phase of CT/PT and between CT & PT circuit if any ( <b>Mega Ohm</b> )	
3	<b>CT Checks</b>	
a.	CT ratio	
b.	CT secondary resistance	
c.	CT polarity check	
4	Check for contact alignment and wipe	
5	Check/test all releases/ relays	
6	Check mechanical interlocks	
7	Check electrical interlocks	
8	Check switchgear/control panel wiring	
9	<b>Checking breaker/Bidder/Supplier circuits for</b>	
a.	Closing- local and remote (wherever applicable)	
b.	Tripping-local and remote (wherever applicable)	
10	Opening time of breaker/ contactor	
11	Closing time of breaker/ contactor	
Signature and seal of Engineer-in-charge of Purchaser		Signature and seal of Engineer-in-charge of Bidder/Supplier

<b>Table 3 Pro forma for motor testing</b>	
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	<b>SN</b>	<b>Test</b>	<b>Report</b>
	<b>1</b>	<b>Name plate details</b>	
	A	Voltage	
	B	HP / KW	
	C	Mounting	
	D	Current	
	E	RPM	
	F	Frame size	
	G	Make	
	H	Sr No	
	I	Others	
	<b>2</b>	<b>Insulation test (before cable connection)</b>	
	A	Between Phase and Earth (Mega Ohms)	
	B	Between each Phase (Mega Ohms)	
	<b>3</b>	<b>Insulation test (after cable connection)</b>	
	A	Between Phase and Earth (Mega Ohms)	
	B	Between each Phase (Mega Ohms)	
	<b>4</b>	<b>No load current</b>	
	A	R Phase Amps	
	B	Y Phase Amps	
	C	B Phase Amps	
	<b>5</b>	<b>Full load current</b>	
	A	R Phase Amps	
	B	Y Phase Amps	
	C	B Phase Amps	
	<b>6</b>	<b>Temperature rise after 4 hours run</b>	
	A	On no load degree C	
	B	On full load degree C	
	C	Ambient temperature during test degree C	
	<b>7</b>	<b>Operation of thermal overload relay</b>	
	A	At normal Full Load current of motor	
	B	At twice Full Load current of motor trips in seconds	
		Signature and seal of Engineer-in-charge of Purchaser	Signature and seal of Engineer-in-charge of Bidder/Supplier

**Table 4**  
**Pro forma for Testing Cables**

Sr No	Test	Report
1	Date of Test	
2	Drum Number (from which cable is taken)	
3	Cable From -> To	
4	Length of run of this cable (meter)	
5	<b>Insulation resistance test (In Mega Ohm)</b>	
A	Voltage of Megger Volts	
B	Between core-1 to earth	
C	Between core-2 to earth	
D	Between core-3 to earth	
E	Between core-1 to core-2	
F	Between Core-2 to Core-3	
G	Between Core-3 to Core-1	
6	<b>High Voltage Test (Voltage Duration)</b>	
A	Between Cores and Earth	
B	Between Individual Cores	
Signature and seal of Engineer-in-charge of Purchaser		Signature and seal of Engineer-in-charge of Bidder/Supplier



**Table 5**  
**Recommended Cables Sizes for Industrial Wiring**

3 Ø 415 V Motor HP	Aluminium Conductor Cable Size (in mm <sup>2</sup> )			
	Rotor Resistance Starter		Star Delta Starter	
	Supply side	Motor Side (2 Cables)	Supply side	Motor Side (2 Cables)
10	6	6	6	4
15	10	10	10	4
20	16	16	16	6
25, 30	25	25	25	10
40	35	35	35	16
50	50	50	50	25
60	70	70	70	35
75	95	95	95	50
100	120	120	120	70
125	150	150	150	95
150	225	225	225	120
180	300	300	300	150
215	300	300	300	185

For **DOL Starter up to 10 HP Motor**, up to **4 mm<sup>2</sup>** copper armoured cables should be used.

**Table 6**  
**Sizing of Earthing Lead/ Wire**

Sr No	ITEM	Size
1	Control switches	G.I. wire 14 SWG
2	Motor upto 10 HP	G.I. wire 8 SWG
3	Motor above 10 HP upto 125 HP	G.I. strip 25 x 3 mm
4	Motor above 125 HP	G.I. strip 25 x 6 mm
5	Switch Board	G.I. strip 25 x 6 mm
6	Power control centre/ LT panel of sub-station	G.I. strip 40 x 6 mm

**SECTION -5**  
**TECHNICAL SPECIFICATIONS**

## INDEX

### **Sub Section**

- 1. Instructions to the Bidders**
- 2. Introduction & Design Basis**
- 3. Responsibility**
- 4. Project Management**
- 5. Technical Specifications**
- 6. Battery Limits**
- 7. Deviations from Technical Requirement**
- 8. Optional Items**
- 9. Drawing, Data & Documentation**
- 10. Process Performance and Consumption Guarantee**
- 11. Criteria for Technical Evaluation of Bid**
- 12. Bidders Meeting**
- 13. Technical Qualification Applications**

**SUB SECTION-1 INSTRUCTION TO THE BIDDERS**

## INSTRUCTIONS TO BIDDER

- 1.1 This Sub - Section of the tender defines the way that bidder is required to structure the presentation of the technical section of their bid.
- 1.2 All technical data required by the tender is to be provided in the format given in this Sub - Section. If no format is given for any specific item, the bidder may submit bid in their format.
- 1.3 Any bidder not following the required bid document structure of presenting technical data that is not in the required format is liable to be deemed non- responsive

## BID STRUCTURE OF TECHNICAL SECTION

- 2.1 The technical section of the bid is to be structured in the same order as Tender Document. Each statement is to be numbered with the same Sub-section and paragraph number as in the Tender Document. Every page of the technical section of the bid is to be numbered. Section number is also indicated in every page. The general structure, therefore, is to be as follows:

<b>Sub – Section</b>	<b>Subject</b>
1	Instruction to the Bidders
2	Design Basis
3	Responsibilities
4	Project Management
5	Scope of Supply and Technical Specifications (Tender package)
6	Battery Limits
7	Deviations from Technical Requirements
8	Optional Items
9	Drawings data and Documentation
10	Process Performance and Consumption Guarantee
11	Criteria for Technical Evaluation of Bid
12	Bidder meeting
13	Technical Qualification Application
14	Appendices

- 2.5 The bidder is to cover each requirement of the Tender Document by statements, technical data and descriptive material and, in particular to detail the following section--

## **SUB - SECTION 2 INTRODUCTION & DESIGN BASIS**

### **Preamble**

The bidder is to describe his technical proposal in detail, stating the processes and systems, which he has, applied in designing the plant. Also, to highlight any special technical innovations that the bidder proposes to include in the plant that will improve the performance, reduce operating cost, or improve product quality. The "Preamble" should commence at the start of the process and work logically through the process. Any such highlights should be cross-referenced with the Bid sub-Section and paragraph number to which they apply.

The bidder is required to follow the Basic of Design in the tender and indicate clearly where additional processes or alternative processes of equipment are considered to be necessary or desirable to achieve optimum plant operation efficiency, optimum product quality within the standards specified, and optimum plant operation convenience.

Under the utilities section, quantify the peak and daily loads of each utility and cross-reference this two service load histogram data to be provided with this bid.

## **SUB – SECTION 3 RESPONSIBILITIES**

### **Responsibilities of the Bidder**

The bidder is required to specifically state his acceptance or non-acceptance of each clause in this sub-section. Non acceptance shall be deemed a deviation from the tender and should be mentioned in deviations, Sub - Section 7.

### **Responsibilities of Client**

The bidder is required to state here any additional responsibilities that he considers are to be borne by Client besides those described in the tender.

## **SUB – SECTION 4 PROJECT MANAGEMENT**

### **● Time Schedule**

The bidder is to state in this subsection the proposed program of implementation from receipt of order to commencement of product trials, to be provided as per Sub - Section 10.

### **● Management Team**

The bidder is to provide detail of the management team in terms of designation, accordance with this Sub - Section of the tender. Also, to quantify the support that will be given by foreign collaborators, with designation and man months of attendance in India and at site.

This bidder is to ensure that the following Sub - Sections are fully detailed and quantify the duration and manpower supplied to each.

- **Commissioning**
- **Product trials**
- **Training**

**SUB – SECTION 5            SCOPE OF SUPPLY & TECHNICAL SPECIFICATIONS (TENDER PACKAGE)**

The bidder is required to follow the sequence of the tender Document and to make a statement on each paragraph. **Do not** leave any item without a clarify statement.

**SUB – SECTION 6            BATTERY LIMITS**

**Battery limits for the plant are mentioned in this sub-Section.**

**SUB – SECTION 7            DEVIATIONS**

All technical deviations are to be stated. This is mandatory, and failures to comply with make the bid liable to be deemed non-responsive

**SUB – SECTION 8            OPTIONAL ITEMS**

Items that the bidder includes in this Sub - Section that are considered by evaluation team to be essential to the satisfactory operation of the plant, shall be included in the commercial evaluation of the bid.

**SUB – SECTION 9            DRAWINGS, DATA & DOCUMENTS**

The list of drawings and technical documents required for technical evaluation is included in this Sub - Section. These include a number of data sheet formats to be completed by the bidder. The completion of this format is mandatory, and failure to comply will make the bid liable to be deemed non-responsive.



## **SUB SECTION-2 INTRODUCTION & DESIGN BASIS**

## 1.0 INTRODUCTION

Together the need of upcountry market and the part of expansion of its capacity, it was proposed to establish a 1.0 LLPD plant with various products processing and packing like milk in pouches, card in pouches as well as in cup, buttermilk in pouches, white butter and ghee at Haringhata Dairy plant.

The proposed plant shall be fully automatic Run shell have facility to expand up to 1.5 LLPD without any major modifications in this civil infrastructure.

The project in all respect to be considered greenfield project and all the activities shall be planned accordingly.

### **Location of Plant:**

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The proposed plant shall be located at.

XG3G+F6H, Haringhata Farm Road,  
Haringhata Farm,  
West Bengal 741252

### **Contact Person:**

Mr. Sanjay Das , Sub-Assistant Engineer  
**West Bengal Livestock Development Corporation Ltd.,**  
Contact : **9875633163 ; 9007872759**  
E mail: [info@wbldc.in](mailto:info@wbldc.in)

### **Design Basis**

### **Shall be submitted**

## **SUB SECTION-3 RESPONSIBILITY**

## **RESPONSIBILITIES OF BIDDER**

- 3.01 Developing the process design, complete engineering design, manufacturing and/or supply of respective equipment/goods/services as per the technical specifications and ensuring best performance of individual equipment/systems/process plant. The Bidder shall avail the assistance of reputed specialists in the respective field wherever required as well as past experiences gained during installation/ commissioning of the of projects.
- 3.02 Development of automation services, software, interfaces etc. wherever applicable and its incorporation in the project as per technical specifications.
- 3.03 Providing technical data, technical literature, production, and service load calculations.
- 3.04 Not applicable for this tender
- 3.05 First charge of oil/lubricants/gas as per technical specifications.
- 3.06 Execution of project in accordance with prevailing Indian standards IER & IBR, wherever applicable & relevant to this project.
- 3.07 Testing and commissioning satisfactorily and performance of all equipment in Bidder's scope and after sales service at mutually agreed terms.
- 3.08 Test equipment, test kits, instrumentation and materials required for establishing performance parameters.
- 3.09 Provide necessary manpower during positioning, pre-commissioning, testing, and commissioning along with tests.
- 3.10 Testing, commissioning of the system under scope as per agreed performance parameters and utility consumption.
- 3.11 Training Purchaser's personnel in the field of instrumentation automation, management system, plant operation & control, maintenance & repair of systems & equipment.
- 3.12 Dry Chemical Powder type fire extinguishers shall be provided at strategic points by Bidder as per BOQ scope.
- 3.13 Making small cut outs in the wall shall be the responsibility of the Bidder. The same shall be made using rotary cutters.
- 3.14 Cut outs in the slab as required shall be responsibility of the Bidder and the same will be carried out at no extra cost by drilling into the concrete by rotary cutters with prior permission from Civil supervisor
- 3.15 **All civil works including buildings, roads, cable trench, underground condensate piping and drainage (as per scope of work) .**

## **3.1 RESPONSIBILITIES OF PURCHASER**

- 3.1.1 Details of civil design, building layout and drainage and sewage details **for approval.**
- 3.1.2 Documents on local site conditions related to climate, access, and communications.

- 3.1.3 Temporary water and power supply at one point within the plant premises during erection. Water supply and power shall be free of cost.
- 3.1.4 Lighting and domestic wiring system and internal telephone system including the switch boards for lighting. Engineering personnel to liaison with the Bidder, Project Manager, and the execution team.
- 3.1.5 Permanent water and power supply at the time of pre-commissioning of the plant.
- 3.1.6 Adequate staff including operators, supervisors, and engineers for product trials.
- 3.1.7 Provision of and cost of services, raw products, packaging materials & chemicals.
- 3.1.8 Timely provision of personnel for training.
- 3.1.09 Provide open storage area, lockable store and office space during erection and commissioning of project.
- 3.1.10 Suitable Site fabrication yard
- 3.1.11 Telephone and fax on chargeable basis.
- 3.1.12 Payment as per agreed terms and conditions.
- 3.1.13 Approval of drawing within 10 days from date of submission and decision within a week on any issue which will come up.
- 3.1.14 Project manager with team throughout the implementation.
- 3.1.15 Lightening protection system & protection against rain.
- 3.1.16 Readiness of Civil Building, clear civil fronts in all respects along with necessary utilities within agreed schedule to enable commencement of erection activities to meet the overall completion schedule.
- 3.1.17 Availability of required quantity of milk for the designed product to conduct the first run of product trials at the rated plant capacity.

**SUB SECTION-4 PROJECT MANAGEMENT**

#### **4.1 TIME SCHEDULE**

- 4.1.1 Project execution shall be scheduled to mutually agreed time bound program, which should not exceed as specified in the IFB from the date of signing of contract along with advance payment to commencement of product trials and service load trials. The Project Manager of bidder will provide the Project Manager of the Purchaser with monthly expediting and progress reports, which clearly indicate the actual vs., planned progress and the new likely completion dates of supply, erection, and commissioning and product trials.
- 4.1.2 The project-staffing pattern shall be submitted before commencement of work and should include sufficient personnel to meet the execution time schedule.

#### **4.2 MANAGEMENT TEAM**

- 4.2.1 A Project Manager who shall be adequately experienced in projects of similar magnitude and type shall head a competent executive team. Reputed experts in various fields who shall be responsible for satisfactory execution of the project shall assist the Project Manager. He shall be responsible for overall implementation of the project, from commencement to final takeover of the plant.
- 4.2.2 A Project Engineer shall be appointed for day-to-day operation and co-ordination, and to ensure successful and satisfactory design, procurement, manufacture, inspection, erection, testing and commissioning of all the equipment/facilities/systems within the time bound schedule.
- 4.2.3 The Project Manager and Project Engineer shall attend technical and review meeting between various parties involved in the project and ensure implementation of all decision taken in the meetings.
- 4.2.4 The Project Manager shall also be responsible for detailed material accounting at site and management of project materials and equipment stored at site.
- 4.2.5 The Purchaser will nominate a Project Manager with whom the Project Manager of the bidder shall communicate/co-ordinate.
- 4.2.6 For smooth execution of the project, a team of Project Manager and Key Personnel shall remain consistent throughout the execution period.
- 4.2.7 The Project Manager shall be fully authorized to take on-spot decision with regards to: -
- Modification in layout and execution program to suit local condition.
  - To purchase essential materials from local market to avoid delays.

#### **4.3 APPROVAL**

- 4.3.1 Purchaser shall give approval on technical documentation within 7 working days after submission. Amendments, which are not in the original scope of work or due to changes in concept, shall be taken up by the bidder as per mutually agreed rates to be decided before execution, and shall be binding on the bidder.

- 4.3.2 Bidder shall obtain approval for purchase of specific makes of equipment whose makes are not mentioned in his offer. If two or more makes of equipment are mentioned in the form of alternatives in the approved list, the bidder shall select any one of the particular make from the approved list after mutual discussions with the Purchaser.

#### **4.4 INSPECTION**

- 4.4.1 For indigenous items, the bidders shall invite Purchaser for inspection and preliminary testing. Inspection may be required at various stages of manufacture/assembly for some items. The Purchaser will arrange to complete such inspection as maybe necessary along with clearance within a reasonable time (7 days) from the date of intimation by the bidder.
- 4.4.2 For imported items, however, the bidder shall do the inspection at his cost and submit the necessary test certificate wherever possible.

#### **4.5 SITE WORK AND INSTALLATION**

- 4.5.1 Protection of electronic equipment.

It is the responsibility of the bidder to ensure that all electronic equipment and control system shall be fully protected against hostile environment, humidity, heat and dust that will be encountered during storage and installation.

- 4.5.2 Temporary power supplies.

Power supply at site is normally very stable, but the bidder is responsible to ensure that delicate electronic equipment used during construction, such as welding machine, testing devices etc. are protected against damage from mains supply. In the event of a major power failure in the system, it shall be the responsibility of the bidder to hire a diesel generator if this proves to be necessary.

#### **4.6 COMMISSIONING**

- 4.6.1 After satisfactory erection and testing, a competent team shall be deputed to commission the plant and to run product trials and to establish performance parameters. However, the commissioning of the complete plant will be done at an appropriate stage which shall be informed to the successful bidder. Bidder to participate in the entire plant commissioning activity and ensure that his equipment is working as per the specifications and in the harmony with other equipment and design philosophy.

#### **4.7 PRODUCT TRIAL AND PERFORMANCE GUARANTEE**

- 4.7.1 On completion of the Commissioning period, the plant will be operated at full capacity to the satisfaction of the Project Authority for a period of seven days on the designed product.
- 4.7.2 If shut down occurs due to External Force Majeure reasons after 16 hours of operation in any day, this shall be considered as a full day of testing. If at less than 16 hours of operation, the trials shall be continued for an additional full day.
- 4.7.3 Performance Guarantee: Performance and services consumption guarantees, and the relevant penalties for not meeting the rated capacities and efficiencies are covered in the tender.



## **4.8 TRAINING**

4.8.1 The objective of the training is to provide selected staff members of the dairy with necessary knowledge of dairy technology and maintenance to ensure a sound and suitable operations of the plant. Emphasis will be given on application as well as operation and not on basics.

- Dairy staff for:
  - Operation of process, services utilized and process technology
  - Operation of machinery and equipment
- Maintenance staff for:
  - On the job training for technical personnel
  - Maintenance of plant and equipment

4.8.2 All above training has been considered as mentioned in the design basis. Time allocation for each of those can be finalized before testing of the plant.

4.8.3 Services will be provided by Purchaser:

- Classrooms with chairs and tables for theoretical training
- Persons selected for training will have a good basic technical education
- Continuity in training and their assistance during startup of the plant
- Teaching material and audio-visual aids.
- Training at manufacturing work if any in India/ abroad will be provided, if required travel, boarding, lodging and individual expenses will be extra to the Purchaser's account.

## **4.9 STAND BY OPERATION OF THE PLANT**

Not Applicable for this tender.

## **4.10 SERVICE COVER**

Not Applicable for this tender.

## **SUB SECTION - 5**

### **SCOPE OF SUPPLY & TECHNICAL SPECIFICATIONS**

## 1.0 Raw Milk Reception & Storage

### Can Reception

#### 1.01 Incoming Can Conveyer (powered) with MS platform

Capacity : As per BOQ

Qty: : As per BOQ

Incoming Can Conveyer shall be two track type with one no. 90 Deg. Bend (if required) and drive unit. The chain shall be of MS/poly acetylene and framing structure shall be MS duly spray galvanized and painted with two coats of epoxy paint of gray colour. Adjustable ball feet shall be provided in the legs.

The length of incoming conveyors shall be as per final compact layout.

Length : As per layout

#### 1.02 Can Tipping Bar

Capacity : As per BOQ

Qty: : As per BOQ

This will be used as can support in manual tipping of milk cans into the weigh bowl. It shall be a horizontal wooden (teak) bar supported on two legs. The legs shall be grouted down to the floor.

#### 1.03 Can Washer with incoming & Outgoing Conveyer with lid washer

Capacity : As per BOQ

Qty : As per BOQ

**Splash Guard:** Can will be tipped in to the splash guard where it will undergo coarse filtration Here, the can after tipping shall be kept up side down over SS Ship chain conveyer, which will carry the empty can over the drip collection tray.

**Drip Collection Tray:** While travelling over the ship chain as above, residual milk shall drip in to the SS drip tray of 1 x 1.5 m length. The drip milk shall be collected in separate can through a nozzle.

**Lid conveyer:** The lids shall be placed over the chute and passed on the lid conveyer inside the can washer. The chute shall be designed as per the site condition.

The can washer shall be constructed in SS frame with SS track, hood, covers and condensing box.

Configuration : Straight through

**Washing Sequence :**

**Fresh water pre-rinse**

Here the water jet shall remove the residual milk adhere ring to the surface of the can. Pressure hot water first rinse having minimum 3.5 kg/sq cm discharge head and 55 C deg. temp. (Return water from after rinse shall be used).

Pressure hot detergent cleaning having mini.3.5 kg/sq cm discharge head and 70 C deg temp. here the fat shall be melted and SNF shall be cleared from the surface with the help from detergent.

Pressure hot water after rinse having minimum 3.5 kg/sq cm discharge head and 80 Deg. C temperature. In this section, the can is completely cleaned and shall be ready for sterilization.

**Live Steam sterilization.** – in this section, the can is finally sterilized using the live steam.

**Hot Air Drying at 100 Deg C.** – The can before discharge from the can washer shall be completely dried by blowing hot air at about 100 Deg. C.

**Condensing Box:** The hot Air and wet vapor shall be sucked by a blower through a condensing box mounted over the can washer. The condensate from the condensate box shall be drained through an SS pipe on the floor/nearest drain point.

**Required Services:**

Steam at 3.5 Kg/sq cm pressure & HP steam at 7 bar pressure for steam coil of hot air generator.

Water : Raw/Soft water at 3 kg/sq cm

Electric Power 3 phase + N electrical supply from MCC to terminal box + earthing

Finish all welding joints shall be ground flush and finished to 150 grit all SS surfaces are to be polished 150 grits.

**Scope of Supply:**

**Main Enclosure :** The main enclosure which houses the washing & sterilizing sections shall be made from 2 mm thick stainless steel conforming to AISI 304 having removable stainless steel (AISI 304) inspection doors all along its length at the front side for easy access. Can guide shall be provided all along the inside length.

**Under frame :** The complete under frame shall be made from SS pipe section. The complete assembly shall have sufficient number of MS legs with stainless steel ball feet having 50 mm vertical adjustment.

**Conveyor Chain :** The machine conveyor chain shall ensure that the individual cans and lids remain properly spaced. The drive motor, transmission drive shaft and idler shaft shall have adequate and accessible provision for adjustment all tensioning.

MOC : SS 304

**Condensate Box** : The vapor duct ending in a condensate box shall be provided on top of the can washer for condensing flash vapor from the can washer. The warm water from the condensate box can be in the hot water section of the can washer. The condenser and duct shall be made from SS 304. There shall be an exhaust blower of suitable capacity mounted on flanged type motor to suck vapor from the can washer and throw out non condensable gases. Exhaust fan shall have protection against chemical fumes and moisture. **The exhaust duct shall be extended up to nearest point outside building with all support and structure required to ensure that heat is not rejected in the building area.**

**Can Discharge:** The clean and dry cans shall be discharged from the machine on to a clean can conveyor in the up right position with the timing mechanism. The system shall also be provided with a mechanical chute arrangement to receive the clean lid for manual placement of lids on the cleaned cans.

**Washing Stations:**

**Washing:** The pumping and jetting arrangement shall apply sufficient washing liquid to the inside and outside surfaces of the cans and the lids.

**Filters:** A SS pressure filter shall be provided in the liquid re-circulation line to prevent choking of pump impeller and nozzles. The filter shall be fabricated from AISI 304 SS material.

**Sump Tanks:** These shall be made from stainless steel AISI 304 and would be used as feed tanks for various washing liquids. Correct operating levels shall be maintained automatic in all the sump tank with necessary float valves. There shall not be any intermixing between the different Liquids- 3 nos.

**Water Heating Arrangement:** For hot water, direct steam injection system shall be provided using steam-water ejector for mixing steam with water. For detergent heating indirect system with SS heating coil ending in a steam trap shall be provided. Condensate from the coil shall be discharged into the hot water tank. Suitable drain points to be provided to drain the used liquid.

**Air Heating Arrangement:** For Can drying hot air shall be used and blower, air heater and ducting etc, shall be provided. Coil of air heater shall be SS tubes of 14 G.

**Jet Nozzles:** Nozzles for jets shall be made from stainless steel conforming to AISI 304 - 1 lot

**Pumps :** The centrifugal monoblock type pump set having cast iron impeller, cast iron body and SS sheet with mechanical seal having 35 MWC discharge pressure shall be supplied having required capacity. – 3 Nos.

**Instruments:** Suitable connections/thermo well shall be provided on the delivery sides of the pumps and on the sump tanks for fixing pressure and temperature gauges. Instrument panel fabricated from SS 304 with acrylic cover shall contain dial type pressure gauges and digital temperature indicators.

**Control Panel:**

**Main Enclosure:** The enclosure and supporting structure shall be made from stainless steel conforming to AISI 304. The enclosure shall be moisture, dust and vermin proof. Panel shall be foot-mounted type, by 100 mm SS pipe.

**Mimic Diagram:** It shall show the complete can washing process with LED's showing the operation of various motors.

**Push Buttons and Indicating Lamps:** ON/OFF push buttons for all the motors. All the push buttons shall have indicating lamps and suitable inscriptions. Panel shall also have an emergency lockable switch to stop total operation of the can washer in case of emergency.

**Wiring :** The control panel shall be completely pre wired. The wiring shall be done by copper cables and be dressed in accordance with the standard practice.

**Termination Points:** All distribution piping shall be pre assembled and terminated at a single flange for each service connection

#### 1.04 Electronic Weigh Bowl with weigh scale

Capacity : As per BOQ

Qty: : As per BOQ

SS Weigh Bowl shall be suspended from the Weigher and its weight is sensed through electronic resistive/capacitive strain gauge load cells.

MOC : SS 304

Capacity : As per BOQ

Qty : As per BOQ

Electronic type weigh scale shall be used for weighing Milk.

The system shall consist of;

**Measurement:** Through Resistive/capacitive type Load cell.

**Display :** Weight of milk will be indicated in bright seven segment LEDs'/LCD of 25 mm height. There shall be no visual errors. It will be possible to mount the display separately at a convenient point.

System would be powered with 230 V, 1 phase, 50 HZ AC supply. It will have automatic zeroing and span drift correction. It will be able to work in ambient temperature of 50 Deg. C. and 90% relative humidity. System shall have facility for interfacing with a PC for entry/recording of data. Load cells shall conform to IP 65 and shall withstand overload of 300% to take care of the impact loading when milk is poured into the weigh bowl.

A dedicated tailor-made MIS system for reception data entry and collection shall be supplied.

#### **1.05 Can Scrubber with Lid Scrubber**

Capacity : As per BOQ

Qty: : As per BOQ

Duty : To clean the empty can and Lid after unloading milk

It shall be motorized detergent cleaner with special brushing arrangement.

Bidder to submit the GA drawing with the offer showing dimensions.

#### **1.06 SS dump Tank (Double Compartment 500 L each)**

Capacity : As per BOQ

Qty : As per BOQ

Function : For collecting and storing the milk

Type : Open rectangular trough with cover

Material : 2 mm SS 304

Accessories : Bottom outlet, ball feet & suitable cover with opening for milk receiving

#### **1.07 Pipe in Pipe filter for Cow Milk**

Duty : For online filtering of milk before chilling

Capacity : As per BOQ

Quantity : As per BOQ

Material : Stainless steel confirming to AISI 304.

Strainer : Pipe in pipe type

Gasket : Food grade rubber

#### **1.08 Pipe in Pipe filter for Buffalo Milk**

Duty : For online filtering of milk before chilling

Capacity : As per BOQ  
Quantity : As per BOQ  
Material : Stainless steel confirming to AISI 304.  
Strainer : Pipe in pipe type  
Gasket : Food grade rubber

#### **1.09 Raw Milk Transfer Pump for Cow Milk**

Capacity : As per BOQ  
Qty : As per BOQ  
Type : Centrifugal, mono block  
Fittings : Quick opening sanitary fittings  
Material : AISI 316  
Mounting : Free standing with adjustable SS ball feet  
Shaft sealing : Mechanical shaft seal  
Gasket : Nitrile rubber  
Shroud : AISI 304 with acoustic lining  
Motor : 415V, AC, 3 phase, 50 Hz. EFF-I (IE3) Squirrel cage induction motor with TEFC/IP 55 Enclosure.

**Note:**

1. **Suitable arrangement to be done for cooling of motor running with VFD to avoid over heating while running on low speed. Use special motor for VFD operated pumps.**
2. **The SS shroud shall be cladded with sound barrier lining for noise reduction.**

#### **1.10 Raw Milk Transfer Pump for Buffalo Milk**

Capacity : As per BOQ  
Qty : As per BOQ  
Type : Centrifugal, mono block



All other Specifications are same as per Item No. 1.09

### 1.11 Raw Milk Chiller (Cow Milk)

Capacity : As per BOQ  
Qty : As per BOQ  
Type : Plate heat exchanger with SS 316 type plates  
MOC of plate : SS 316  
Duty : This PHE shall be used to chilled raw milk with chilled water

Instruments :

1. Temp control valve for chilled water
2. Milk in/out Temp. Transmitter
3. Temp. Transmitter on Chilled water return line

Raw milk content : as mentioned in the design basis

Milk Feed temp. : 10 Deg. C (Max)

Milk Discharge Temp. : 4 Deg. C (Max)

Chilled water feed temperature : 2 Deg. Celsius

Maximum permissible chilled water flow: 1:2 ratio of milk

Maximum pressure drop on milk side: 0.5 Kg/cm<sup>2</sup>

**Note: Manual Isolation valves on in and out line and with NRV on return line to be considered.**

### 1.12 Raw Milk Chiller (Buffalo Milk)

Capacity : As per BOQ

Qty : As per BOQ

**All other specifications are same as per Item No.: 1.11**

### 1.13 Can Reception Panel for Milk Unloading & CIP Operation

Capacity : As per BOQ

Qty : As per BOQ

This shall be SS control panel with push buttons for start/stop/ CIP operation of the can unloading system.

Bidder to submit the design details for approval before commencing the work in the event of placement of order.

### Tanker Reception

#### 1.14 FDA Approved Tanker reception Hose (6 meter) with rubber rings for safety

Size : As per BOQ

Qty : As per BOQ

Type : Crush proof reinforced plastic spiral construction flexible hose with vulcanized SS end connection & fittings, resistant to CIP cleaning liquids up to 90°C with rubber/polymer protection ring to prevent the hose from soiled ground

Length : As per BOQ

Material : Food grade, US FDA approved

**NOTE: Connections piece with welded reducers required to connect 63.5mm tanker outlet to be considered in the scope. (6 nos.)**

#### 1.15 SS Deration Vessel

Capacity : As per BOQ

Qty : As per BOQ

Duty : To ensure no dry running of unloading pump & to remove air

Type : Cylindrical, no foam side entry and bottom outlet with continuous level sensor to control the pump operation.

MOC : SS 304

Instruments : Low &High-Level Switches and automatic BF valve for air removal.

### 1.16 Inline Filter (Pipe in Pipe)

Capacity	: As per BOQ
Qty	: As per BOQ
Duty	: For online filtering of milk.
Material	: Stainless steel confirming to AISI 304.
Filter	: Perforated type filter
Mesh Size	: 50 mesh
Gasket	: Food grade rubber

### 1.17 Milk Transfer Pump (1+1 cold Standby)

Capacity	: As per BOQ
Qty	: As per BOQ
Type	: Centrifugal, mono block
Fittings	: Quick opening sanitary fittings
Material	: AISI 316
Mounting	: Free standing with adjustable SS ball feet
Shaft sealing	: Mechanical shaft seal
Gasket	: Nitrile rubber
Shroud	: AISI 304 with acoustic lining
Motor	: 415V, AC, 3 phase, 50 Hz. EFF-I (IE3) Squirrel cage induction motor with TEFC/IP 55 Enclosure.

**Note:**

1. **Suitable arrangement to be done for cooling of motor running with VFD to avoid over heating while running on low speed. Use special motor for VFD operated pumps.**
2. **The SS shroud shall be clad with sound barrier lining for noise reduction.**

### 1.18 Raw Milk Chiller for Tanker Milk

Capacity	: As per BOQ
----------	--------------

Qty : As per BOQ  
Type : Plate heat exchanger with SS 316 type plates  
MOC of plate : SS 316  
Duty : This PHE shall be used to chilled raw milk with chilled water  
Instruments :  

1. Temp control valve for chilled water
2. Milk in/out Temp. Transmitter
3. Temp. Transmitter on Chilled water return line

**NOTE: All TT for this equipment shall have head mounted display with backlight**

Raw milk content : as mentioned in the design basis  
Milk Feed temp. : 10 Deg. C (Max)  
Milk Discharge Temp. : 4 Deg. C (Max)  
Chilled water feed temperature : 2 Deg. Celsius  
Maximum permissible chilled water flow: 1:2 ratio of milk  
Maximum pressure drop on milk side: 0.5 Kg/cm<sup>2</sup>

**Note: Manual Isolation valves on in and out line and with NRV on return line to be considered.**

### **1.19 Burst Rinse system for tanker milk recovery**

The proposed system shall comprise of;

#### **Dummy Manways for burst rinse with flexible hose**

Size : As per BOQ  
Length : As per requirement  
Qty : as per BOQ  
Duty : For Burst Rinse before CIP to recover the milk solids  
Material of construction : SS 304 for dummy man way

Accessories : Air vent, spray ball and clamps

Each Dummy many ways should consists of required no. of man ways and fittings required for Burst Rinse of tanker before going to CIP.

The hose shall be able to withstand 3.5 bar pressure. Hose shall have SMS union to fit at tanker flushing manhole.

There shall be push button on the top of each tanker bay to start soft water bursting for required time comprising automatic valve backed up by manual valve in the soft water line

### **1.20 Dummy Manway for Tanker CIP with turbine**

Dummy man way shall be used to clean the tanker without CIP spray ball. It shall consist of CIP spray ball (openable) type. Spray Turbine to be considered for tanker CIP.

Capacity : As per BOQ

Qty : As per BOQ

MOC : SS 304

Accessories : CIP spray ball (openable type), clamp etc.

### **1.21 Tanker CIP forward Hose**

Capacity : As per BOQ

Qty : As per BOQ

Type : Crush proof, acid & Alkali proof hose with temp resistance up to 90 Deg. C

### **1.22 Tanker CIP Return Hose**

Capacity : As per BOQ

Qty : As per BOQ

Duty : to connect the tanker to CIP return pump during tanker CIP

All other specification is same as per item no: 1.14

### **1.23 Tanker CIP Return Pump**

Capacity : As per BOQ

Qty : As per BOQ

Type : Centrifugal, Self-priming

All other specifications are same as per item no: 1.17

#### **1.24 Electrical Weigh Bridge for tanker**

Capacity : As per BOQ

Qty : As per BOQ

The scope shall include, but not limited to the followings;

1. Dismantling of existing weigh bridge from Ujjain plant
2. Loading, transportation and unloading at new dairy site
3. Positioning & erection of the weigh bridge as per approved layout
4. power, control, and data transfer cabling work
5. Hook up with MIS system

Supplier/ has to consider hooking up the existing weighbridge with the new dairy plant automation and MIS System. Supplier has to visit and inspect the existing weighbridge installed at Ujjain Dairy plant and quote for missing item/accessories required.

#### **1.25 Tanker Reception Panel for Milk Unloading & CIP Operation**

Touch screen OP in SS panel for reception operations like start, stop, pause, water purge etc.

Touch screen OP in SS panel for tanker Burst rinse and CIP operation start, stop, pause etc.

#### **1.26 SS Railing with SS collapsible platform for Tanker Bay (Suitable for 2 tanker bay - 1 present & 1 future)**

For approaching the tanker top for manhole opening and CIP/Burst rinse connection

MOC: SS 304 with SS chequered /dimple plate and SS railing

Spiral stair with railing to be considered for approach

#### **1.27 Raw Milk Silo**

Capacity : As per BOQ

Qty : As per BOQ

Type	: Outdoor type silo with alcove.
Material	: a) Inner shell - AISI 304, 3 mm (bottom), 4 mm (middle), 3mm (top) sheet & conical top 3 mm b) Outer cladding - AISI 304: 2 mm thick in welded construction or thickness <b>as per OEM design with guarantee.</b>
Finish	: 2B Finish sheet with 180 grit finish for joints
Agitation	: Single side mounted mechanical agitator to ensure uniform fat distribution without any adverse effect on the contents in 10-minute time. <u>Slow speed agitator is only permitted</u>
Ports and fittings	: <ol style="list-style-type: none"> <li>1. Inlet/outlet</li> <li>2. Breather – as per OEM Design</li> <li>3. CIP spray ball – rotating type (openable type)</li> <li>4. Nozzles for high- and low-level sensors</li> <li>5. Nozzle for level transmitter</li> <li>6. Nozzle for temperature sensor,</li> <li>7. man way</li> <li>8. alcove</li> <li>9. light cum sight glass with LED lamp &amp; 1.5 V battery</li> <li>10. leaky and rainwater down pipe up to foundation level and to be installed within the insulation</li> <li>11. Toe guard (fully welded) to ensure no water mark in case of any CIP Leakage on silo outer surface</li> <li>12. SS railing of <u>2 mtr height</u> - as per OEM Design</li> <li>13. Instrument conduit, provided within the insulation</li> <li>14. Silo surface cleaning water ring on top of silo with water connection port</li> </ol>
Insulation	: PUF Insulation of suitable thickness to ensure temp. rise does not exceed 1 deg. C in 24 hours' time in all seasons. (as per OEM Design)

**The brief detail for insulation is as follows;**

First layer	: 15 mm thick PUF of 35-40 Kg/m <sup>3</sup> density
2 <sup>nd</sup> Layer	: 50 mm EPS of 16-18 Kg/m <sup>3</sup> Density to be applied longitudinally with bitumen
3 <sup>rd</sup> Layer	: 50 mm EPS of 16-18 Kg/m <sup>3</sup> Density to be applied radially with bitumen
4 <sup>th</sup> Layer	: 1mm thick aluminium Foil

Bottom will be PUF injected of density 45-50 Kg/M<sup>3</sup>

Silos Bird guard : Milk silos top shall be covered with bird guard for preventing the entry of bird. The MOC will be SS. The entry to the bird guard cage shall have spring closing door with helical hinges

Silo Base : MS base of the silo shall be chemically cleaned completely and shall be applied with Epoxy Primer and two coats of Epoxy Paint to prevent corroding due to moisture in grace

Supporting Structure : As per OEM Design

Instruments :

1. RTD for milk temperature to be indicated on MMI (SCADA) as well as head mounted display
2. Proximity switch for man way status indication
3. level switches for high & low indication on MMI
4. level transmitter for level indication to MMI as well as local display

**Note:**

1. Supplier shall submit GA drawing for approval to the purchaser for tank prior to fabrication work in the event of placement of order
2. The silo support structure shall be welded in such a way that no metal-to-metal contact is established between inner shell and out shell to avoid sweating during all the weather condition
3. Stage inspection to be offered for MOC, fabrication, welding, insulation and final inspection before dispatch
4. Agitator seal leakage drainpipe with 38 mm blind union to be provided
5. Manual weldable butterfly valve shall be provided at the common inlet/outlet of the silo for safety
6. Silo manhole shall align smoothly and inside shall match with the silo wall to have proper cleaning of the manhole surface

**1.28 Raw Milk Silo interconnecting platform with railing & approach ladder in SS 304 construction**

Capacity : As per BOQ

Qty : As per BOQ

This shall be SS 304 chequered plate platform interconnecting all silos. Connecting platform and approach ladder in SS304 construction to be considered. Platform for the silos shifted from existing dairy to be considered

Supplier to submit GA drawing for approval before commencing fabrication work in the event of placement of order

**1.29 Bird Cage for raw Milk Silo with openable door**



Capacity : As per BOQ

Qty : As per BOQ

This shall be installed on top of each silo for bird proofing in perforated SS 304 mesh construction of 0.8 mm thickness with approach door with door closer arrangement.

The scope shall include bird cage for existing silos also.

Supplier to submit GA drawing for approval before commencing fabrication work in the event of placement of order

### **1.30 Milk Transfer pump to Past -1 (1W+1 Cold Standby)**

Capacity : As per BOQ

Qty : As per BOQ

Head : Suitable

**Functional requirements:** The pumps shall be used for transfer of milk from dump tanks to raw milk silos through milk chillers.

**General Design:** The pump shall be sanitary design and centrifugal mono block construction.

**Finish:** All stainless-steel surfaces shall be polished to 150 grits.

#### **Scope of Supply:**

**The Pump:** It shall be made from stainless steel conforming to AISI 316.

**The Drive:** The pump shall be provided with flanged motor with hygienic sealing arrangement. The motor shall be squirrel cage TEFC with IP55 protection suitable for 415 V 50 HZ AC supply and IE-3 standard. The pump and drive shall be integrated together. The pump shaft end for fixing the impeller shall be of stainless steel.

#### **Accessories:**

**Inlet/Outlet:** Stainless steel (AISI 316/ AISI 304) inlet and outlet shall end in stainless steel complete union. The inlet shall be 230 mm above the finished floor level.

**Motor Shroud:** The motor part of the pump shall be stainless steel shrouded. The shroud shall be easily dismantlable. It shall have provisions for air circulation and entry of electric cable.

**Legs:** The pump with drive shall be supported on legs with stainless steel ball feet. The ball feet shall have provision for height adjustment of 50mm.

### **1.31 Milk Transfer pump to Past -2 (1W+1 Cold Standby)**

Capacity : As per BOQ

Qty : As per BOQ

All other specifications shall be same as item no: 1.30

### **1.32 Inter Silo cum Dispatch Pump**

Capacity : As per BOQ

Qty : As per BOQ

All other specifications shall be same as item no: 1.30

### **1.33 CIP Return Pump for Raw Milk Silo**

Capacity : As per BOQ

Qty : As per BOQ

Type : Self priming, centrifugal

All other specifications same as Item no. 1.17

### **1.34 Pneumatic Valve Battery for Raw Milk Silos**

The valve battery shall be constructed on SS square box pipe with following, but not limited to features;

1. Incoming lines as per BOQ with provision for 1 more line in future
2. Outgoing lines as per BOQ with provision for 1 more line in future
3. Silo CIP return line
4. Incoming milk from reconstitution
5. Incoming rinse milk
6. Cream inlet
7. Re-pasteurization line
8. Separate header for dispatch and inter silo transfer with diversion for sr. no 4,5,6 & 7
9. Separate CIP line with mix proof valve for header CIP
10. The SS support structure shall be used as air reservoir and all the flexible tapping for valves to be taken from it
11. Dedicated FR unit to be considered for valve battery
12. Internal cabling to be done for all the valves at factory and all the cables shall be terminated in SS junction box
13. SS tray for drain collection & SS pipe up to nearest drain

### 1.35 SS Pipes, Valves & Fitting for Raw Milk Reception Section

Qty : 1 Lot

#### **Pipes:**

Sizes : As required

Type : TIG welded; annealed and de-scaled tubes shall be manufactured as per the standard ASTM-A270.

Material : AISI 304 / AISI 316 as per requirement

Finish : Outer surface of the tubes shall be with dairy finish and inner surface should be pickled as per dairy standard

Thickness : The average wall thickness of tubes should be 1.6 mm up to 76.2 mm OD and 2.0 mm for diameters above 76.2 mm OD.

#### **SS 304 Fittings**

Type : SMS or quick opening tri-clover clamp type.

Thickness : Thickness of fitting made from tube will not be less than 1.6 mm up to 76.2 mm dia. and will not be less than 2.0 mm for above 76.2 mm dia.

Unions : Will be complete with liner, male nut and gasket. Liner made of male parts will be suitable for expansion joints.

Pipe clamps : Will be quick opening type

Supports required for pipes:

Size : Square sections as required

Type : Supported from walls, ceilings and floors

Material : AISI 304

#### **SS Pneumatic mix proof and single Seat Valves**

Qty : 1 Lot

Type : Pneumatically operated sanitary valves of mix-proof double seat type with independent seat lifting facility for CIP

Application : The Mix proof and single Seat Valves shall be provided for all valve batteries to ensure mixing free simultaneous product and CIP operation and flexibility in operation.

Material	: AISI 316
Gaskets	: EPDM
Features	: Housing should be ball shaped for the ideal flow characteristics to ensure 100% clean ability by CIP. Housing closed by cover plates should not create a sump or dead corners. The seals such as housing seals, stem seals and disc seals shall be flush mounted.
Position Sensing	: separate on and off proximity switches for open and close feedback
Signaling	: All the pneumatic valve shall have Asi bus connectivity

### **SS Actuated Butterfly Valves**

Type	: sanitary Pneumatic butterfly valve with control cap and 24 DC connectivity
Qty	: 1 Lot

All other specification shall be as per item no 16.02

**Note: Utility actuated valves shall be with 24V DC hard wired connectivity**

### **SS Manual Valves**

Required number of valves to be finalized during detail engineering as per functional requirement & standard engineering practice.

**a) Manual butterfly Valve:** The butterfly valve shall be of sanitary design and all liquid contacting parts shall confirm to AISI 316. The valve sealing gasket shall be EPDM /Nitrile rubber material suitable for hot water sterilization temperature of 100 Deg. Celsius and hot acid and lye solution of 2% concentration at 85 Deg. Celsius. The valve shall be provided with SS handle.

The valve shall be with plain ends shall be suitable for direct welding on the pipes.

**b) Non Return Valve:** The non-return valve shall be of sanitary design and all liquid contacting parts shall confirm to AISI 304. The valve sealing gasket shall be EPDM / Nitrile rubber material suitable for hot water sterilization temperature of 100 Deg. Celsius and hot acid and lye solution of 2% concentration at 85 Deg. Celsius. The non-return valve shall be with plain ends shall be suitable for direct welding on the pipes.

**c) Unions:** All the parts unless otherwise specified shall be made out of investment casting using AISI 304 material The union shall be complete with liner, male part, nut and sealing ring

(neoprene food grade rubber gasket). The liner and male parts should be suitable for expansion joints. All the inside as well as outside surface of the union shall be with dairy finish.

**d) Bend, Tee, Elbow:** These fittings shall be made out of AISI 304 unless otherwise specified, process tube, TIG welded, annealed, de-scaled having outer surface mirror polished and inside pickled, manufactured as per ASTM A270. The thickness of the fittings made from the tube section should not be less than 1.6 mm up to 76 mm dia. and should not be less than 2.0 mm for above 76 mm dia. The wall thickness at any point shall not vary more than 12.5% over and under from the average wall thickness specified.

Bends and elbows shall be free from wrinkles. Tee shall have uniform flaring on the branch connection. The ovality on the open ends shall be within the permissible limit specified in the ASTM A270.

### Manual Utility Valves

Capacity	: Suitable
Qty	: 1 Lot
Type	: Non- Sanitary
Make	: As per approved make list
Service	: Utility lines.
Working Pressure	: 5.0 bar (g)
Design Pressure	:8.0 bar (g)
Working Temp.	:1.5°C to 100°C
Class	: Non-IBR
Pressure Rating	:150 #
Body	:CI/Die cast Aluminium
Wetted Parts	:CI/ Die cast aluminium
Body Liner/Seat	: Nitrile rubber /AISI304
End Connections as required	: Valve shall be sandwich between <b>GI</b> flanges or weldable end
Test Pressure	:15 bar (g).

### **Actuated Utility Valves**

Capacity	: Suitable
Qty	: 1 Lot
Actuator	: SOV (24V DC operated)
Feedback	: On/off (separate) through proximity/limit switches

## **2. Reconstitution Section**

### **2.1 Recon. Milk Preparation cum Storage Tank**

Capacity	: As per BOQ
Qty	: As per BOQ
Duty	: to prepare and store the reconstituted milk
Type	: Vertical, insulated
Material	: a) Inner shell - AISI 304 2 sheet & 2.5 mm thick bottom & top b) Outer cladding - AISI 304: 2 mm thick welded construction
Finish	: 2B finish
Agitation	: Single side mounted mechanical agitator to ensure uniform fat distribution without any adverse effect on the contents in 10-minute time. Slow speed.
Ports and fittings	: <ol style="list-style-type: none"><li>1. Common Inlet/outlet &amp; circulation nozzle on top</li><li>2. breather</li><li>3. CIP spray ball (openable type)</li><li>4. Nozzles for high and low-level sensors</li><li>5. Nozzle for level transmitter</li><li>6. Nozzle for temperature sensor</li><li>7. man way</li><li>8. light cum sight glass with LED battery</li><li>9. Toe guard (fully welded) to ensure no water mark in case of any CIP Leakage</li><li>10. Common platform of SS with SS staircase</li></ol>
Insulation	: PUF Insulation of suitable thickness to ensure temp. rise does not exceeded 1 Deg. C in 24 hours' time in all seasons

Instruments :

1. RTD for milk temperature to be indicated on MMI as well as head mounted display
2. level switches for high & low indication on MMI
3. level transmitter for level indication to MMI as well as local display

**Note:**

1. Supplier shall submit GA drawing for approval to the purchaser for tank prior to fabrication work in the event of placement of order.
2. The tank support structure shall be welded in such a way that no metal to metal contact is established between inner shell and out shell to avoid sweating during all the weather condition.
3. Stage inspection to be offered for MOC, fabrication, welding, insulation and final inspection before dispatch
4. Agitator seal leakage drainpipe with 38 mm blind union to be provided (if required).
5. Manual butterfly valve shall be provided at the common inlet/outlet of the tank for safety.
6. Ball feet with SS round plate at bottom to be provided. The base plate shall accompany the tank or will be delivered, prior to dispatch. This will be used without fail, to prevent damage to tiled flooring, during levelling due to point load.

**2.2 Powder Blending System with Table mounted hopper and shear & booster pump with accessories**

Capacity : As per BOQ  
Qty : As per BOQ

The System shall be skid mounted with following major components.

1. Liquid Ring Pump
2. Shear Blender (only this will be allowed)
3. Powder Induction Funnel
4. Powder Control Valve
5. Liquid Control Valve
6. Internal Piping & Fitting
7. S. S. Skid for assembling all the above Parts

Technical Details of individual components are as follows.

**a) Liquid Ring Pump.**

Duty : It will draw the base milk out of the batch tank and will transfer it through a short pipe to the powder & will be of Sanitary Type.

Model No : Supplier to specify

kW/HP : Supplier to specify

Type : Sanitary, Monoblock, Self-Priming Centrifugal

MOC : SS 304

Accessories : Suitable rating motor with SS shroud & Base frame

**b) Shear Blender**

Duty : To blend powder coming from funnel and mix with liquid

Type : Sanitary with specially designed impeller to create high turbulence mixing zone at the suction

MOC : SS 304

Model : Supplier to specify

kW/HP : Supplier to specify

Accessories : SS sound absorbing shroud, Motor, Base frame etc.

**c) Powder Induction Funnel.**

Duty : To Dump Powder in the shear pump

Capacity : 50 Kg

MOC : SS 304

Thickness : 2.5 mm

**d) Powder Control Valve**

Duty : To regulate powder flow in the suction of Shear Pump

Type : Sanitary Manual Valve

MOC : SS 304

Size : 63 mm

**e) Liquid Control Valve**

Duty : To regulate Liquid flow in the suction of water ring Pump



Type : Sanitary Manual Valve  
MOC : SS 304  
Size : 51 mm

**f) Internal Piping & Fitting**

SMS standard fitting to connect water ring pump, shear pump, funnel etc.  
All SS 304 with suitable size.

**g) S. S. Skid for assembling all the above Parts**

All above components shall be mounted on SS 304 skid of suitable size.

**2.3 PHE type Chiller for recon milk chilling in recirculation mode**

Capacity : As per BOQ

Qty : As per BOQ

Duty : To chill the reconstituted milk from 38 Deg. C to 4 Deg. C.

Frame : Free standing SS 304 clad carbon steel frame on SS ball feet

Nozzles : AISI 304

Duty : Cooling raw milk from 35 to 4Deg.C.

Gasket : 'SNAP-ON'(clip-on) type of Nitrile rubber

Instruments : Based on the milk outlet temperature from the chiller, chilled water flow rate will be regulated automatically. The milk outlet temperature will be indicated in the control room. Control valve and TT at milk inlet & outlet and chilled water outlet to be considered in the scope of supply

Services : Chilled water at +2 Deg. C. Pressure drop less than 1.0 kg/sq.cm.

Pressure drop : Less than 1.0 kg/sq.cm on milk side

**2.4 Recon. Milk Transfer pump to Raw Milk silo, curd milk storage tank & past Balance Tank**

Duty : To transfer the reconstituted milk to raw milk silo and past. balance tank

Capacity : As per BOQ

Qty : As per BOQ

All other specification are same as that of item no 1.17

**Note: Suitable arrangement to be done for cooling of motor running with VFD to avoid over heating while running on low speed. Use special motor for VFD operated pumps.**

### **2.5 CIP Return Pump for Recon. Tanks**

Capacity : As per BOQ

Qty : As per BOQ

Type : Centrifugal, self-priming

All other specification is same as that of item no 1.17

### **2.6 Pneumatic Valve Battery for Reconstitution Section**

The valve battery shall be constructed on SS square box pipe with following, but not limited to features;

1. Circulation valve
2. Transfer valve
3. CIP return valve
4. Provision to add one more tank in future
5. The SS support structure shall be used as air reservoir and all the flexible tapping for valves to be taken from it
6. Dedicated FR unit to be considered for valve battery
7. Internal cabling to be done for all the valves at factory and all the cables shall be terminated in SS junction box
8. SS tray for drain collection & SS pipe up to nearest drain

### **2.7 SS Pipes, Valves & Fitting for Reconstitution Section**

Capacity : As per BOQ

Qty : As per BOQ

All other specification is same as per item no: 1.35

## **3. Milk Processing, Storage & Transfer**

### 3.1 Milk Pasteurizer with all standard accessories. Fully automatic with all instruments and pneumatic valves for remote operation through central control room

Milk pasteurizer, complete module shall be required for pasteurization of raw chilled milk up to 80 deg. C. max. Cream chilling section or separate cream chiller with chilling facility from incoming milk shall be provided to cool the outgoing cream to around 8–12 deg. C.

The brief description of milk pasteurizer shall be as below:

Type	: Plate Heat Exchanger
Capacity	: As per BOQ
Qty	: As per BOQ
Material	: SS 316, 0.5 mm thick plates with clip ON gaskets. The gaskets for Hot water section shall be of EPDM and of other sections in pasteurizer shall be NBR clip on type.
Frame	: Free standing SS-304 clad carbon steel frame on SS – 304 ball feet
Finish	: 150 grit
Milk in/out temp.	: Inlet 4 to 5 Deg. C, final outlet 4 Deg. C
Services	: Chilled water at + 2 0 C (min)& Steam at 3.5 Kg/cm <sup>2</sup> pressure
Milk to CW ratio	: 1:2 (max)
Hot water Ratio	: 1:3 (max)
Regeneration Efficiency	: 93% (min) on whole milk considering cream cooling through incoming raw milk
Temperature program	: 4 – 80 – 4 Deg. C with take-off temp. for separator and homogenizer as per OEM

The milk pasteurizer will have set of the following items:

#### **Balance tank**

Capacity	: Suitable
Material	: AISI 304.

Finish : 150 grit.

Accessories :

1. CIP spray ball
2. Half Openable cover
3. Nozzles for incoming milk
4. Nozzle for outgoing milk
5. Nozzle for soft water inlet
6. Ball feet with SS round plate at bottom
7. Instruments & valves –
  - a. Incoming milk butterfly valve with open/close feedback
  - b. Low- & high-level switch
  - c. Level Transmitted with local as well as HMI display
  - d. Emergency soft water valve with open/close feedback
  - e. 3-way pneumatic seat valve with open/close feedback at the outlet of balance tank for draining of the tank in case of emergency

Note: The Supplier shall ensure that in case of flow diversion or power failure, the milk does not overflow from the balance tank.

All Transmitters shall be integrated type only.

### **SS Feed pump**

Capacity : As per the capacity of the pasteurizer and CIP requirement

Type : Centrifugal

The specifications shall be the same as per item no: 1.09 of suitable capacity.

### **Note:**

The pump shall be VFD driven hence the motor shall be de-rated accordingly and insulation class to be selected accordingly.

### **Flow Controller**

Type : Flowmeter based flow controller with regulating feed pump frequency for smooth flow of milk to the pasteurizer

### **Booster Pump**

Capacity : As per capacity of the pasteurizer and CIP requirement

Type : Centrifugal.

All other specifications same as Item no. 1.05

### **Holding Tube& Hydro cyclone**

Type : Skid top mounted design

Holding time : 20 Sec.

Material : SS – 304

Accessories : junction box on the pasteurizer shall be SS construction only. The emergency switches and isolators shall be in polymer construction

Hydro Cyclone : The hydro cyclone shall be SS 304 construction and shall have two nos. of pneumatic drain valves for ensuring zero pressure drop during discharge

**Instruments** : Following, but not limited to instruments and pneumatic valves are required for pasteurizer.

1. Pneumatic butterfly valve for milk inlet line (with open & close feedback)
2. Pneumatic butterfly valve for soft water make up line (with open & close feedback)
3. Pneumatic butterfly valve for CIP inlet line (with open & close feedback)
4. 3-way Pneumatic seat valve (with open & close feedback) at balance tank outlet
5. 3 Way Pneumatic seat type diversion valves for hot and cold diversion of the milk (with open & close feedback) – 2 nos.
6. Pressure transmitter at inlet of regeneration section, heating section and chilling section
7. Level switches and level transmitter for balance tank
8. Magnetic Flow meter for milk inlet line
9. VFD for Milk forward pump
10. Temp transmitters at all inlet and outlet port of milk, hot water as well as chilled water with head mounted local display (no deviation is accepted)
11. Back pressure valve with pneumatic pressure adjustment

Note: The pasteurizer operation shall be controlled from main control room so all the above instruments shall be pre-wired in one junction box

### **3.2 Tri-purpose Cream separator with all standard accessories & Hydro flow system for separator**

Capacity : As per BOQ

Qty : As per BOQ

Type : Soft Stream system/bottom feed airtight separator with self-cleaning type disc bowl, automatic, periodic discharge of solids. Hydraulic control of the sliding piston.

- Material : AISI 304
- Drive : Integrally mounted, 3 phase 415 V, 50 Hz. electrical motor direct driven (motor mounted directly on vertical shaft)
- Shrouding : Complete body and motor shall be shrouded in SS304.
- Accessories :
1. Instruments (As per OEM), controls and fittings,
  2. Control panel with VFD
  3. constant water pressure unit (hydro flow with 1W+1S pump)
  4. sludge discharge funnel (to be drained)
  5. Silencer cum sludge collection tank with level switches
  6. Sludge transfer pump

### 3.3 Online Bactofudge with All Standard Accessories

<b>Model</b>	Supplier to specify
<b>Rated Capacity</b>	As per BOQ
<b>Feed Pump</b>	Supplier to specify
<b>Bowl feed system</b>	Self-ejecting bowl with hydraulic operation the Hydro soft feed system ensures very gentle product handling without turbulences at low flow speed and low feed pressure leading to excellent product quality.
<b>Hydro hermetic Seal</b>	The feed system is hydraulically sealed and reliably prevents any air intake. It is designed without mechanical seals which would require increased service and additional cooling water.
<b>Product discharge</b>	Closed discharge with double centripetal pump
<b>Frame</b>	Cast Iron , Varnished in RAL 7037 , grey
<b>Drive system</b>	Integrated direct drive without clutch

<b>Condition Monitoring</b>	1 set of Vibration sensors for connection to a Condition monitoring system
<b>Dismantling</b>	The Bowl can be taken out of the machine in One piece Spindle and bearings can be taken out of the machine in One piece
<b>Product Connections</b>	DIN 11864 aseptic Screw connections with counter Part
<b>Removal Efficiency</b>	Anaerobic spores 98%    Aerobic spores 90% At rated capacity/optimum process Condition
<b>Maximum Feed pressure</b>	1.0 Bar
<b>Useful discharge pressure</b>	2.5 bar max. after back pressure
<b>Dimensions</b>	Supplier to specify
<b>Bowl weight</b>	Supplier to specify
<b>Total weight</b>	Supplier to specify
<b>Installed motor power and actual power demand</b>	Supplier to specify
<b>Starting type</b>	Frequency Converter
<b>Documentation</b>	3 sets in English
<b>Required hoist details</b>	
<b>Vibrocontrol</b>	Continuous vibration monitoring to prevent damages from unbalanced product deposits in the bowl
<b>Inspection Opening</b>	For direct access to the Piston Valves for service without bowl disassembly
<b>Design</b>	With Wear protection for milk containing abrasive components

<b>Shrouding</b>	Complete body and motor shall be shrouded In SS 304
<b>Material</b>	AISI 304
<b>CIP</b>	Auto CIP system
<b>Additional Accessories</b>	
	1 Foundation frame to be integrated in the floor structure
	01 Set of tools for dismantling, Lifting and assembling of bowl
	01 set of spare parts for approx. 2500 operating hours
	01 Nos Inductive flow meter for feed flow control output 4-20 mA
	01 Nos Manual Valve + Flow indicator for controlling the recirculating concentrate
	01 Nos pressure sensor and control valve for controlling the required back pressure in the discharge line
	Instruments (As per OEM), controls and fittings, de-sludging panel, flow control valve, constant water pressure unit, sludge discharge funnel and all other standard accessories including silencer cum sludge collection drum
<b>Control System</b>	
<b>Dimension</b>	
<b>Design</b>	Stainless steel for installation near the machine
<b>Operator Panel</b>	Supplier to specify
<b>Display</b>	: 7 "colour touch screen



<b>Signal Exchange</b>	: 4 DI + 4 DO , dry contacts
<b>Motor starter</b>	: Frequency converter
<b>Pneumatic equipment</b>	Solenoids and pneumatic components integrated
<b>Safety feature</b>	: Emergency stop button
<b>Communication</b>	: to be integrated with main plant PLC through digital communication
<b>Preconditions of the raw milk requirement</b>	Supplier to specify
<b>Milk Sampling Methods (Including arrangement, equipment and arrangement of samplings)</b>	Arrangement of sampling Points: directly in the machine intake and outlet line
	Equipment for sampling: Sterile system to be used for sampling
	Aerobic Spores - Separation effectiveness should be >90% if spores content in raw milk is higher than 500 spores/ml
	Anaerobic Spores - The effectiveness is >98% if spores contents is higher than 1000 spores/l
	Method of analysis: Supplier to submit

### 3.4 Online Standardizer with all standard Accessories

Capacity	: Matching the separator capacity
Qty	: as per BOQ
Instrumentation	: Internal processing data computer along with Control unit and OP and all instruments and valves as per OEM
Material	: AISI 316

Accuracy	: +/- 0.03% (min.)
Type	: Fat standardization
Accessories	: control panel with touch screen OP for graphical representation of standardization data

**Note: Supplier shall ensure that no “un standardize” milk is transferred to PMST during start up, interruption and at the end of process. For that necessary diversion/software shall be considered in the scope of supply. Supplier to submit scheme for above arrangement**

**3.5 Milk Homogenizer with All standard Accessories and hydraulic pressure regulating mechanism with suction & Discharge dampener, Suction pressure transmitter, PLC with OP, All safety instrument and controls**

Capacity	: As per BOQ
Qty	: As per BOQ
Type	: The Homogenizer shall be of the multi-piston type
Material	: All parts in contact with the product are made of stainless steel (SS 316), Frame in CS with SS 304 cladding, the Compression block shall be made of a special high-strength stainless steel alloy and the pistons of ceramic material.
Finish	: 2B finish
Drive	: 415 V 50 Hz Electric motor

Working Pressure: The homogenizer is required to attend creaming index of less than 10 as per BIS/international recommended testing method. The pressure shall be adjusted in two stages and the pressure adjustment shall be automatic through hydro pneumatic system and to have facility to adjust from central control room through the main PLC. New generation homogenization valves to be selected for highest possible energy efficiency.

Accessories	: Two stage Homogenizing arrangement with two homogenizing valves, pressure gauges with pressure switches for remote indication and control from the main PLC for both the stages. Provision for CIP and all other standard safety systems, in built strainers, pressure transmitting sensors to record in central control room, flow dampener in suction and discharge line, bypass between suction and delivery of the homogenizer for preventing damage in case of accidental failure of any valves of discharge line etc. If any buffer tank or pump required for smooth operation of homogenizer, it shall be considered in the scope of supply.
Water conservation	: The jacket cooling water will be re-circulated through a buffer tank after chilling

- Lubrication : The Homogenizer shall be provided with a water cooling/ lubrication system with flow switch for the pistons, safety device, as well as local pressure gauge.
- PLC : All the control of homogenizer shall be done through dedicated PLC and touch screen OP. All the control shall be done either from the central control room or from locally through OP.
- Instrument : Following instruments and valves to be considered for automatic operation of homogenizer
1. Suction pressure transmitter
  2. 3-way bypass valve in suction as well as discharge
  3. NRV for safety
  4. Oil flow switch
  5. Oil level switch
  6. Seal water make up tank (size as per OEM) with low- & high-level switch
  7. THE for-cooling seal water
  8. Water flow switch
  9. Homogenizer rpm meter (separate for actual speed measurement)
  10. Filter in water circulation system to trap oil

Note:

The homogenizer should run uninterrupted during the production and CIP while separator goes in partial/full discharge.

If required, a balance tank with LT, level switch, transfer pump and its logic shall be considered in the scope of supply.

NOTE:

**Supplier may like to offer partial homogenization for homogenized milk subject to unconditional performance guarantee for creaming index as per standard of creaming index for market milk recommended by BIS/international**

### 3.6 Seal Cooling system for homogenizer with tank, Chiller and circulation pump

Capacity : As per BOQ

Qty : As per BOQ

The system shall comprise of THE, Tank (insulated), filter to trap oil & Pump for seal cooling of homogenizer. The capacity to be selected as per design requirement.

### 3.7 Manual Hoist with I beam for separator bowl lifting

Capacity : As per BOQ

Qty : As per BOQ

**Note** : The I beam section of suitable size to be considered in the scope of supply

### **3.8 Pasteurizer Milk Storage Tank**

Capacity : As per BOQ

Qty : As per BOQ

All specifications shall be same as Item No. 1.27

### **3.9 CIP return pump for Past. Milk Storage tank**

Capacity : As per BOQ

Qty : As per BOQ

Type : Centrifugal, Self-priming

All other specifications are same as per item no: 1.17

### **3.10 Milk Transfer Pump to HMST Line -1**

#### **PUMP**

Duty : To transfer the past. milk to HMST Line - 1

Capacity : As per BOQ

Qty : As per BOQ

All other specification are same as that of item no 1.17

**Note: Suitable arrangement to be done for cooling of motor running with VFD to avoid over heating while running on low speed. Use special motor for VFD operated pumps.**

### **3.11 Milk Transfer Pump to HMST Line -2**

#### **PUMP**

Duty : To transfer the past. milk to HMST Line - 1

Capacity : As per BOQ

Qty : As per BOQ

All other specifications are same as that of item no 1.17

**Note: Suitable arrangement to be done for cooling of motor running with VFD to avoid over heating while running on low speed. Use special motor for VFD operated pumps.**

### **3.12 Milk Transfer to Curd/Butter Milk Section /Paneer Section**

Duty : To transfer the past. milk to Curd/ BM Section/ Paneer Section

Capacity : As per BOQ

Qty : As per BOQ

All other specification are same as that of item no 1.17

**Note: Suitable arrangement to be done for cooling of motor running with VFD to avoid over heating while running on low speed. Use special motor for VFD operated pumps. This item will be located at PMST only.**

### **3.13 Inter Silo cum Dispatch cum re pasteurization Pump for Past Milk with VFD**

Duty : To transfer the past. milk to Inter Silo cum Dispatch cum re pasteurization Pump for Past Milk with VFD

Capacity : As per BOQ

Qty : As per BOQ

All other specification are same as that of item no 1.17

### **3.14 Past Milk Dispatch Chiller**

Capacity : As per BOQ

Qty: : As per BOQ

Duty : To chill the past. Milk from PMST to dispatch up to 3 Deg. C

All other specifications are same as per item no: 1.18

### **3.15 Past. Milk Valve battery as per design and logic**

The valve battery shall be constructed on SS square box pipe with following, but not limited to features;

1. Incoming lines as per BOQ with provision for 1 more line in future
2. Outgoing lines as per BOQ with provision for 1 more line in future
3. Silo CIP return line
4. Separate header for dispatch and inter silo transfer
5. Separate CIP line with mix proof valve for header CIP
6. The SS support structure shall be used as air reservoir and all the flexible tapping for valves to be taken from it
7. Dedicated FR unit to be considered for valve battery
8. Internal cabling to be done for all the valves at factory and all the cables shall be terminated in SS junction box
9. SS tray for drain collection & SS pipe up to nearest drain

### **3.16 SS Pipes, valves & Fittings for complete section**

Capacity : As per BOQ

Qty : As per BOQ

All other specification is same as per item no: 1.35

## **4. Cream Processing, Storage & Transfer**

### **4.1 Raw Cream Storage tank**

Capacity : As per BOQ

Qty : As per BOQ

Type : Insulated (50 mm thk PUF), cladded, vertical cylindrical tank.

Material : a) Inner shell - AISI 304 2 & 2.5-mm thick SS  
b) Outer shell – AISI 304 2.0 mm

Finish : 2B finish

Accessories & Ports :

- a. Air vent,
- b. Inlet/outlet,
- c. CIP spray ball,
- d. Nozzle for high and low-level sensors,
- e. Nozzle for Level transmitter,
- f. Nozzle for temperature sensor,
- g. Manhole,

- h. Lifting lugs
- i. Common platform with railing & toe guard
- j. Other standard accessories.

Instruments :

- i. Level Transmitter,
- ii. Low- & High-Level switches
- iii. Temp. Transmitter

**Note:**

- 1. Supplier shall submit GA drawing for approval to the purchaser for tank prior to fabrication work in the event of placement of order.**
- 2. Stage inspection to be offered for tanks for welding, insulation and final inspection before dispatch**

**4.2 Raw Cream transfer pump to cream pasteurizer**

Capacity : As per BOQ

Qty : As per BOQ

Duty : To transfer raw cream to cream past. balance tank

All other specifications shall be same as per item no 1.17

**4.3 Cream pasteurizer with all standard accessories, Fully automatic with all instruments & valves for remote operation through central control room**

Capacity : As per BOQ

Qty : As per BOQ

Type : Plate Heat Exchanger

Material : All Plates shall be of AISI 316,0.5mm thick

Nozzles : AISI 304

Duty : 8 - 77.7 - 90 - 20 - 8

Gasket : 'SNAP-ON' (clip-on) type of Nitrile rubber

Services : Chilled water at 2° C. Pressure drop less than 1kg/sq.cm

Reg. efficiency : 85% minimum

The Pasteurizer shall be complete with Feed pump with VFD, flow diversion valve, instruments and SS skid etc.

Following, but not limited to instruments and valves for pasteurizer to be considered;

1. Pneumatic butterfly valve for milk inlet line (with open & close feedback)
2. Pneumatic butterfly valve for soft water make up line (with open & close feedback)
3. Pneumatic butterfly valve for CIP inlet line (with open & close feedback)
4. Pneumatic butterfly valve for balance tank CIP (with open & close feedback)
5. 3 Way Pneumatic seat type diversion valves for hot and cold diversion of the cream (with open & close feedback)
6. Pressure transmitter at inlet of regeneration section, heating section and chilling section
7. Level switches and level transmitter for balance tank
8. Magnetic Flow meter for milk inlet line
9. VFD for Milk transfer pump
10. Temp transmitter at all inlet and outlet port of milk, hot water as well as chilled water with head mounted local display.
11. Back pressure valve with pneumatic pressure adjustment.

**Note: The pasteurizer operation shall be controlled from main control room so all the above instruments shall be pre-wired in one junction box.**

#### 4.4 Pasteurized Cream Storage Tank

Capacity	: As per BOQ
Qty	: As per BOQ
Type	: Insulated, clad and dimple jacketed vertical cylindrical tank.
Material	: a) Inner shell - AISI 304 2.5 mm & 3.0 mm b) Intermediate - AISI 304 2.5 mm minimum c) Outer Cladding - AISI 304 2 mm or as per OEM with performance guarantee
Finish	: 2B finish
Insulation	: PUF insulation of suitable thickness to ensure 1 Deg. C temp rise in 24 hours.
Accessories & Ports	: <ol style="list-style-type: none"><li>a. Inlet/outlet,</li><li>b. CIP spray ball,</li><li>c. Nozzle for high and low-level sensors,</li><li>d. Nozzle for Level transmitter,</li></ol>



- e. Nozzle for temperature sensor,
- f. Manhole,
- g. Agitator
- h. Jacket inlet and outlet ports
- i. Lifting lugs
- j. Common platform with railing & toe guard
- k. Other standard accessories.

Instruments :

- i. Level Transmitter,
- ii. Low- & High-Level switches
- iii. Temp. transmitter for cream
- iv. Temp. Transmitter for jacket
- v. Chilled water temp control valve for jacket

**Note:**

- 1. Supplier shall submit GA drawing for approval to the purchaser for tank prior to fabrication work in the event of placement of order.**
- 2. Stage inspection to be offered for tanks for welding, insulation and final inspection before dispatch**

**4.5 Cream transfer pump to CBMM machine (Lobe pump) + CIP forward pump**

Capacity : As per BOQ

Qty : As per BOQ

Type : Positive, Lobe type & CIP forward pump of centrifugal sanitary type

Head : Suitable

MOC : All the product contact parts shall be SS 304

All other specifications shall be as per item no: 1.17

**4.6 Cream Transfer pump to Cream Dispatch/Raw Milk Silo/Milk Past balance tank**

Duty : To transfer past. Cream to cream dispatch or Raw milk silo or pasteurizer balance tank

Capacity : As per BOQ

Qty : As per BOQ

All other specifications shall be same as per item no 1.17

#### **4.7 CIP return pump for raw & past cream storage tank**

Capacity : As per BOQ

Qty : As per BOQ

Type : Centrifugal/ self-priming

All other specifications same as Item no. 1.17

#### **4.8 Pneumatic Valve battery for raw & past cream storage tank as per design & operation philosophy**

The valve battery shall be constructed on SS square box pipe with following, but not limited to features.

##### **Raw & Past Cream Storage tank (Separate Valve battery)**

1. Incoming lines as per BOQ with provision for 1 more line in future
2. Outgoing lines as per BOQ with provision for 1 more line in future
3. Tank CIP return line
4. Separate header for past cream dosing to raw milk silo/ milk pasteurizer and dispatch
5. The SS support structure shall be used as air reservoir and all the flexible tapping for valves to be taken from it
6. Dedicated FR unit to be considered for valve battery
7. Internal cabling to be done for all the valves at factory and all the cables shall be terminated in SS junction box
8. SS tray for drain collection & SS pipe up to nearest drain

#### **4.9 SS Pipes, valves & Fittings for complete section**

Capacity : As per BOQ

Qty : As per BOQ

All other specification is same as per item no: 1.35

### **5. Milk Packing & Storage**

#### **5.1 Horizontal Milk Storage Tank for Pouch Milk**

Qty : As per BOQ

Capacity : As per BOQ

Type : Horizontal Milk Storage tank

Duty : To receive and store past. milk from PMST and transfer it to pouch packing machine

MOC : SS 304, Thickness 2.5 mm shell& 3 mm Cone, cladding 2 mm or as per OEM with guarantee

Insulation : Suitable thickness PUF insulation to ensure 1 Deg. C temp rise in 24 hours

Agitator : Back Side mounted with gearbox & SS shroud

Instruments :

1. Low & High-Level Switch
2. Temp Transmitter with head mounted local display +remote data transfer
3. Level Transmitter with local display +remote data transfer

Accessories : Light glass, sight glass, Agitator SS shroud, lifting lug, SS platform & railing as per requirement.

Ports : Milk in and Milk out ports to be decided by the Supplier either single or double (for milk filling and milk emptying)

**5.2 PHE for rechilling of Pouch Packing Milk in milk up line**

Capacity : As per BOQ

Qty : As per BOQ

Duty : To chill the Past. Milk from PMST to HMST line up to 3 Deg. C

All other specifications are same as per item no 1.18

**5.3 Inline Filter (Pipe in Pipe) for HMST outgoing line**

Capacity : As per BOQ

Qty : As per BOQ

All specification shall be as per 1.16

#### **5.4 Detergent based Crate washer with pre-cleaning, air drying attachment and crate twister**

Capacity : As per BOQ

Qty : As per BOQ

Type : Detergent & steam-based crate washer with straight through conveyor

MOC : Base frame, support, structure shall be of SS 304 construction

MOC of chain : Poly propylene High density chain

The crate washer shall have following sequence of operation

1. Pre-rinse section:
2. Detergent wash
3. Hot water washing
4. Final rinse
5. Air Drying
6. Crate turning device
7. Final discharge

Media of heating: steam at 3.5 bar pressure

Note: Supplier to submit

1. Complete technical specification
2. GA drawing of the crate washer
3. Power consumption
4. steam consumption

#### **5.5 Auto2 Tier crate conveying system for filled & Empty Crate conveying**

Capacity : As per BOQ

Qty : As per BOQ

Size : Suitable for 12 Litre crates

Mode of operation: Powered Two Tier conveyor

1. Empty crate distribution to all machines

2. Filled crate transfer to milk cold store
3. Crate counter for filled crate
4. SS control panel for start-stop of the conveyors
5. Crate Conveyor with PP Link type conveyor to be considered.

MOC : All support and structure – SS 304 square box/round pipes of suitable size

### 5.6 High Speed Packing Machines for Milk Packing

Capacity : As per BOQ

Qty : As per BOQ

<b>PRODUCT</b>	Milk or any other free flowing liquid
<b>MACHINE CONTROL</b>	PLC controlled with servo mechanism & Touch screen Operating panel
<b>FEEDING SYSTEM</b>	Gravity Filler
<b>DOSAGE</b>	Up to 1000 ml.
<b>ACCURACY</b>	WEIGHT VARIATION: ± 0.2%. under ideal Working condition.  BAG LENGTH VARIATION:± 1 mm.
<b>SPEED (min)</b>	5000 pouches / hour / head. (500 G) 10,000 pouches / hour / machine (500 G)
<b>PACKING MATERIAL</b>	Virgin Film: Any Impulse sealing material like co-ex LDPE 1) Film Width – 321 mm ± 2mm 2) Thickness: 42-47 micron 3) Maximum weight of film rolls 75 Kg (in built without external attachment) 4) Film Roll dia. – 300 mm. Core dia. 76 mm
<b>TYPE OF SEAL</b>	Vertical –Overlap Horizontal – Seal & Cut Impulse Type. Leakage rate: < 2000 Part Per Million.
<b>SUPPLIES TO THE MACHINE</b>	0) Electrical

	<p>1 Power Supply: Supplier to specify.</p> <p>2. Connected Load: Supplier to specify</p> <p>3. Power Consumption (in kWh): Supplier to specify</p> <p>4. Electrical connection cable size: Supplier to specify</p> <p><b>B) Cooling Water:</b> Pressure- Supplier to Specify  Flow Rate- Supplier to specify  Temperature: Supplier to Specify</p> <p><b>C) Utility for Actuation of Injection System:</b></p> <p>Electromagnetic coil actuation system the movement of the same is regulated by electromechanical device with MMI display.</p>
<b>DESCRIPTION OF THE MACHINE BODY</b>	The components, which form, fill seal the pouches/sachets are enclosed in a stainless-steel cabinet. All major items are of stainless steel or treated with Aluminium protected by a weatherproof paint. All parts in contact with the product are of AISI-304 stainless steel with smooth finish.
<b>SPOOL BEARER ASSEMBLY</b>	The Roll of heat sealable films are mounted in a compartment at the rear bottom of the machine. They are supported on the idler rollers in sliding drawers with bottom opening machine cabinet doors, which enables to change the rolls quickly. The Film layers passes in each head via different idler rollers, film loosening takes place through positive film unwinding AC drive mechanism and moves in front of the ultra violet sterilization tube before it is engaged in the forming device. The specially designed former converts this layer in to a tube.
<b>VERTICAL SEAL</b>	The film is overlapped and sealed into a tube on each head by impulse heated elements known as vertical electrodes. The sealing jaws are water-cooled and are mechanically operated by link mechanism through the drive shaft. The formed film tube surrounds the injection or filling tube through which the products to be filled flows in the film tube.
<b>INJECTION SYSTEM</b>	<p>The filling system is as follows:</p> <ul style="list-style-type: none"> <li>▪ A constant level tank is mounted on top of the machine</li> <li>▪ A filling tube leading down from the tank and inside tube of film</li> <li>▪ A liquid injection electromagnetic coil is mounted on top of the injection tube</li> <li>▪ A gate at the lower end of the injection tube opens when injection switch is turned ON. This allows the liquid to be packed in the surrounding formed film tube. The gate</li> </ul>

	opens by electromagnetic coil actuation system of the piston in the injection cylinder assembly when injection switch is made ON.
<b>FILM FEED</b>	Rubber nip rollers below each vertical sealer control downward movement of the film tube. Vertical overlapped sealed film tube is pulled down by nip rollers coupled with clutch and brake unit through drive shaft. The length of the film tube pulled down is controlled by PLC.
<b>HORIZONTAL SEALING AND CUTTING</b>	The sealed tube then arrives at the bag making point. Here when the horizontal presses close on the film tube, the horizontal assembly mounted on one of the presses seals and cuts the horizontal portion of the film tube. The horizontal jaw simultaneously seals the upper horizontal sealed band of the lower filled pouch and the lower horizontal sealed band of the upper film tube. The other horizontal press on which there is only silicon back up rubber and a Teflon magazine is called a counter electrode.
<b>COOLING</b>	Both horizontal and vertical electrode holders should be water-cooled
<b>CODING MECHANISM</b>	<ol style="list-style-type: none"> <li>a. Heat embossing coding device with 9 characters</li> <li>b. TTO printer for each head</li> </ol>
<b>PHOTOCELL REGISTRATION SYSTEM</b>  <b>SPARES</b>  <b>MANUALS</b>	<p>It should be working properly while photo mark film is used. Sensor make: P&amp; F, OMRON, Banner</p> <p>Set of critical spares related to two years of operation.</p> <ol style="list-style-type: none"> <li>A) Manufacturer/Supplier's Guarantee certificate.</li> <li>B) Four copies of certificate of Insurance.</li> <li>C) Four copies of the list of all spares related to machine with its part number.</li> <li>D) Critical spare list along with model number, part number and make.</li> <li>E) Four Copies of user Manual.</li> </ol>

**Salient Feature:**

- Automation equipped with PLC & HMI
- Simple maintenance friendly construction
- Servo Motor Controlled Bag Pulling Mechanism

- Independent head operation allowing flexibility
- Hygienic machine design. MOC of product contact parts from stainless steel SS 304
- Servo driven impulse sealing mechanism
- Motorized mechanical filling system for consistent fill accuracy through programmer and ease of change over
- UV film sterilization system for packaging material in back as well as front side with door interlocking
- Motorized/manual web tracking system
- Jumbo reel trolley with hygienic enclosure
- End of film roll facility with interlock of machine to parking mode
- Motorized film reel unwinding control mechanism
- Heating element failure linked alarm generation
- Electrical system of respective head/ track housed in separator cabinet
- Maintenance friendly horizontal & vertical seal mechanism
- Lubrication free design of the machine
- Automatic homing of Horizontal jaw position at power on
- Independent balance tanks offering flexibility to handle different products simultaneously
- Vertical and horizontal jaw sealing temperature to be optimized through programmed PLC

#### **Features required in high-speed Machine**

- There shall be equal distribution of electrical load on all 3 phases to avoid any interruption during DG set operation
- Isolation switch is required for cut off of machine from mains
- LED light (8/10W) to be provided in place of PL tube light
- Machine body should be SS 304 construction. As well as all contact parts are of SS 304.
- Machine Operations should be electronically controlled with PLC
- Digital Setting Control for all Setting Timings
- Individual Head operation
- Positive unwinding for each Head
- Rooftop with SS.
- Provision to run different bag size.
- Separate Control for Seal voltage & timer for handling different film.
- Provision of Jaw close switch.
- Adjustable cooling time.
- Electrical control circuit shall be with 24 V DC.
- Bank of UV tube for Sterilization of film with interlock for stoppage
- SS Nozzle for CIP system
- Toughened Door glass
- SS Legs with height adjustment.



- No Milk No fill with indication and alarm.
- Front and back door safety interlocks.
- Solenoid valve control for jaw cooling water control with start/stop of machine.
- SS pipeline with suitable diameter for Jaw cooling. No water line in backside of machine.
- End of the roll detection system to be supported on insulated bush to prevent earth fault in PLC and other electronic parts
- Friction free forming tube shoulders to be provided to ensure minimum wear and tear of the forming tube
- Locking arrangement to be provided for maximum height of the injection rod
- Film roll stand to be provided with extra length to easily slide the new roll inside the machine
- Chequered plate stand to be provided in the space available between two films roll for maintenance purpose
- During CIP, the injection rod should be in full open position for 100% flow (i.e. 1 liter mode)
- CIP hose for each machine to be supplied
- TTO printer for each head each machine to be considered in the scope of supply

### 5.7 5/6 Litters FFS packing machine

Capacity : As per BOQ

Qty : As per BOQ

Type : Single head machine

Capacity : 5000/6000 ml packing

All other specifications shall be same as item no 5.05

Film type : co-extruded LDPE with minimum 100-micron thickness

Accuracy : 0.2% on ideal working condition for milk  
0.1% bag length variation for film

### 5.8 Seal Water Cooling System with 500 L Insulated tank, PHE, Pump & Automatic temp controlling system and make up water

Capacity : As per BOQ

Qty : As per BOQ

The system shall comprise of;

1. Insulated Cooling water tank of suitable capacity to meet the ultimate packing requirement with level switches and automatic make up pneumatic butterfly valve
2. Cooling water circulation pump (capacity suitable and other specs. Are same as item no
3. PHE/THE to maintain temp of jaw cooling water to 15-20 Deg. C with chilled water control valve and TT in CW in and out line
4. Inline SS strainer to filter any foreign particles in the jaw cooling water

All the necessary pipe, valves, fittings to be considered in the scope with understanding that the complete operation in automatic mode

The system shall be common for curd & butter milk packing machines

**5.9 Leakey Pouch cut open tank (500 L, SS 304 Insulated) with transfer pump and PHE type chiller with automatic level control & CIP facility**

Capacity : As per BOQ

Qty : As per BOQ

Duty : To collect the cut open milk from packing machine

Type : Horizontal tank specially designed with cut open perforated screen

MOC : SS 304

Instrument : Level switches for automation operation of transfer pump

**Note: Supplier shall submit GA drawing for approval to the purchaser for tank prior to fabrication work in the event of placement of order.**

**PHE type Chiller**

Capacity : As per BOQ

Qty : As per BOQ

Duty : To chill the leaky pouch milk from 15 Deg. C to 4 Deg. C before transfer to rinse milk recovery tank

All other specifications are same as per item no 1.05

**Transfer Pump**

Capacity : As per BOQ

Qty : As per BOQ

Duty : To transfer cut open milk to rinse milk recovery tank

All other specifications are same as per item no 1.17

**NOTE: As there are 2 sets of leaky pouch tank, chiller and pump with all standard accessories, one set shall be used in milk packing line, another will be used for fermented product.**

**5.10 Pouch washing trough with secondary chilled water THE**

Capacity : As per BOQ

Qty : As per BOQ

Duty : To wash the good pouches from the leakage crate

MOC : SS 304

The trough shall have raw water tapping with THE for cooling with 10 Deg. Water

Note: Supplier to submit the GA drawing for approval before fabrication in the event of placement of order.

**5.11 3 D Crate Counter for Filled Crate conveyer to milk Cold Store**

Capacity : As per BOQ

Qty : As per BOQ

Type : 3 D crate counter to detect only filled crates

Accessories : 8" LED display with mounting, sensor mounting SS support

**5.12 SS Cross over Bridge for Conveyer**

Capacity : As per BOQ

Qty : As per BOQ

MOC : SS 304

This shall be used to transit between two lines.

### **5.13 Pneumatic valve battery for HMST filling, emptying & CIP as per technical Specifications**

The valve battery shall be constructed on SS square box pipe with following, but not limited to features;

1. Incoming lines as per BOQ with provision for 1 more line in future
2. Outgoing lines as per BOQ with provision for 1 more line in future
3. HMST CIP return line
4. Separate line for left over milk directly to pouch cut open tank/past milk recovery tank
5. The SS support structure shall be used as air reservoir and all the flexible tapping for valves to be taken from it
6. Dedicated FR unit to be considered for valve battery
7. Internal cabling to be done for all the valves at factory and all the cables shall be terminated in SS junction box
8. SS tray for drain collection & SS pipe up to nearest drain

### **5.14 Pasteurized Milk Recovery tank**

Capacity : As per BOQ

Qty : As per BOQ

Type : Vertical, Insulated

MOC : SS 304 with top & bottom of 3.0 mm shell 2.5 mm and outer 2.0 mm thick.

Duty : To collect the water/product push& left over milk from HMST & transfer to Rinse milk recovery/RMST

Insulation : Suitable thickness PUF insulation to ensure 1 Deg. C temp rise in 24 hours

Agitator : Top mounted with gear box

Instruments :

1. Low & High-Level Switch
2. Temp Transmitter with head mounted local display +remote data transfer
3. Level Transmitter with local display +remote data transfer

Accessories : Light glass, sight glass, Agitator SS shroud, lifting lug, SS platform & railing as per requirement.

**5.15 Past Milk Transfer Pump to RMST/Rinse Milk Recovery Tank**

Capacity : As per BOQ

Qty : As per BOQ

Type : Centrifugal, Self-priming

All other specifications shall be same as per item no 1.17

**5.16 CIP return pump for HMST/Past Milk Recovery tank**

Capacity : As per BOQ

Qty : As per BOQ

Type : Centrifugal, Self-priming

All other specifications shall be same as per item no 1.17

**5.17 Milk Cold Store for 1.0 LLPD pouch Milk with 3 nos of doors and 2 nos of hatch door**

Capacity : As per BOQ

Qty : As per BOQ

Cold Store milk intemp : +4 Deg. C

Cooling media : **Diffuser (Direct expansion unit) connected with dedicated ammonia screw compressor-based refrigeration plant for cold store**

No. of Diffuser : As per requirement

Type of Diffuser: Direct Expansion ammonia type, slim design

Material to store : Milk

Milk inlet temp : 4-5 Deg. C

Temp. of milk required : 3 Deg. C

Working person  
Inside cold store : 8-10 persons

Pull down time : 4 hours

Area : As per layout  
Width : As per layout  
Height : 3.5 m

Minimum Thickness of insulation required: 80 mm

Density of PUF insulation: minimum 40 Kg/M3

**Floor Insulation:**

Floor shall have vapor barrier of aluminium foil/PVC sheet.

One layer of tar felt sealed duly with 80:20 bitumen as per prevailing IS code

Two layers of insulation covered & sealed with tar felt.

**NOTE:**

PUF Panel shall be manufactured as per IS 12436-88.

The PUF panel tungun groove type for effective sealing and shall have an airtight joint between panels with the help of PVC/neoprene gasket.

Cam lock type panels will be preferred.

Internal electrification & supply of LED type light fixtures to be considered in the scope. The on off switches to be installed outside the cold store for safety

Suppliers shall be required to make provision for fixing guard rail support through the bottom panel of the wall.

For Emergency exit, self-illuminated exit sign board shall be supplied and installed by Supplier at mutually agreed location in both cold store and deep freeze. (At every door – 8 Nos.)

**Cold Store Doors (Manual) sliding**

Qty : As per BOQ

Capacity/Size :1500 x 2100 mm

The Doors for Milk Cold store is required for Men & Material Movement. The requirement is as follows;

- The door is surrounded by a four-side rubber sealing gasket that ensures hermetic sealing, which shall prevent loss of cooling and controls the temperature.
- The door slides on an overhead track which shall be fabricated from high quality aluminium extrusion with indentations for a 3D movement to ensure complete hermetic sealing while closing.
- The door blades are made out of insulated panel in a door frame. The insulation properties shall ensure the environment temperature and humidity can be maintained as required.
- The door frame shall withstand high abrasion as it shall be made of high-quality anodized aluminium. Ready for atmospheric exposure.
- Top rollers made of self-lubricating nylon which shall ensures smooth and noise free movement of the door.

The Brief Technical Description of major parts & Accessories shall be as follows;

**Rail:** Heavy aluminium/SS track (6.7kg / meter extrusion), with 14 mm indentations under 45-degree angle for runner to slide into to create a 3D movement while closing to ensure hermetic sealing. Includes SS 304 end stops and brackets.

**Runners:** SS 304 wheelchair with V shaped wheels (POM grade plastic) with sealed double roller bearings. Three dimensional adjustments for door blade position.

**Canopy:** Coated steel canopy with sloping top, colour RAL 9006

**Door blade:** minimum 80mm thick insulated sandwich panels of 100% CFC-free polyurethane. High density 40 ±2 kg/m<sup>3</sup>. Door Blade finish – both sides 0.60mm RAL 9002 coated steel. Door blade panels are framed on all four sides in heavy aluminium extruded (1.86 kg/meter) profiles.

**Gasket:** 3-sided exchangeable EPDM sealing gasket, fixed in special PVC holder on inside of the door blade frame. Special profiled bottom seal is fitted to ensure a hermetic seal.

**Opener:** Hermetic stainless-steel lever handles on in and outside of door.

**Wall frame:** In Cold Store doors, for door blade to close hermetically on panel wall. GI coated steel 150 x 45mm of 0.6mm thickness with thermal break shall be given for overheating protection.

**Cladding:** 0.7mm GI coated steel; protect and reinforce the cut out opening in panel wall.

**Fixing material:** to be Included for fixing on PU panels or Brick wall

**Lock:** SS Padlock device on track side

NOTE: Supplier to consider partition wall to divide

**5.18 SS Pipes, valves & Fittings for complete section**

Capacity : As per BOQ

Qty : As per BOQ

All other specification is same as per item no: 1.35

**6. Curd & Yoghurt Processing & Packing**

**6.1 SMST for curd/butter milk/Paneer milk storage**

Capacity : As per BOQ

Qty : As per BOQ

Type : Vertical, Insulated

MOC : SS 304 (inner shell & outer cladding) thickness -2.5 & 3 mm for inner shell & 2 mm cladding

Insulation : PUF insulation of suitable thickness to ensure temp rise of 1 Deg. C in 24 hours

Accessories : Sight glass, light glass, agitator (with SS shroud), SS railing, SS ladder, SS platform (as required), sampling cock, lifting lug, nozzles for instruments etc.

Instruments :

- a. Low & High-Level Switches
- b. Level transmitter with local and remote display
- c. Temp transmitter with local & remote display

**6.2 Powder Blending System with Table mounted hopper and shear & booster pump with accessories**

Capacity : As per BOQ

Qty : As per BOQ

Duty : For makeup of SNF for production of standardized milk for various product



All other specifications shall be as per item no: 2.02

### **6.3 PHE with Circulation for SMST**

Capacity : As per BOQ

Qty : As per BOQ

Duty : To make up temperature of milk after powder addition

Temp duty : 15 Deg. C to 4 Deg. C through circulation

All other specifications are same as per item no: 1.18

### **6.4 Milk Transfer Pump to Curd Pasteurizer**

Capacity : As per BOQ

Qty : As per BOQ

All other specifications shall be as per item no: 1.17

**Note: Suitable arrangement to be done for cooling of motor running with VFD to avoid over heating while running on low speed. Use special motor for VFD operated pumps.**

### **6.5 Curd Milk Pasteurizer with fully automatic operation from control room including all the instruments & Pneumatic valves**

Capacity : As per BOQ

Qty : As per BOQ

Temp. : 4 – 65-95 – 45 or 4 deg. C

Gaskets : NBR, Clip on type

Test Pressure : 6 bar

Design Pressure: 8 bar

Holding time : 600 seconds

**Accessories:**

1. Balance tank – 200 L with float and level switches, CIP spray ball etc.
2. Interconnecting piping

Instruments, valves & Controls:

1. Balance tank level transmitter
2. Balance tank level switch
3. Balance tank milk inlet pneumatic butterfly valve type control valve
4. Soft water inlet pneumatic butterfly valve (with on and off feedback)
5. CIP inlet butterfly valve (with on and off feedback)
6. Automatic Flow diversion seat valve ((with on and off feedback)
7. Magnetic flow meter in forward line
8. VFD for forward pump
9. Pressure transmitter at inlet of regeneration section, heating section and holding section
10. Temp transmitter at all milk & HW in and out ports
11. Operation through Central control room
12. Back pressure valve (pneumatic + spring operated)
13. Any other instrument/valves required for automatic operation

**Note: Pasteurizer shall have ports for homogenizer connection**

**Holding Tubes minimum 10 minutes holding**

Capacity : 10 Min.

Qty : 1 No.

Construction : Spiral circular with SS 304 outer cladding.

Insulation : Hot insulation

Accessories : inlet, outlet with thermo well

**Special Note: Supplier to submit GA drawing & P & ID for approval to the purchaser before commencing the fabrication work in the event of placement of order.**

### 6.6 Curd Milk Homogenizer

Capacity : As per BOQ

Qty : As per BOQ

Duty	: to homogenize the curd milk during the past. process
Material	: All parts in contact with the product are made of stainless steel (SS 316), Frame in CS with SS 304 cladding, the Compression block shall be made of a special high-strength stainless steel alloy and the pistons of ceramic material.
Finish	: 150 Grit or mirror finish
Drive	: 415 V 50 Hz Electric motor

Working Pressure: The homogenizer is required to attend creaming index of less than 10 as per the prevailing international standard used by co-operative dairies across india. The pressure shall be adjusted in two stages (manual adjustment) The Supplier is free to select the pressure range to suit the application. Homogenization valve shall be such that the complete machine is highly energy efficient.

Accessories : Two stage Homogenizing arrangement with two homogenizing valves, pressure gauges with pressure switches for safety. Provision for CIP and all other standard safety systems, in built strainers, suction pressure PT, flow dampener in suction and discharge line, bypass between suction and delivery of the homogenizer for preventing damage in case of accidental failure of any valves of discharge line etc.

Water conservation : The jacket cooling water will be re-circulated through a buffer tank after chilling

Lubrication : The Homogenizer shall be provided with a water cooling / lubrication system with flow switch for the pistons, safety device, as well as local pressure gauge.

Instrument : Following instruments and valves to be considered for automatic operation of homogenizer

1. Suction pressure transmitter
2. 3-way bypass valve in suction as well as discharge
3. NRV for safety
4. Oil flow switch
5. Oil level switch

### 6.7 Past. Curd Milk Storage tank

Capacity : As per BOQ

Qty : As per BOQ

Duty : To store the chilled curd milk from the curd milk pasteurizer for further processing

MOC : SS 304 with 2- & 2.5-mm thickness of inner shell and top, 2mm for outer cladding.

Insulation : PUF 75 mm (minimum) thickness.

Accessories : Sight & Light glass, lifting lugs, SS ladder, SS railing, manhole (TOP), sampling cock, nozzles for various instruments

Instruments :

1. Level switches (Low & High)
2. Level Transmitter with local as well as remote display on central control room
3. Temperature transmitter with local as well as remote display

**Special Note: Supplier to submit GA drawing for approval to the purchaser before commencing the fabrication work in the event of placement of order.**

DVS culture shall be added to this tank (cold culturing)

#### **6.8 Curd Milk heater (4-45 Deg. C) with all standard Accessories, instruments, pneumatic valves, and automatic operation from the control room**

Capacity : As per BOQ

Qty : As per BOQ

Type : PHE type heater

Temp program : 4 -45 Deg. C

Gaskets : NBR, Clip on type

Test Pressure : 6 bar

Design Pressure: 8 bar

#### **Accessories:**

1. Balance tank – 200 L with float and level switches, CIP spray ball etc.
2. Interconnecting piping

Instruments, valves & Controls:

1. Balance tank level switch
2. Soft water inlet pneumatic butterfly valve (with on and off feedback)
3. CIP inlet butterfly valve (with on and off feedback)
4. Automatic Flow diversion seat valve ((with on and off feedback)
5. Magnetic flow meter in forward line
6. VFD for forward pump
7. Temp transmitter at all milk & HW in and out ports
8. Any other instrument/valves required for automatic operation

### 6.9 Curd Inoculation cum Balance tank

Capacity : As per BOQ

Qty : As per BOQ

Type : Vertical, Insulated

Duty : for buffer between Thermizer and packing machine

MOC : SS 304 2 mm thick inner shell and 2.0 mm thick outer cladding

Insulation : Hot insulation of suitable thickness

Accessories : Sight & Light glass, lifting lugs, SS ladder, SS railing, manhole (TOP), sampling cock, nozzles for various instruments

Instruments :

1. Level switches (Low & High)
2. Level Transmitter with local as well as remote display on central control room
3. Temperature transmitter with local as well as remote display

**Special Note: Supplier to submit GA drawing for approval to the purchaser before commencing the fabrication work in the event of placement of order.**

**CIP return Pump should be considered in the scope of Supplier.**

### 6.10 Crate washer for Curd /BM line

Capacity : As per BOQ

Qty : As per BOQ

The scope shall include but not limited to the following,

1. Dismantling of existing crate washer from Ujjain plant
2. Loading, transportation and unloading at new dairy site
3. Positioning & erection of the crate washer as per approved layout
4. Utility and service piping and power & control cabling work
5. Reconditioning of crate washer with minor part changes & overhauling/replacement (if required) of pump etc.

**6.11 Manual two tier crate conveying system for empty & filled crate up to incubation room and cold store**

Capacity : As per BOQ

Qty : As per BOQ

Size : Suitable for 12 Litres crates

Mode of operation: Manual mode but motorized conveyors

1. Empty crate distribution to all machines as per layout
2. Filled crate transfer to milk cold store
3. Crate counter for filled crate

MOC : All support and structure - SS 304 square box/round pipes of suitable size

**6.12 Curd FFS Packing Machine (Common for BM & Curd)**

Capacity : As per BOQ

Qty : As per BOQ

Duty : To pack the past. butter milk & curd

All other specifications are same as per item no: 5.06

**6.13 Rotary Curd Cup Filling Machine with All standard Accessories, Outgoing conveyor & Inkjet Printer**

Capacity : As per BOQ

Qty : As per BOQ

Packing Size : 200g & 400g cup

Packing dia. : As per existing Amul cup standard (80mm & 95 mm – to be confirmed before finalization of size)

Filling Accuracy : +/- 3 to 4 gram for both size

Type : Rotary

Dosing System : Piston filler

Other Specifications:

- Fully automatic, rotary indexing type machine for filling and sealing of pre-made stackable cups and tubs.
- One machine is considered for curd filling and another for lassi filling.
- Multi station machine with provision for dispensing from stack, filling of liquids, lid placing from stack, sealing and discharge of plastic containers (cups/tubs) as detailed below.
- The machine is capable of handling different sizes of containers and or different type of lidding foils by using of change parts which part of the tender
- Machine frame shall be in stainless steel
- Machine housing shall be with hygienically smooth and easy to clean SS external surfaces.
- Aesthetically designed front guards with interlock safety.
- Completely enclosed drive elements for protection from dust.
- Easy accessibility to the machine elements for servicing.
- Machine base with height adjustable leveling elements.
- Quick Clamp devices for tool less changeover of size parts.
- The rotary table is indexed through a precision cam indexer designed with effective acceleration / deceleration to handle liquids without spillage, driven by an AC geared motor lubricated for life in IP54 enclosure and controlled by Digital frequency controller. This is placed in a zone effectively isolated from product contact.

- Pneumatic equipment like Solenoid Valves, Pressure Regulators, Pneumatic Cylinders and Vacuum generators to perform various function based on sequence.
- SS rotary table for easy cleaning and hygiene control suitably mounted on precision bearing housing assembly and it is rigidly connected to the CAM indexer by a shaft.
- Standard stations are Cup dispenser, lid place, lid seal, & Cup discharge
- Electrically interlock to ensure No cup – No fill – No lid place – NO seal
- Machine shall be PLC operated with touch screen OP
- Changeover parts for 400g pack size to be included in the scope of supply for both the machine (separate set for each machine)

For lassi packing, please consider the viscosity and select the filling mechanism accordingly to achieve the required filling accuracy

**6.14 Matka packing machine (5 Kg/6Kg) with sealing & coding**

Capacity : As per BOQ

Qty : As per BOQ

Type : Volumetric filler, Semi-Automatic with off line foil sealing

Accessories :

Inkjet printer for coding & Conveyor for outgoing line

**6.15 SS trolley for cup curd & matka packing**

Capacity : As per BOQ

Qty : As per BOQ

Type : Perforated SS trolley with selves for placement of cup to incubation and then to blast room and finally in storage area

This shall be a SS trolley with castor wheel mounted with perforated slaves for storage of packed cup transferring to incubation room. The trolley after curd get incubated shall be transferred to curd blast room so as to avoid manual handling to ensure firm shape of the curd and reduce separation.



Note: Supplier to submit GA drawing for approval before commencing fabrication work in the event of placement of order.

#### **6.16 Curd Incubation Room with Electrical heating system**

Capacity/Size : Suitable

Qty : As per BOQ

Temp. : 45 Deg. C

Heater : Electrical heater with temp. controller (continuous controller)

Duty : for incubation of curd to achieve the desired acidity in approx. 4 to 5 hours

Insulation : 60 MM 40 Kg/ M3 thick PUF 2 side PPGI sheet with even air flow

Accessories :

1. Temp indicating controller and Electrical heater switchgear in electrical panel
2. SS chequered plates for bottom in welded construction.
3. Manual sliding door for approach (Size: 2100 x 1500 mm) – 2 Nos
4. SS Railing for safety
5. Room Lights (LED type)

Note: Uniform temp. shall be ensuring in the inoculation room at all the corners and if, required circulation fans shall be installed. The incubation room shall be divided in to two part and PUF partition wall and 2 separate door to be considered.

#### **6.17 Curd Blast room with insulation panel, Standalone freon based refrigeration system, 2 nos of manual sliding doors and other standard accessories. Product to be cooled from 45 Deg. C to 10 Deg. C in 2 hours**

Capacity : As per BOQ

Qty : As per BOQ

Duty : 45 Deg. C to 10 Deg. C cooling

Insulation :

1. Cold insulation with 120 mm thick PPGI sheet with PUF of 40 Kg/m<sup>3</sup> Density for wall
2. Cold insulation of Floor shall have vapor barrier of aluminum foil/PVC sheet. One layer of tar felt sealed duly with 80:20 bitumen as per prevailing IS code and two layers of insulation covered & sealed with tar felt.
3. Cold insulation of column (as per requirement)

Refrigeration : Standalone refrigeration system (Freon based)

Temp : To cool down curd cup from + 45 Deg. To + 10 Deg. C in 2 hours' time

Loading : 2 Ton/Hr.

Pull down time : 2 hours

Other Accessories:

1. Control panel with digital temp controller
2. Manual sliding door for approach (2100 x 1500 mm)
3. Hatch door for opening in cold store
4. SS railing for safety
5. SS chequered plate for flooring
6. Room Lights (LED type)

### **6.18 Curd Setting tank**

Capacity : As per BOQ

Qty : As per BOQ

Type : Vertical insulated tank

Duty : For curd setting required for lassi

MOC : SS 304 2 mm thick with 2.0 mm thick SS 304 outer

Instrument : High & Low-level switches  
Level transmitter with local display & data transmission  
Temp transmitter

Insulation : Hot insulation of 50 mm (minimum) thickness

Accessories : Sight & Light glass, lifting lugs, SS ladder, SS railing, manhole (TOP), sampling cock, nozzles for various instruments

#### **6.19 Sugar mixing system**

Capacity : As per BOQ

Qty : As per BOQ

Duty : To mix sugar with cultured milk for lassi production

**Note: Powder blender shall be used for mixing of sugar into curd mass. Therefore, separate sugar syrup preparation is not required.**

All other specifications are same as per item no: 2.02

#### **6.20 Mixing tank for chakka sugar, flavour & fruits**

Capacity : As per BOQ

Qty : As per BOQ

Duty : To mix sugar, flavor & fruits for Lassi

MOC : SS 304 with 2- & 3.0-mm thickness of inner shell and top, 2mm for outer cladding.

Insulation : PUF + EPS+ EPS+ ALU FOIL: 15 + 50+50+0.07 mm insulation or Hot insulation of 100mm thickness

Accessories : Sight & Light glass, lifting lugs, SS ladder, SS railing, manhole (TOP), sampling cock, nozzles for various instruments

Instruments :

1. Level switches (Low & High)

1. Level Transmitter with local as well as remote display on central control room

2. Temperature transmitter with local as well as remote display

**Special Note: Supplier to submit GA drawing for approval to the purchaser before commencing the fabrication work in the event of placement of order.**

**6.21 Circulation pump with chiller**

**Shear Pump**

Capacity : As per BOQ

Qty : As per BOQ

Type : Centrifugal with specially designed impeller for shearing of lassi with sugar and fruit pieces

All other specifications shall be as per item no: 1.17

**Tubular Heat Exchanger**

Capacity : As per BOQ

Qty : As per BOQ

Type : Tubular shell & Tube type Heat exchanger

MOC : All product contact parts in SS 304

Duty : To chill the lassi up to 4 Deg. C through circulation

Accessories : All standard Accessories/instruments for automatic operation through control room

**6.22 Lassi transfer pump to curd past/packing machine**

Capacity : As per BOQ

Qty : As per BOQ

Type : Progressive cavity type (PD pump) suitable to handle viscous liquid with 7000 Cp viscosity, sanitary design

MOC : All product contact parts SS 304

**Note: Probiotic Lassi shall not be thermized**

**6.23 CIP return pump for pouch packing machine**

Capacity : As per BOQ

Qty : As per BOQ

Type : Centrifugal, Self-priming

All other specifications shall be same as per item no 1.17

**6.24 CIP return pump for cup filling machines**

Capacity : As per BOQ

Qty : As per BOQ

Type : Centrifugal, Self-priming

All other specifications shall be same as per item no 1.17

**6.25 CIP return Pump for Mixing tanks**

Capacity : As per BOQ

Qty : As per BOQ

Type : Centrifugal, Self-priming

All other specifications shall be same as per item no 1.17

**6.26 Pneumatic valve battery for SMST area**

The valve battery shall be constructed on SS square box pipe with following, but not limited to features;

1. Incoming lines as per BOQ with provision for 1 more line in future
2. Outgoing lines as per BOQ with provision for 1 more line in future
3. SMST CIP return line
4. The SS support structure shall be used as air reservoir and all the flexible tapping for valves to be taken from it
5. Dedicated FR unit to be considered for valve battery

6. Internal cabling to be done for all the valves at factory and all the cables shall be terminated in SS junction box
7. SS tray for drain collection & SS pipe up to nearest drain

**6.27 SS Pipes, valves & Fittings for complete section**

Capacity : As per BOQ

Qty : As per BOQ

All other specification is same as per item no: 1.35

**7. Butter Milk Processing & Packing**

**7.1 Butter milk pasteurizer**

Capacity : As per BOQ

Qty : As per BOQ

Duty : To heat the milk for curd setting required for Butter Milk processing

Temp profile : 4-95-45 Deg. C

Holding time : 20 Seconds

All other specifications shall be as per the milk pasteurizer

**7.2 Curd Setting Tanks**

Capacity : As per BOQ

Qty : As per BOQ

Type : Vertical insulated tank

Duty : For curd setting required for lassi

MOC : SS 304 3 mm thick bottom, 2.5 mm shell & 3 mm top with 2.0 mm thick SS 304 outer

Instrument : High- & Low-level switches  
 Level transmitter with local display & data transmission  
 Temp transmitter

Insulation : Hot insulation of 75 mm (minimum) thickness

Accessories : Sight & Light glass, lifting lugs, SS ladder, SS railing, manhole (TOP), sampling cock, nozzles for various instruments

### 7.3 Butter Milk Circulation pump

Capacity : As per BOQ  
Qty : As per BOQ  
Type : Centrifugal, Sanatory  
Duty : To circulate the BM for rechilling & mixing

All other specifications shall be same as per item no 1.17

### 7.4 Butter Milk Shear Pump

Capacity : As per BOQ  
Qty : As per BOQ  
Type : Centrifugal shear pump with specially designed impeller  
Duty : to partially break the butter milk particles to give uniform distribution of buttermilk particles  
Fittings : Quick opening sanitary fittings  
Material : AISI 316  
Mounting : Free standing with adjustable SS ball feet  
Shaft sealing : Mechanical shaft seal  
Gasket : Nitrile rubber  
Shroud : AISI 304  
Motor : 415V, AC, 3 phase, 50 Hz. EFF-I (IE3) Squirrel cage induction motor with TEFC/IP 55 Enclosure.

**Note: Suitable arrangement to be done for cooling of motor running with VFD to avoid over heating while running on low speed. Use special motor for VFD operated pumps.**

### **7.5 Butter Milk Circulation chiller**

Capacity	: As per BOQ
Qty	: As per BOQ
Type	: Plate heat exchanger with SS 316 type plates
MOC of plate	: SS 316
Duty	: This PHE shall be used to chill the butter milk with chilled water
Instruments	: Butter milk in/out TT.
Feed temp.	: 40 Deg. C (Max)
Discharge Temp.	: 4 Deg. C (Max)
CW feed temperature	: 2 Deg. Celsius
Maximum permissible chilled water flow	: 1:2 ratio of milk
Maximum pressure drops on milk side	: 0.5 Kg/cm <sup>2</sup>

### **7.6 Butter Milk Transfer Pump to BM pasteurizer**

Capacity	: As per BOQ
Qty	: As per BOQ
Type	: Centrifugal, Self-priming
Duty	: To transfer the BM to BM pasteurizer

All other specifications shall be same as per item no 1.17

### **7.7 Butter Milk Thermizer with All standard Accessories and instruments and controls for fully automatic operation from the central control room**

Capacity	: As per BOQ
Qty	: As per BOQ



Duty : To thermize butter milk from 4/10-70-4 Deg. C

It shall have all the required instruments mentioned below to enable centralized operation from the control room;

1. Modulating control valve at the inlet of the Balance tank
2. Level transmitter in the balance tank
3. Low & High-level switches in the balance tank
4. Butterfly valve for CIP inlet of the balance tank
5. Butterfly valve for the soft water inlet line
6. Flow meter at the feed pump outlet
7. VFD for feed control
8. Various Temperature Transmitters at all the milk inlet and outlet of the milk, hot water, and chilled water side to measure online "regeneration efficiency" of the pasteurizer
9. Pressure Transmitters at the inlet, intermediate and the outlet of the milk line (3 nos)
10. Pressure Transmitters at the hot water side
11. Flow diversion valve for hot and cold diversion
12. Constant Pressure Modulating valve (CPM) valve)
13. Remote I/o cards for operation of the pasteurizer through control room
14. Any other instruments and controls required for automatic operation through control room as per detailed P & ID
15. New shear pump to be installed in the pasteurizer

All the instruments and valves required for complete remote operation shall be considered in the scope.

### **7.8 HMST for Butter Milk**

Qty : As per BOQ

Capacity : As per BOQ

The scope shall include but not limited to the following;

1. Dismantling of existing HMST from Ujjain plant
2. Loading, transportation and unloading at new dairy site
3. Positioning & erection of the HMST as per approved layout
4. Installation of LT, TT, Level switches (low & High), Door Proximity Switches in each HMST
5. Power, control, and instrument cabling work
6. Hook up with Automation System

Supplier has to visit and inspect the existing weighbridge installed at Ujjain Dairy plant and quote for missing item/accessories required.

#### **7.9 CIP return pump for Curd Setting tanks**

Capacity : As per BOQ

Qty : As per BOQ

Type : Centrifugal, Self-priming

All other specifications shall be same as per item no 1.17

#### **7.10 CIP return Pump for Butter Milk HMST**

Capacity : As per BOQ

Qty : As per BOQ

Type : Centrifugal, Self-priming

All other specifications shall be same as per item no 1.17

#### **7.11 Pneumatic Valve battery for curd setting tanks as per design and technical specifications**

The valve battery shall be constructed on SS square box pipe with following, but not limited to features;

1. Incoming lines as per BOQ with provision for 1 more line for 20 MT/day in future
2. Outgoing lines as per BOQ with provision for 1 more line for 20 MT/day in future
3. Tank CIP return line
4. The SS support structure shall be used as air reservoir and all the flexible tapping for valves to be taken from it
5. Dedicated FR unit to be considered for valve battery
6. Internal cabling to be done for all the valves at factory and all the cables shall be terminated in SS junction box
7. SS tray for drain collection & SS pipe up to nearest drain

#### **7.12 Pneumatic valve battery for Butter Milk HMST filling, emptying & CIP as per technical specifications**

The valve battery shall be constructed on SS square box pipe with following, but not limited to features.

1. Incoming lines as per BOQ with provision for 1 more line in future
2. Outgoing lines as per BOQ with provision for 1 more line in future
3. Tank CIP return line
4. The SS support structure shall be used as air reservoir and all the flexible tapping for valves to be taken from it
5. Dedicated FR unit to be considered for valve battery
6. Internal cabling to be done for all the valves at factory and all the cables shall be terminated in SS junction box
7. SS tray for drain collection & SS pipe up to nearest drain

### **7.13 SS Pipes, valves & Fittings for complete section**

Capacity : As per BOQ

Qty : As per BOQ

All other specification is same as per item no: 1.35

## **8. Ghee Processing & Packing**

### **8.1 Continuous Butter Making Machine for White Butter with all standard Accessories, SS control panel, Balance tank, Chiller for BM etc.**

**Capacity** : As per BOQ

**Qty** : As per BOQ

**Purpose** : To manufacture White butter

**Accessories** : Buttermilk Collection, Wash water system & other standard accessories

#### **Construction**

Stainless steel SS316 framework on level adjustable wheels and feet with integrated equipment: each mechanical element is fitted in this frame but is independently assembled. This concept guarantees that the entire unit is perfectly rigid, and vibrations are completely reduced. Main components completely made of stainless steel. The various elements are accessible for a quick dismantling.

#### **Churning section**

The churning section consists of a horizontal cylinder and a beater.

The cream is pumped at the rear end of the cylinder. It is immediately pressed outward against the cylinder wall and forced forward. This action of the beater churns the cream into butter grains and butter milk.

### **Separating section**

The separating section consists of a horizontal, rotating cylinder. In principle, the section is divided into two, a post churning section and a draining section. In the post churning section, the small butter grains clump together to form larger clumps before the buttermilk is drained off in the draining section.

### **Working section**

Working section comprises both augers for transportation of the butter and working elements: working vanes and perforated plates. In this section the buttermilk is worked out of the butter before dosing of water and/or salt. The working section 1 consists of:

- An extra-long buttermilk separation section with cooling jacket and separate buttermilk tank.
- A highly efficient squeeze-drying block to eliminate all the buttermilk and produce butter

### **Buttermilk tank**

Collection tank for buttermilk from working section one and section two  
Complete closed with cover and buttermilk transfer pump

### **Operation**

The machine should be capable of automatic operation through its dedicated HMI & PLC

Speeds variation for the Beater of churning section, separation cylinder and augers of working section to be provided.

## **8.2 Online butter melting machine with all standard accessories and hot water generation system with circulation pump and hopper**

Capacity : As per BOQ

Qty : As per BOQ

Type : spiral tube in tube heater

MOC : All product contact parts in SS 304 construction

Duty : To receive butter from CBMM and melt it with hot water in line for ghee processing

Accessories :

1. Hot water generating & circulating system
2. Interconnecting piping
3. Temp controller with PID valve

4. Control panel
5. Other standard accessories

### 8.3 Pre-stratification tank

Capacity	: As per BOQ
Qty	: As per BOQ
Duty	: It shall be used to stratify molten butter, free moisture and solids in butter. Free water and solids shall be taken out through the bottom outlet
MOC	: SS 304
Finish	: 2B finish outside
Insulation	: Not required as per process requirement

#### Accessories & Ports:

- a) Air Vent,
- b) Inlet & outlet,
- c) Nozzle for temperature sensor,
- d) manhole,
- e) Sight cum Light Glass

#### Instruments :

1. Digital Temp indicator with local display

**Note: Supplier shall submit GA drawing for approval to the purchaser for tank prior to fabrication work in the event of placement of order.**

**Stage inspection to be offered for fabrication for material inspection, welding, insulation & cladding & final inspection**

### 8.4 Seram Separator for sweet butter milk with all standard Accessories

Capacity	: As per BOQ
Qty	: As per BOQ

Type	: Bowl Design – Self ejecting type with hydraulic operation, belt driven Product Discharge: Closed discharge with centripetal pump
Cleaning	: CIP without dismantling
MOC	: All product contact parts in SS 304
Duty	: To remove fat from the serum collected from the pre-stratification tank
Accessories	: Balance tank & Feed pump, PHE type Chiller for serum cooling

### 8.5 Ghee Boiler

Capacity	: As per BOQ
Qty	: As per BOQ

**Functional Requirement:** Ghee boiler (steam heated kettle) shall be used for the manufacture of ghee from butter or cream.

**Services Required:**

**Steam:** at 3 Kgs/cm. Sq. pressure

**Electric Power:** 3 phases, 415 V, 50 Hz., AC supply

**Finish:** All stainless-steel welding joints shall be ground smooth. All stainless-steel surfaces shall be polished to 150 grits.

**Constructional Features:**

**Inner Shell:** The inner shell with cylindrical body, hemispherical bottom and reinforced brim shall be fabricated from stainless steel plate of thickness 5 mm conforming to AISI 304.

**Intermediate Shell:** The intermediate shell with cylindrical body and hemispherical bottom shall be fabricated from SS 304 plate of 4mm thickness.

**Outer Shell:** The outer shell with cylindrical body and hemispherical bottom shall be fabricated from stainless steel sheet of 2 mm thickness conforming to AISI 304.

**Insulation:** 100mm crown 150 resin bonded fibre glass wool supplied with chicken wire netting shall be provided in between the outer and intermediate shell. The insulating material shall withstand the steam temperature.

**Accessories:**

**Girder:** 5mm thick stainless steel (AISI 316) girder for mounting agitator and covers.

**Covers:** Semi-circular, removable, stainless steel (AISI 316) covers of 2mm thickness with lifting handles.

**Agitator:** Sweeping type stainless steel (AISI 316) agitator with vertical geared motor complete with oil seal, supporting arrangement, support on the shell bottom etc. The agitator shaft shall be a solid rod.

**Legs:** Mild steel legs with stainless steel (AISI 304) pipe cladding with stainless steel ball feet provided at the bottom of the tank. The stainless-steel ball feet shall have provision for height adjustment of 50mm.

**Steam Inlet:** Steam inlet connection shall and outside in a flange and counter flange. The places mentioned below shall be stiffened with stainless steel padding. Steam valve and thermostatic valve shall be provided. Where steam inlet pipe joins the intermediate shell (3mm thick.)

**Condensate Outlet:** Condensate outlet with strainer floats type, steam trap, sight glass and bypass arrangement shall be provided. It shall also be provided with suitable flange joint for each removable component.

**Air Vent:** 19mm BSP automatic air vent at the topmost portion of the steam jacket.

**Thermo-well:** Thermo-well (made from stainless steel conforming to AISI 316) and suitable connection shall be provided in the outer shell for fixing steam and dial thermometer to measure the temperature of product. The portion of the thermo-well, which is in the steam jacket, shall be insulated with rock wool or equivalent and totally shrouded so that the insulation does not come in contact with steam. TT with Digital display to be consider for temp indication.

**Outlet Bottom:** 63.5mm with AISI 316 vertical outlet having stainless steel straight through plug type flanged valve ending in complete stainless-steel union. The outlet shall be at a clear height of 650mm from the finished floor level to facilitate placement of can under it.

**Side outlet:** Horizontal stainless-steel outlet with stainless steel angular flanged valve ending in complete stainless-steel union for taking out clear ghee.

## 8.6 Ghee Settling cum storage tank with tower water circulation

Capacity : As per BOQ

Qty : As per BOQ

Type : Vertical

Finish : 2B finish

Functional Requirement: Ghee made in ghee boiler, would be transferred in this tank for settling of burnt SNF residue

Constructional Features: The tank should be of vertical double walled, jacketed without insulation with removable sprinkler pipe, 25mm dia. for Hot/Chilled water, U bend 38 mm, steam Spurger/ejector, agitator

**Scope of Supply:**

Inner shell : The Inner shell and inner conical bottom should be made from stainless 2 mm & 2.5 mm steel plate conforming to AISI 304.

Outer Shell : The outer shell and flat bottom should be made from 2 mm & 2.5 mm stainless steel plate conforming to AISI 304

**Accessories :**

Legs : Mild Steel legs with stainless steel (AISI 304) pipe cladding with stainless ball feet provided at the bottom of the tank. The stainless-steel ball feet should have provision for height adjustment of 50 mm.

Drain : Stainless steel (AISI 304) drain with valve at the bottom of the jacket

U Bend : Stainless Steel (AISI304) 'U' bend at the bottom of the jacket.

Overflow : Stainless steel (AISI 304) overflow at top of the jacket and brought up to floor.

**Outlets:**

Bottom : Vertical outlet with stainless steel (AISI 304) straight through plug valve ending in complete stainless-steel union. This outlet should be at a clear height of 650 mm from the finished floor level to facilitate placement of can under it.

Side : Horizontal stainless steel (AISI 304) outlet with stainless steel angular flanged valve ending in complete stainless-steel union for taking out clear ghee.



Inlet : Removable type stainless steel (AISI 304) no foam inlet at top.  
The inlet should end in a complete stainless-steel union outside.

**Note: Supplier shall submit GA drawing for approval to the purchaser for tank prior To fabrication work in the event of placement of order.**

**Cooling tower required for above duty to be considered in the scope of supply with 1 W & 1 S circulation pump and automatic valve for makeup water**

**Stage inspection to be offered for fabrication for material inspection, welding, insulation & cladding & final inspection**

### **8.7 Ghee Clarifier with all standard Accessories & operating panel**

Type : Centrifuge, manual

Duty : To clarify the ghee to remove heavier particles.

Capacity : As per BOQ

Qty : As per BOQ

MOC : SS 304

Accessories : Ghee clarifier feed pump and 100 L balance tank

### **8.8 Ghee Balance tank with circulation pump for packing (VFD Driven)**

#### **Balance tank**

Duty : To store the ghee and transfer it for packing with circulation line

Capacity : As per BOQ

MOC : SS 304 of 2 mm thick

#### **Ghee transfer pump with VFD**

Capacity : As per BOQ

Qty : As per BOQ

Duty : To transfer ghee to packing machine

All specifications are same as per item no: 1.17

### **8.9 Ghee pouch packing machine for 500g & 1 Kg Pouch**

Type : Vertical FSS machine  
Controls : PLC operated.  
Capacity : As per BOQ  
Packing size : 500g and 1 Liter.  
Film Thickness : 100 micron  
Film size : 325 mm x 150 mm (500g)  
325 mm x 250 mm ( 1 Liter)

Filled pouch shall be collected in SS collection tray of suitable size.

Balance Tank with Electrical heating and pump to be considered in the scope of Supplier.

### **8.10 Ghee Tin Packing line for 15 Kg tin with all standard Accessories incoming & outgoing conveyer, online, inkjet printer etc.**

Type : volumetric filler with load cell  
Capacity : As per BOQ  
Packing size : 15 Kg tin  
Accessories :

Incoming & outgoing conveyer (motorized)  
Seamer for cap  
Inkjet Printer (4 line)

### **8.11 Ghee residue recovery system**

Capacity : As per BOQ  
Qty : As per BOQ  
MOC : SS 304

Duty : This is specially designed vat for residue collection and recovery of the fat by addition of chilled water

### **8.12 Local control panel for Ghee processing operation**

SS control panel with switchgear & start stop PB for manual operation of the complete ghee plant. Temp. of various tanks to be indicated on the panel

### **8.13 SS Pipes, valves & Fittings for complete section**

Capacity : As per BOQ

Qty : As per BOQ

All other specification is same as per item no: 1.35

## **9. Paneer Processing & Packing**

### **9.1 Paneer milk Heater with all standard Accessories with regeneration section including all the instruments for automatic operation from the central control room (4-95-85 Deg C)**

Capacity : As per BOQ

Qty : AS per BOQ

The module shall be used to heat the paneer milk with following temp profile.

Paneer milk heating: 4-95-85 Deg. C

The pasteurization module shall have.

#### **a. Balance tank:**

Capacity : 200 L

MOC : SS 304

Type : cylindrical, free standing on ball feet

Accessories : Top cover, CIP spray ball, ball feet, various port for inlet/outlet and other instruments, water inlet etc

#### **b. Feed Pump with VFD control**

Type : Centrifugal

Fittings : Quick opening sanitary fittings

Material : AISI 316

Coupling : Mono-block

Mounting : Free standing with adjustable SS ball feet

Shaft sealing : Mechanical shaft seal

Gasket : Nitrile rubber

Shroud : AISI 304 with acoustic liner

Motor : 415V, AC, 3 phase, 50 Hz. EFF-I (IE3) Squirrel cage induction Motor with TEFC/IP 55 Enclosure

**c. Plate pack**

Construction : required nos. of plate SS 316 with 0.5 mm thickness  
Support structure SS 304 cladded with free standing

Type : Plate heat exchanger with suitable path to meet the temp requirement with heating, regeneration & cooling of whey and well water sections

**d. Holding coil with 10 min. time**

Type : Vertical, spiral

MOC : SS 304

Holding time : 600 Seconds

Insulation & Cladding : Hot insulation with SS 304 (2 mm) cladding

Accessories : Thermowell at inlet & outlet

Make : Fabricated

**e. Booster pump**

Type : centrifugal

Capacity : To match the capacity of pasteurizer

All specifications are same as that of feed pump

**f. Hot Water generation THE with circulation pump**

Type : Tubular Heat Exchanger

Capacity : As per requirement

Hot Water Pump : Centrifugal with High temp duty

Capacity : to match the process capacity

**g. SS skid & interconnecting piping**

The complete assembly of above items except Plate pack shall be mounted on the suitable thick square box pipe skid with base.

All the supports and inter-connecting piping for various sections of PHE shall be mounted on the skid.

Control panel shall be mounted on the vertical support of the skid.

**h. Various instruments and controls**

Following but not limited to instruments to be considered.

1. Incoming milk on off butterfly valve
2. Low- & High-Level Switches
3. Level transmitter
4. Flow meter in Feed pump forward line
5. TT at all milk in & out port
6. PT at inlet, intermediate (after holding tube) and discharge line of the pasteurizer
7. Back pressure valve (pneumatic)
8. Automatic Flow diversion valve with on/off feedback
9. Centralized PLC based control of complete pasteurizer operation for.
  - a. Start
  - b. Circulation on water
  - c. Stabilization
  - d. Sterilization

- e. Production
- f. CIP
- g. Controlled stop or stabilization
- h. Control valve for steam, tower water and chilled water control

**9.2 Paneer Vat (insulated) with CIP & Dosing nozzle rod**

Capacity : As per BOQ

Qty : As per BOQ

MOC : SS 304

The coagulation vat shall be built in the form of a horizontal semi cylindrical tank equipped with:

- a. Cleaning heads
- b. Acid dosing heads
- c. Insulation
- d. A temperature sensor with digital display (Local)

**The vat shall be kept at a suitable height on the SS platform so as the coagulated paneer mass can be collected manually at the outlet of the vat and all the whey shall be drained out in the whey collection trough. SS Dimple plate to be used for platform**

**Bidder to submit the GA drawing for approval before commencing the fabrication work in the event of placement of order.**

**9.3 Citric Acid Dosing tank (Insulated Jacketed) with agitator, CIP nozzle and temp. control valve and controller**

The system shall comprise following item/equipment.

**Acid Dozing Tank (Jacketed + Insulated + Agitator):**

Capacity : As per BOQ

Qty : As per BOQ

Duty : for Citric Acid Solution Preparation by dissolving loose matter in RO water

Type : Vertical, insulated, Jacketed with agitator

MOC : SS 304, 2.5 mm thick top & bottom, Jacket with 2 mm cladding

Connection : Inlet/outlet, port for steam inlet and condensate outlet

Controls : Steam control valve with TT and Temp Controller in local panel

Insulation : Hot insulation of 75 mm thick

**Note:**

**Supplier shall submit GA Drawing of the tank for approval before commencing the fabrication work and offer inspection of the tank in the event of placement of order.**

**Acid Dosing System with Spray to each Vat:**

The system shall comprise of;

1. Suitable dosing pump (1W+1S, acid duty) with flow control.
2. SS distribution piping for all the paneer vats installed.
3. Specially designed nozzles for uniform distribution of the acid in the paneer vat.
4. Manual SS butterfly valves for on off operation above each paneer vat.

**9.4 SS working platform for paneer vat and dosing tanks**

Capacity : As per BOQ

Qty : As per BOQ

MOC : SS 304 square box pipes for support structure and dimple type chequered plate for platform

**9.5 Weigh collection trough**

Capacity : Suitable to collect the whey from all the paneer vat

Qty : 1 no

MOC : SS 304

Accessories : Free standing ball feet, hooks for whey filtration cloth fixing, common drain at suitable height

**9.6 Paneer hoops (in SS construction)**

Capacity : As per BOQ

Qty : As per BOQ

The block molds are made of micro perforated Suitable Grade Food grade plastic or Micro perforated and microgroove stainless steel plates suitable for easy draining of whey and in same time for quick reduction of temperature of paneer. The Mold should be design in such a way that it gives ease in de molding as well as with minimum sticking of Paneer coagulum.

The scope also includes 5 nos. of SS trolley to shift the filled hoops from the whey trough to paneer pressing station. Supplier to take approval of the design before commencing the fabrication work in the event of placement of the order.

#### **9.7 Pneumatic Paneer press with 4 stations with all standard Accessories, pneumatic switches, FR unit, timers and whey collection tray**

Capacity : As per BOQ

Qty : As per BOQ

Duty : To give the final shape and structure to portions of Paneer

The press shall work with increasing pressure.

The pressure force and its duration shall be regulated from the operation panel.

The presses shall consist of:

- i) Supporting structure,
- ii) Pneumatic cylinders
- iii) Pressing lid with individual pressing heads.

The pressing lids shall be replaced after each day production, manually

Cleaned and put into disinfection tank.

The presses shall be made of acid-proof and stainless materials.

The pressing lids shall be made of polythene/SS perforated sheet enough to withstand the pressure and hold the coagulum intact.

#### **9.8 Paneer block cooling tank**

Type : Horizontal open with SS grill specially designed for paneer  
Block handling

Capacity : As per BOQ

Qty : As per BOQ



MOC : SS 304

Insulation : 50 mm thick PUF

Duty : To cool the paneer block coming out from the paneer press through circulation of chilled water

Accessories : Ball feet, inlet and outlet for chilled water

#### **9.9 Chilled Water circulation pump with filter and UV light treatment**

Capacity : As per BOQ

Qty : As per BOQ

Duty : To circulate chilled water in dipping tank

All other specifications are same as per item no: 1.17

There shall be on line UV light chamber through which the water in circulation get passed to make water bacteria free.

#### **9.10 Chiller for dipping tank**

Capacity : As per BOQ

Qty : As per BOQ

Type : Plate heat exchanger

Duty : To chill the water required for paneer block cooling tank (Max. delta T is 10 Deg. C)

Pressure drops : 0.5 kg/cm<sup>2</sup> maximum

Service : CW at 1.5 Deg. C

Accessories : TT with local display on CW inlet and outlet

#### **9.11 Pasteurized Chilled water storage tank**

Capacity : As per BOQ

Qty : As per BOQ

Type : Vertical, insulated

MOC : SS 304 of thickness as per OEM

Insulation : PUF insulation to ensure 1 Deg. C temp rise in 24 hours

Accessories : All standard accessories including manway, sight cum light glass, breather, ball feet, CIP spray ball, side mounted Agitator etc

Instruments :

1. Low- & High-Level switches
2. Temp transmitter
3. Level transmitter

**9.12 Paneer block drying tunnel with high-speed fan, SS enclosure and straight through conveyer**

QTY : Ass per BOQ

Capacity : As per BOQ

This shall be in SS construction with high speed fan mounted on the top. There shall be SS chain/food grade material conveyer.

With the help of air pressure, the moisture from the block surface is removed.

Bidder to submit the GA drawing for approval before commencing the fabrication work in the event of placement of order.

**9.13 Paneer block cutting machine for 200/500/1000 g block**

QTY : Ass per BOQ

Capacity : As per BOQ

MOC : SS 304 (all contact part)

Type : Semi-Automatic with pneumatic cylinder

Operation : Through dedicated PLC

**9.14 Double chambered vacuum packing machine**

Capacity : As per BOQ  
Qty : As per BOQ  
MOC : SS 304  
Chamber : Double  
Min Chamber Clearance: 125 mm  
Speed : 40 Seconds/cycle  
Vacuum pump type : Busch / Toshniwal  
Control : Panel with adjustable timing and pressure indication

**9.15 Whey transfer pump to whey storage tank**

Capacity : As per BOQ  
Qty : As per BOQ  
Duty : To transfer raw whey to storage tank

All other specifications are same as per item no 1.17

**9.16 Raw Whey Storage tank (insulated)**

Capacity : As per BOQ  
Qty : As per BOQ  
Type : Vertical, free standing ball feet, insulated  
MOC : SS 304  
Duty : To collect the whey generated from the paneer coagulation and feed to chiller  
Instrument : TT, LT with local display & Level switches

**9.17 Whey transfer pump to paneer milk heater and chiller**

Capacity : As per BOQ  
Qty : As per BOQ  
Duty : To transfer whey to paneer milk heater & whey chiller

All other specifications are same as per item no: 1.17

**9.18 Double section whey Chiller with cooling tower water section**

Capacity : As per BOQ  
Qty : As per BOQ  
Duty : To chill the whey to 70/12 Deg. -30 - 4 Deg. C

All other specifications are same as per item no: 1.18

**9.19 Chilled whey Storage tank**

Capacity : As per BOQ  
Qty : As per BOQ  
Duty : To store the chilled whey and transfer it for further processing/usage  
Type : Vertical insulated tank  
MOC : SS 304 of thickness as per OEM  
Insulation : PUF insulation to ensure 1 Deg. C temp rise in 24 hours

Accessories : All standard accessories including manway, sight cum light glass, breather, ball feet, CIP spray ball, side mounted Agitator etc

Instruments :

1. Low- & High-Level switches
2. Temp transmitter
3. Level transmitter

**9.20 Whey dispatch pump**

Capacity : As per BOQ  
Qty : As per BOQ

Duty : To dispatch the whey

All other specifications are same as per item no: 1.17

**9.21 Control panel for local operation of paneer section**

SS control panel with required switchgear and start stop push button with temp indication for all tanks to be considered in the scope of supply

**9.22 SS Pipes, valves & Fittings for complete section**

Capacity : As per BOQ

Qty : As per BOQ

All other specification is same as per item no: 1.35

**10. Rinse Milk Recovery Section**

**10.1 Balance tank for rinse milk recovery system**

Duty : For storing the rinse milk from various sections

Capacity : As per BOQ

QTY : As per BOQ

Design : AISI 304, 2 mm thick, bottom outlet, valves inline strainer etc.

**10.2 Milk circulation pump**

Capacity : As per BOQ

QTY : As per BOQ

All other specifications shall be as per item no: 1.17

**10.3 Rinse Milk Chiller**

Capacity : As per BOQ

Qty : As per BOQ

Duty : To chill the rinse milk up to 4 Deg. C. in circulation mode

Instruments :

1. Inlet & outlet TT for milk and TT in CW out line
2. Control valve for temp control

All other specifications shall be as per item no: 1.18

#### **10.4 Rinse Milk Storage tank**

Capacity : As per BOQ

Qty : As per BOQ

Type : Vertical insulated tank

Duty : For storage of Rinse milk

Agitator : side mounted with gear box

Material : SS 304, 2.5 inner shell & 2.5 mm thickness of bottom shell and top, 2.0 mm thick outer cladding

Insulation : PUF of suitable thickness to ensure 1 Deg. C temp rise in 24 hours

Accessories : Level transmitter, RTD, CIP spray ball, air vent, manway sight glass, sampling cock, Level Switches, SS ladder, SS railing, SS platform etc.

**Note: Supplier shall submit GA drawing for approval before commencing the fabrication work in the event of placement of order.**

#### **10.5 Rinse Milk Transfer Pump with VFD & Magnetic Flow Meter**

Duty : For transfer of rinse milk from Storage tank to RMST and reconstitute section.

Capacity : As per BOQ

Qty : As per BOQ

Design : Stainless steel of grade AISI 304

All other Specification are same as per item no: 1.17

#### **10.6 Valve battery for rinse milk recovery system**

The valve battery shall be constructed on SS square box pipe with following, but not limited to features;

1. Incoming lines as per BOQ
2. Outgoing lines as per BOQ
3. Tank CIP return line
4. The SS support structure shall be used as air reservoir and all the flexible tapping for valves to be taken from it
5. Dedicated FR unit to be considered for valve battery
6. Internal cabling to be done for all the valves at factory and all the cables shall be terminated in SS junction box
7. SS tray for drain collection & SS pipe up to nearest drain

Note: the rinse milk for fermented product to be transferred to Curd setting tanks automatically.

#### **10.7 SS Pipes, Valves & Fitting for complete section**

Capacity : As per BOQ

Qty : As per BOQ

All other specification is same as per item no: 1.35

### **11. CIP Section**

#### **Conc. Lye & Acid Storage**

##### **11.1 Conc. Lye unloading pump**

Capacity : As per BOQ

Qty : As per BOQ

Duty : To unload the concentrated Lye from Lye tanker to conc. Acid storage tank

Type : Centrifugal

MOC : SS 316

All other specifications shall be as per item no 1.17

**11.2** Conc. Acid unloading pump

Capacity : As per BOQ

Qty : As per BOQ

Duty : To unload the concentrated Acid from Acid tanker to conc. Acid storage tank

Type : Centrifugal

MOC : SS 316

All other specifications shall be as per item no 1.17

**11.3** Concentrated Lye Storage tank

Capacity : As per BOQ

Qty : As per BOQ

Duty : To store the concentrated Acid

Type : Vertical, un-insulated

MOC : SS 316

Accessories : Sight & Light Glass, Lifting lug, Manhole (Top), SS ladder, SS platform, SS railing, Ball feet, Nozzles for instrument, outlet manual valve (SS 316) etc.

Instruments : Level Switches (Low & High), Level Transmitter

**All Lye handling pipeline, Valves (Diaphragm type) and accessories should be acid proof. All SS lines which is handling high concentrated acid (50% conc.) and Alkali (50% conc.) shall be selected based on above concentration level.**

**Note: Supplier shall submit GA drawing for approval before commencing the fabrication work in the event of placement of order.**

**11.4** Concentrated Acid Storage tank

Capacity : As per BOQ



Qty : As per BOQ  
Duty : To store the concentrated Acid  
Type : Vertical, un-insulated  
MOC : SS 316  
Accessories : Sight & Light Glass, Lifting lug, Manhole (Top), SS ladder, SS platform, SS railing, Ball feet, Nozzles for instrument, outlet manual valve (SS 316) etc.  
Instruments : Level Switches (Low & High), Level Transmitter

**All acid handling pipeline, Valves (Diaphragm type) and accessories should be acid proof. All SS lines which is handling high concentrated acid (50% conc.) and Alkali (50% conc.) shall be selected based on above concentration level.**

**Note: Supplier shall submit GA drawing for approval before commencing the fabrication work in the event of placement of order.**

#### **11.5 Acid & Lye Dosing system for process & fermented CIP**

##### **Acid Dosing Pump**

Capacity : As per BOQ  
Qty : As per BOQ  
Type : Diaphragm Type  
Duty : To Dose concentrated Acid Solution to service tank as per concentration desired based on CT reading

Pneumatic valve shall be used to transfer conc. Acid to either process CIP acid tank or fermented CIP acid tank

##### **Lye Dosing Pump**

Capacity : As per BOQ  
Qty : As per BOQ  
Type : Diaphragm Type  
Duty : To Dose Concentrated Lye Solution to service tank as per concentration desired based on CT reading

Pneumatic valve shall be used to transfer conc. Lye to either process CIP Lye tank or fermented CIP acid tank.

### **11.6 SS Platform for CIP Kitchen**

For Approach of conc. Acid top, the platform shall be made of SS 316 and railing should be provided. SS 316 dimple plate to be used for fabrication. SS ladder to be provided for approach.

### **11.7 Pneumatic Valve Battery for CIP forward & Return Circuit**

Capacity : As per BOQ

Qty : As per BOQ

The valve battery shall consist of:

1. CIP Forward lines as per BOQ for CIP Kitchen tanks
2. CIP Return line as per BOQ for CIP Kitchen tanks
3. SS square box pipe structure for all the valves
4. Complete Air distribution piping including FR unit
5. Internal Cabling for all valve up to Junction Box
6. SS Tray below valve cluster with common drain point

### **11.8 SS Pipes, valves & Fittings for complete section**

Capacity : As per BOQ

Qty : As per BOQ

All other specification is same as per item no: 1.35

### **Process CIP Kitchen**

#### **11.9 Lye Tank**

Capacity : As per BOQ

Qty : As per BOQ

Type : Vertical insulated

MOC : SS 304 2.5 mm & 3 mm thick inner shell & top, outer shell 2 mm thick

Insulation : 100 mm thick hot insulation of glass wool

Accessories : Sight glass, light glass, SS lifting lugs, Manhole, overflow pipe from inside, manual butterfly outlet valve, SS ladder, SS platform, SS railing, Nozzles for instruments, sample cock

Instruments &controls:

Level Switches (low, middle & high)  
Temperature Transmitter  
Conductivity transmitter  
Automatic soft water make up pneumatic butterfly valve

**Note: Supplier shall submit GA drawing for approval before commencing the fabrication work in the event of placement of order.**

#### **11.10 Acid Tank**

Capacity : As per BOQ

Qty : As per BOQ

Type : Vertical insulated

MOC : SS 304 2.5 mm & 3 mm thick inner shell & top, outer shell 2 mm thick

Insulation : 100 mm thick hot insulation of glass wool

Accessories : Sight glass, light glass, SS lifting lugs, Manhole, overflow pipe from inside, manual butterfly outlet valve, SS ladder, SS platform, SS railing, Nozzles for instruments, sample cock

Instruments &controls:

1. Level Switches (low, middle & high)
2. Temperature Transmitter
3. Conductivity transmitter
4. Automatic soft water make up pneumatic butterfly valve

**Note: Supplier shall submit GA drawing for approval before commencing the fabrication work in the event of placement of order.**

### 11.11 Hot Water Tank

Capacity : As per BOQ

Qty : As per BOQ

Type : Vertical insulated

MOC : SS 304 2.5 mm & 3 mm thick inner shell & top, outer shell 2 mm thick

Insulation : 100 mm thick hot insulation of glass wool

Accessories : Sight glass, light glass, SS lifting lugs, Manhole, overflow pipe from inside, manual butterfly outlet valve, SS ladder, SS platform, SS railing, Nozzles for instruments, sample cock

Instruments & controls:

1. Level Switches (low, middle & high)
2. Temperature Transmitter
3. Automatic soft water make up pneumatic butterfly valve

**Note: Supplier shall submit GA drawing for approval before commencing the fabrication work in the event of placement of order.**

### 11.12 Recuperation Tank

Capacity : As per BOQ

Qty : As per BOQ

Type : Vertical insulated

MOC : SS 304 2.5 mm & 3 mm thick inner shell & top, outer shell 2 mm thick

Insulation : 100 mm thick hot insulation of glass wool

Accessories : Sight glass, light glass, SS lifting lugs, Manhole, overflow pipe from inside, manual butterfly outlet valve, SS ladder, SS platform, SS railing, Nozzles for instruments, sample cock

Instruments &controls:

1. Level Switches (low, middle & high)
2. Temperature Transmitter
3. Automatic soft water make up pneumatic butterfly valve

### **11.13 Fresh Water tank**

Capacity : As per BOQ

Qty : As per BOQ

Type : Vertical uninsulated

MOC : SS 304 2.5 mm & 3 mm thick inner shell

Accessories : Sight glass, light glass, SS lifting lugs, Manhole, overflow pipe from inside, manual butterfly outlet valve, SS ladder, SS platform, SS railing, Nozzles for instruments, sample cock

Instruments &controls:

1. Level Switches (low, middle & high)
2. Automatic soft water make up pneumatic butterfly valve

### **11.14 Sterilization tank**

Capacity : As per BOQ

Qty : As per BOQ

Type : Vertical, cylindrical, insulated

MOC : 2.0 mm thick SS 304 inner shell and 2.0 mm thick outer cladding SS 304 in welded construction.

Insulation : Hot insulation as per relevant IS code

Accessories :

- a. SS ball feet
- b. Nozzles for high, low, and middle level
- c. Half openable top cover (Hinged)
- d. Automatic make up water butterfly valve

Instruments:

- a. High, Low & middle level switch

b. Temp. transmitter

**Note: Supplier shall submit GA drawing for approval before commencing the fabrication work in the event of placement of order.**

**11.15 Recirculation pump for lye & Acid**

Capacity : As per BOQ

Qty : As per BOQ

Duty : To circulate Ly & Acid during the preparation cycle

All other specifications are same per item no: 1.17

**11.16 CIP forward pump**

Capacity : As per BOQ

Qty : As per BOQ

Duty : For CIP forward flow to various circuit (VFD duty)

All other specifications are same per item no: 1.17

**11.17 CIP Heater (THE)**

Capacity : As per BOQ

Qty : As per BOQ

Type : Tubular

Media of heating : Hot Water

Temp rise : 20 Deg. C (minimum)

MOC : SS 304

Accessories : TT & Temp control loop, Supporting SS frame, In/out nozzles etc

**Note: Automatic Pumping trap to be consider for All THE**

**11.18 Duplex filter for CIP return line**

Capacity : As per BOQ

Qty : As per BOQ

MOC : SS 304

Type : Quick opening bucket type

Duty : To filter the CIP return solution

Accessories : inlet & outlet 3-way pneumatic seat valve (automatic)

**11.19 SS Platform for CIP Kitchen**

Capacity : As per BOQ

Qty : As per BOQ

MOC : SS 304

Chequered plate: SS 304

Support: SS 304

Railing : SS 304

Staircase : Step stair with SS step and SS railing

This shall be common platform for CIP kitchen as per Approved layout.

Supplier to submit the GA drawing of arrangement made and take approval from the purchaser in the vent of placement of order.

**11.20 Pneumatic Valve Battery for CIP forward & Return Circuit**

The valve battery shall be constructed on SS square box pipe with following, but not limited to features;

1. CIP Forward lines as per BOQ with provision for 1 more line in future
2. CIP Return line as per BOQ with provision for 1 more line in future
3. The SS support structure shall be used as air reservoir and all the flexible tapping for valves to be taken from it
4. Dedicated FR unit to be considered for valve battery
5. Internal cabling to be done for all the valves at factory and all the cables shall be terminated in SS junction box
6. SS tray for drain collection & SS pipe up to nearest drain

**11.21 SS Pipes, valves & Fittings for complete section**

Capacity : As per BOQ

Qty : As per BOQ

All other specification is same as per item no: 1.35

**Fermented CIP Kitchen**

**11.22 Lye Tank**

Capacity : As per BOQ

Qty : As per BOQ

All other specification are same as per item no: 11.09

**11.23 Acid Tank**

Capacity : As per BOQ

Qty : As per BOQ

All other specifications are same as per item no: 11.10

**11.24 Hot Water Tank**

Capacity : As per BOQ

Qty : As per BOQ



All other specifications are same as per item no: 11.11

**11.25      Recuperation Tank**

Capacity            : As per BOQ

Qty                    : As per BOQ

All other specifications are same as per item no: 11.12

**11.26      Sterilization tank**

Capacity            : As per BOQ

Qty                    : As per BOQ

All other specification are same as per item no: 11.13

**11.27      Recirculation pump for lye & Acid**

Capacity            : As per BOQ

Qty                    : As per BOQ

All other specification are same as per item no: 11.14

**11.28      CIP forward pump**

Capacity            : As per BOQ

Qty                    : As per BOQ

All other specification are same as per item no: 11.15

**11.29      CIP Heater (THE)**

Capacity            : As per BOQ

Qty                    : As per BOQ

All other specifications are same as per item no: 11.16

**11.30      Duplex filter for CIP return line**

Capacity            : As per BOQ

Qty : As per BOQ

All other specifications are same as per item no: 11.17

**11.31 SS Platform for CIP Kitchen**

Capacity : As per BOQ

Qty : As per BOQ

All other specification are same as per item no: 11.18

**11.32 Pneumatic Valve Battery for CIP forward & Return Circuit**

Capacity : As per BOQ

Qty : As per BOQ

All other specification are same as per item no: 11.19

**11.33 SS Pipes, valves & Fittings for complete section**

Capacity : As per BOQ

Qty : As per BOQ

All other specification is same as per item no: 1.35

**12. Automation & Instrumentation**

**12.1 Hybrid PLC system with power supply, CPU, IM, necessary hardware including Main PLC panel RIO panels, communication cables, etc for complete plant automation**

Qty : As per BOQ

Microprocessor based Distributed Control System (DCS) shall be used for centralized operation of the plant.

The DCS system offered shall have open architecture and shall use common engineering tool for operator station, automation system, communication system, engineering system and I/O. Sub systems are integrated together with standard &

proven networks with fully optimized & standard open protocols. All the components using led at a base.

Scalability: The offered system should be suitable for future expansion of Phase II. Here, CPU memory should be sufficient for future expansion.

Comprehensive self-diagnostic features shall be provided to facilitate easy fault location and detection of failure without individually checking each module. On-line testing facility of control system while the unit is in operation shall be provided with suitable indication for easy identification of faulty module.

The process / final control element interface section of DCS shall comprise of various signal interface cards suitable for digital communication with distributed I/O stations, local control panel, and other PLCs.

Sensors will be checked for open and short circuit conditions. Failure of sensor/transmitter shall not lead to malfunction of the corresponding control system as shown in the configuration diagram.

The entire Control & Instrumentation (C&I) system shall be designed, supplied, and commissioned to enable the operator to operate the Dairy in a safe, efficient, and reliable manner, without exceeding plant operational limit sand ensuring the overall performance guarantee conditions.

The C&I System shall be designed utilizing state-of-the-art technology to ensure:

- High degree of System avail ability and reliability
- Extensive diagnostic capability to pinpoint failure areas
- Low down time and high mean time between failures
- System flexibility and modular expansion capability
- Safety of the main equipment, system, and operating personnel
- Open connectivity using OPC (Client Server architecture)
- Hot swappable system modules

### **Control & Monitoring Philosophy**

The C&I Systems hall be configured to perform the following basic functions: -

- Start-up and shutdown of major equipment of the plant maintaining the operating conditions

- Regulation function for various valves to achieve guaranteed performance.

Acquisition, display and archiving of plant data and generation of reports.

The entire operation and monitoring under all regimes of operation i.e., start-up, normal operation, shutdown etc. shall be possible through operator's consoles in Control Room.

HMI (Human Machine Interface) panel shall be used for control & monitoring of milk reception activity and shall be connected to the main control network for interfacing with the main DCS system.

The Supplier is to supply the hardware and software for DCS.

The envisaged System configuration is as per the attached Appendix-2, however Supplier may come out with alternate system configuration.

The system shall support Client Server Architecture with Fiber Optics as a backbone. All the Personnel Computers (PC) shall have latest configuration at the time of ordering.

There shall be 2 PLC system (communicating with each other)

1. For LMP operations
2. For Ice Cream Plant operation

1. Main PLC panel & Ice Cream Plant PLC Panel in CRCA (Rittal or Elden)
2. Both above PLC CPU with 50% spare memory after full programming
3. Redundant power supply module for both PLCs
4. Remote I/o with 20% spares for Both system
5. Control room furniture with 9 chairs & Separate PC table for OS at packing area & Control room furniture with 4 chairs & separate OS for mix processing area with PC table

## **12.2 System software development including original licenses for development software, OS, ES software and programming back up**

### **Automation software**

Qty : 1 Lot

The system software will preferably be based on open architecture and shall support minimum 32-bit processing platform. For networking TCP/IP or ISO-OSI model will be in use. It shall be latest object-oriented software, which result in fully saleable system. Original license version of the latest release of software shall be used.

## **Other Software**

Latest windows operating system license version (lifetime) & Latest MS office (lifetime license) to be considered in the scope for all the PCs. Other software like Acrobat PDF, antivirus etc to be included for each PC with original license

In addition to above, any other software required for selected PLC to be considered in the scope.

Following, but not limited to area to be considered for automatic operation;

1. Milk reception in tanker & can, storage, transfer & its CIP
2. Milk processing, standardization, transfer, storage and its CIP
3. Raw cream transfer, storage, processing, transfer to past. cream storage tank, storage, distribution and its CIP to be considered
4. Sweet butter milk transfer, storage & CIP
5. Reconstitute section
6. Rinse milk recovery section
7. HMST area Pouch packing section
8. Curd processing & packing
9. HMST & Butter milk processing & packing
10. Lassi processing & packing
11. CIP kitchen for milk
12. Fermented CIP kitchen
13. Boiler (Standalone PLC)
14. Refrigeration (standalone PLC for plant and standalone PLC for individual compressors)
15. Air Compressors (standalone PLC)
16. Water treatment & Hydro flow system (standalone PLC)
17. Homogenizer (standalone PLC)
18. Milk Separator & online standardiser (standalone PLC)
19. Bactofudge (Standalone PLC)
20. Any other PLC as per the OEM

Locally controlled area are;

1. Paneer processing & packing (Milk transfer & line CIP to vat is automatic)
2. White butter and Ghee processing & Packing

In addition to above, Ice cream plant shall have separate PLC and Scada System for fully automatic operation which shall be communicate with the main plant PLC.

MIS data transmission for all above PLC to main PLC to be consider in the scope. All the software and hardware required to be considered in the scope.

**12.3 Engineering Station + Operator Station with 29" LED Monitor with Latest Industrial grade PC configuration at the time of ordering. (2 OS + 1 ES out of which 1 OS with dual monitor)**

Qty : As per BOQ

Capacity : As per BOQ

The scope shall include but not limited to the following;

1. Server grade PC with I7/11<sup>th</sup> Generation or higher/ 16 GB RAM/4 GB graphic memory / 512 GB SSD & 1 TB HDD with 32" LED monitor for OS with 2 LAN port. One OS shall have dual monitor facility for ease of operation
2. Server grade PC with I7/11<sup>th</sup> Generation or higher / 16 GB RAM/ 4 GB graphic memory / 512 GB SSD & 1 TB HDD with 32" LED monitor for ES with 2 LAN port.

**12.4 Networking Hardware including Communication bus cable, power cable, control cable, RIO panel cable, router, modem for internet connectivity, FO cable & Accessories**

Qty :1 Lot

The scope shall include but not limited to the following;

- 1.Dedicated IMs to for Digital communication with all remote i/o panels with ring topology
- 2.Communication Digital bus to connect all remote i/o panel to main PLC
- 3.SS 304 construction remote I/o panel with power supply and ring Topology to connect with main PLC/DCS
- 4.Router & modem for internet connectivity for mobile based app for critical plant data sharing with management and plant status to key staff
- 5.Digital bus as per the latest available standard at the time of ordering
- 6.Networking switches to connect various PCs and MIS client & server, printers etc.
- 7.Repeater, bus connector and other misc. items for networking
- 8.Any other networking hardware deemed necessary for complete System

**12.5 SS Conduits & GI cable trays for instruments & Control cabling**

Qty : As per BOQ

Capacity : As per BOQ

Separate GI cable tray shall be used for automation. For all vertical drop SS conduits to be used for small bunch of cable where wall is not available.

**12.6 MIS system including MIS server, MIS clients (7 Nos. for various section), MIS networking hardware, Software development and software licenses including software backup**

Capacity : As per BOQ

Qty : As per BOQ

This shall be a tailor-made software solution with backbone of SQL server-based data fetching & storage directly from the plant PLC/ES/OS.

The MIS server shall be industrial grade server with raid 5 configuration and latest windows server edition and all other licensed software necessary for MIS programming and report generation. MIS client PCs shall be industrial grade PC with 16 GB memory and

This shall be based on software of open architecture/protocol. Following minimum reports are envisaged from the system. Necessary forms to develop on the networked PC's for entering the data. All the reports shall be developed after the discussion with the Purchaser/Project Authority. However, following minimum reports are to be considered for development.

- Milk Analysis report
- Milk Storage report.
- Utility consumption report
- CIP log report.
- Solid Loss to ETP report.
- Utility status & consumption report
- Steam/air generation & consumption
- Power consumption (section wise)
- Water (raw & soft) consumption report
- CIP chemicals consumption.
- Maintenance Report.
- Lab reports.

- Inventory report of the plant
- Any other report as per dairy requirement during detailing

**12.7 Network Printer for ES + OS & MIS (1 A3 colour laser + 4 A4 B/W Laser)**

Capacity : As per BOQ

Qty : As per BOQ

The scope shall include;

1. A3 printer color laser printer for MIS report printing
2. A4 black & white printer for OS data printing & MIS client printing & other duties

**12.8 UPS system for Complete Automation system for plant**

Qty : As per BOQ

For applications requiring AC power, 240 V AC, 50 Hz uninterrupted power supply shall be made available by Supplier from UPS complete with voltage and frequency regulators, static bypass switch & a servo stabilizer. Necessary filters should be considered to protect the system from harmonics, which may be generated in the UPS.

The 10 KVA (min. for each) True Online UPS power supply should be considered for DCS power supply. However, the Supplier shall be responsible to select the suitable rating of the UPS as per requirement of the system. On total failure of the incoming A.C. supply to the plant, sufficient battery back-up has been envisaged to allow all control and instrumentation system including valve actuation power to operate for at least 30 minutes to allow safe shutdown of the plant.

12 / 24 V DC power supply shall be used wherever applicable for Control System and will be derived from UPS. Any other voltage level required for the system shall be the responsibility of the Supplier along with all required hardware.

DC voltage system for Main CPU & all I/O stations/panels shall be with dual channel & kept separate for different step downs as per requirement. Each field I/O stations shall have separate voltage step down/standard power converter module system from 220V AC to dual channel 12/24 V DC to meet the requirement.

**12.9 Control & PLC Earthing for complete plant (Separate from power earthing)**

Qty : As per BOQ



This shall be special earthing for entire instrumentation and automation system. It is preferred to have copper earthing with less than 0.5-ohm resistance for individual/nearest group of PLCs.

Separate earthing (Chemical type) of all instruments to be considered in the scope.

Supplier needs to submit the earthing scheme before commencing the work in the event of placement of order. Civil work for the same shall be carried out by purchaser.

## **INSTRUMENTATION**

Supplier to consider following but not limited to the instrument for complete plant automation requirement. All process instrument and pneumatic valves shall have 4-20 mA connectivity. This will override smart instrument written elsewhere in the tender. Instruments and valve shall be terminated to nearest RIO panel.

### **Instrumentation**

Supplier to consider following but not limited to the instrument for complete plant automation requirement. All process instrument and pneumatic valves shall have 4-20 mA connectivity. This will override smart instrument written elsewhere in the tender. Instruments and valve shall be terminated to nearest RIO panel.

#### **12.10 Level Switches**

Quantity : 1 Lot

level switches for pressure, differential pressure, temperature, level etc. shall be blind type and shall be suitable for 24 dc switching. OEM shall supply adaptor for the level switches

Set points shall be adjustable throughout the range. Switching differential shall be adjustable.

#### **12.11 Pressure Transmitters**

Quantity : 1 Lot

All the Pressure Transmitters will be connected to PLC RIO panel through Hard wired communication (4-20 mA, 24 V DC) through local junction box. Transmitters shall be provided with integrated Local Digital Indicator.

Measuring ranges of transmitters shall be selected in such a way that the rated value of the measuring variables appears at approx. 50-70% of the span.

The sensing elements and internal parts shall be constructed with AISI 316. In case of stock and corrosive fluid application, diaphragm seal type transmitter with capillary is foreseen.

Transmitters shall be installed on Instrument Stands made of 2" SS pipes located at convenient points if required as per detailed engineering.

#### **12.12 Flow Switches**

Quantity : 1 Lot

Flow switch with sensitivity adjustment and OEM supplied adaptor to be supplied as per process requirement.

#### **12.13 Temp. Transmitter with sensor**

Quantity : 1 Lot

All Temperature Sensors Elements shall be of Duplex type with SS 316 sheath and MgO filled. Depending on temperature ranges, Pt-100 Resistance Temperature Detector (RTD) or thermocouple shall be used

Thermocouple / RTD heads, with chain holder, shall be of the waterproof type, with duplex terminal block, gasketed cover and stainless-steel chain. Screwed covers shall be used.

The Temp. transmitter shall be head mounted and will be connected to PLC RIO panel through Hard wired communication (4-20 mA, 24 V DC) through local junction box. Transmitters shall be provided with Local Digital Indicator for following area.

1. All raw & past milk storage tank, SMST
2. Milk Cream and Curd milk pasteurizer

Measuring ranges of transmitters shall be selected in such a way that the rated value of the measuring variables appears at approx. 50-70% of the span.

#### **12.14 Magnetic Flow meters**

Quantity : 1 Lot

Magnetic flow meters shall be considered with Hard wired communication (4-20 mA, 24 V DC) through local junction box to PLC RIO panel. The flow tube material shall be of AISI 304 with PTFE lining. The electrode material shall be either SS 316L or Hastelloy depending upon process condition. In general, SMS type process connection may be used for magnetic flow meters.

Accuracy of magnetic flow meter shall be plus or minus 0.5% of flow rate or better.

Local digital flow rate as well as totalizer display shall be provided.

Earth ring of SS 316 shall be provided for proper grounding of mag flow meter.

### **12.15 Mass Flow Meters**

Quantity : 1 Lot

The Mass flow meter envisaged shall be Coriolis Curved tube type. The Mass flow meter shall be capable of measuring mass flow rate, density, temperature, volumetric flow rate and totalized flow. Integrated local display to be considered

Mass flow meters shall be with Hard wired communication ( 4-20 mA, 24 V DC ) through local junction box to PLC RIO panel. The flow tube / wetted parts material shall be SS 316 / SS 316L or as per the requirement of process fluid. SMS type process connection may be used for mass flow meters.

Accuracy of Mass flow meter shall be plus or minus 0.2% of flow rate or better.

### **12.16 Control valves 2 way & 3 Way**

Quantity : 1 Lot

Pneumatic control valves complete with 4-20 mA output electro- pneumatic positioners to be considered with sanitary design for process

The control valve sizing shall be done in such a way that the calculated noise level at worst operating condition shall not be more than 85 dBA at 1 m distance.

Valve trim material shall be harder than, but compatible with, the pipe in which it is installed.

All control valves shall have sufficient overload range. At maximum operation, the control valves shall be at 75-80% open. Valve bodies shall be no more than two (2) line sizes smaller than the pipe in which they are installed.

Leakage class ANSI IV

All control valves stroke/throughput characteristic shall, dependent on the purpose. The valve stems shall be well guided, and the valves shall operate without excessive vibration and noise. The above shall achieve a stable fluid control over the entire flow range. Control valve design and location shall consider flashing and cavitation conditions.

In case of failure of electric or pneumatic supply or in case of failure of the controller output signal, the actuators shall remain locked in actual position or shall reach a safe position, depending on the process requirement

#### **12.17 Level Transmitters**

Quantity : 1 Lot

Flange mounted diaphragm seal type level transmitters shall be used for level measurement on tanks. The wetted parts shall be of SS 316 or suitable material to suit process fluid. The process connection with the tank / vessel shall be 3" flanged.

For clean liquid, water, condensate service etc. (other than milk applications) normal differential pressure type level transmitters shall be used.

Level gauges shall be of the reflex / transparent / tubular type as per the application area and made of stainless steel and fitted with toughened borosilicate glass Each gauge shall be fitted with top and bottom-isolating valves with full bore drain valve at the bottom and plugged vent at the top. Flanged connections, rated same as the vessel, shall be used. Gauges shall be arranged so that the visible length is in excess of the maximum operating range.

Displacement / float type instruments and switches shall be mounted in external cages with flanged connections, rating same as the vessel. This type of instrument shall not be used for applications involving viscous, corrosive or flashing liquids. The cage material shall be carbon steel in accordance with vessel material and the float shall be of 316 SS. Drain and vent shall be provided on the cage.

Local display and 4-20 mA connectivity to be considered for all Level transmitted.

#### **12.18 Conductivity Transmitter**

Quantity : 1 Lot

The conductivity analyzer may be installed on-line or at a distance connected by sampling line. The necessary mounting of analyzer electronic unit shall be taken care suitably. The process connection shall be SMS type.

The conductivity analyzer shall be microprocessor based. The electrode and cell material shall be of SS 316.

Automatic temperature compensation shall be provided with the analyzer. The meter shall have 4-20 mA output

Special cable for connection between electrode and transmitter to be considered in the scope

Transmitter display shall be remote type for safety and ease of reading.

#### **12.19 Manual gauges for temp, pressure etc.**

Manual Temp & pressure gauge with or local indication on all utility lines. Pressure gauge sensing element shall be Bourdon / Bellow / Diaphragm type in general depending upon the process condition. Direct reading Pressure / Differential Pressure gauges shall be used of SS 316 sensing element and AISI 304 movement material.

All accessories, such as 2-valve manifold etc. shall be provided with pressure gauges according to application. Where process temperature exceeds 70 C, siphon loops shall be utilized.

Local temperature measurement shall be done bi-metal Temperature gauges. Temperature gauges may be direct mounted type (multi-angle) or with SS capillary extension (at least 3 Mtrs) as per the application area.

The sensing element / bulb / capillary etc. shall be of SS 316 for temperature gauges.

#### **12.20 SS pneumatic valves (2 way/3 Way / Butterfly) for complete plant**

Qty : 1 Lot

Type : Pneumatically operated sanitary valves of mix-proof double seat type with independent seat lifting facility for CIP

Application : The Mix proof and single Seat Valves shall be provided for all valve batteries to ensure mixing free simultaneous product and CIP operation and flexibility in operation.

Material : AISI 316

Gaskets : EPDM

Features : Housing should be ball shaped for the ideal flow characteristics to ensure 100% clean ability by CIP. Housing closed by cover plates should not create a sump or dead corners. The seals such as housing seals, stem seals and disc seals shall be flush mounted.

Position Sensing : separate on and off proximity switches for open and close feedback

Signalling : All the pneumatic valve shall have 4-20 mA signalling

### 13. Steam Generation & Distribution

#### 13.1 Solid Fuel Fired Boiler with All standard Accessories, maintenance platform, economizer, APH PLC based control system with O2 trimming & Boiler management system, Chimney, RO plant with dosing system for boiler feed water etc.

Capacity : As per BOQ  
Pressure : 10.5 Kg  
Fuel : Bricket/Coal

#### STEAM BOILER PARAMETERS;

Quantity : As per BOQ

Capacity : As per BOQ (F&A 100°C) Net outputs. Net steam Output without de-aerator steam and blow down Loss.

Code for Design : IBR 1950 with latest amendments

MOC in Shell & man hole : SA 515/516 Gr70 - IS202 Gr 2

Type : Water cum Smoke Tube, Solid fuel Hybrid design

MOC of Tube : BS 3059 Part I, Gr. 320ERW Conventional Tube

thickness / Stay tube thickness : 3.66 mm

Outlet Steam condition and Quality : Saturated for dryness fraction of 0.98

Combustion : Chain Grate/Moving Grate along with mechanical Spreader or Screw feeder

Cooling of Grate : Air cooled or water cooled

Mode of Firing : Auto Firing

Flue Gas temperature : To be provided by bidder not more than 160 Deg C.

Efficiency parameters : On GCV/NCV to be submitted on below mentioned Load conditions

**Steam pressure**

- At main Steam Valve : 10.5 kg/cm<sup>2</sup>(g)
- Boiler SVLOP : 12.5 Kg/cm<sup>2</sup>(g)

**LOAD CONDITIONS for Design, Modulation& Efficiency Guarantees:** The boiler should be able to deliver steam without going into on-off mode for following loads.

- 100% -
- 75%
- 50%

**EFFICIENCY PARAMETERS:**

Supplier to confirm and guarantee efficiency at following loads:

- 100%
- 75%
- 50%

**O<sub>2</sub>% Expected for following loads:** Supplier to confirm O<sub>2</sub> values at following load conditions.

- 100%
- 75%
- 50%

**QUALITY OF RAW WATER:**

pH :  
Conductivity :  
Hardness :  
Oil content : BIDDER TO GET RAW WATER QUALITY DATA  
Oxygen : FROM SITE BEFORE BIDDING. FEED WATER  
Bound CO<sub>2</sub> : QUALITY TO BE PROVIDED BY THE BIDDER.  
TDS :

**FUEL:**

- Primary fuels: Briquettes and Biomass Pettets.  
Calorific value : 3500 kcal/kg.  
Nominal moisture : 10 %  
Ash softening point : > 1250 C  
Size : Coarse (>1 mm) > 85 % and Fines (< 1 mm) < 15 %.  
8 mm to 12 mm.
- Secondary fuel: imported coal.  
Calorific value : 4500 kcal/kg.

Nominal moisture	: 15 %
Ash softening point	: > 1300 C
Volatiles	: > 25 %
Size	: Coarse (>10 mm) > 65 %, 1 to 10 mm > 20 % and Fines (< 1 mm) < 15 8 mm to 12 mm.

#### **DESIGN REQUIREMENTS:**

The main boiler should be a **combined water tube - fire tube steam boiler** type, consists of these major components:

1. A **furnace**
2. A large water tube **radiation part**,
3. A **convection part** with horizontal fire tube bundle
4. An **air pre heater**.

The water tube radiation part should be connected to the convection part on the waterside with down-comers and with riser tubes on the steam side.

#### **A. THE FURNACE**

The furnace should be completely integrated in the boiler: the sidewalls and the roof of the furnace should be completely cooled by the membrane walls of the boiler. The furnace should be built of refractory wall construction or the membrane walls of the furnace should be partially covered by refractory wherever exposed to flame directly. The amount of the concrete should be however restricted to a minimum in order to minimize the investment and the maintenance costs and to maximize boiler availability. The design of furnace into the boiler should be such as to control the combustion temperature and furthermore it should reduce excessive slugging of the ashes on the sidewalls of the furnace. The boiler should be extremely efficient for the combustion of fuels with varying heating values and fuels characterized by low ash fusion temperatures. A door should be mounted into the rear wall of the furnace and ensure that the boiler is easily accessible. An adequate inspection glass mounted in the rear wall gives an inside view of the combustion process in the furnace.

#### **B. THE RADIATION PART**

Membrane tube screens should be provided to enclose the furnace. Secondary air should be injected at a high velocity at the inlet of first empty pass to stimulate the burning out of the flue gases. The drop in temperature in the radiation zone should be lower than the ash fusion temperature. This in order to lower the risk of ash fusion in the fire tubes of the convection part. Accessibility should be assured through a manhole in the water tube screen. The boiler should have huge quantity of boiling water as it serves as the potential energy and the source of constant pressure.

#### **C. THE BOILER DRUM**



The flue gases should be cooled down rapidly in the fire tubes where they are by convection. The fire tube part should be executed as a single pass or two pass heat-exchanger. The large water content should be provided in the convection drum, with a large evaporation surface along with a modulating feed water control (Single Element Drum Level Controller) which shall ensure in a quick response when the steam production shows a peak load. The voluminous drum should be provided to ensure dry steam without complicated or expensive secondary measures as steam dryers. The flue gas velocities should be optimal chosen to reduce the fouling of the fire tubes. Accessibility should be assured through a door(s) the cleaning doors on the smoke box at the end of the drum.

#### **D. THE AIR PRE HEATER**

Air pre heater should be provided to ensure further cooling down of the flue gases and recovery of balance heat. The APH should be smock tube type designed with inlet ambient air at 30°C and recover heat up to 70°C. The flue gas outlet temperature from the APH shall be reduced to 160 °C at full load operation In order to maintain the same within the limiting temperature range of bag filter.

#### **E. COMBUSTION EQUIPMENT**

##### **Chain Grate / Moving Grate**

The combustion equipment should be in the form of a moving grate consisting of an effective air distribution system circulating the cooling air through the steps and the grate bars. The primary air should be regulated across the grate to achieve optimal conditions for combustion without reducing the cooling of the grate. The grate bars are constructed out of high heat resistant Cast Iron Material to ensure extended grate life. The chromium percentage in the grate should be minimum 17 to 19%. The grate should be designed to achieve a minimum online turndown of 40% to 100%. **Supplier to guarantee a maximum drop in efficiency to the tune of 3.5% at lowest operating loads conditions.**

The grate should be cautiously designed to ensure smooth transition of fuel in a progressive manner from one point to another. The grate should be divided into four zones and frequency and speed for each zone should be controlled independently. The incoming fuel at the top-charging end must therefore be mechanically moved to the lower de-ashing end. The drive for the carriage should be through a hydraulic cylinder pack or compressed air or electrically motorized. The drive system should be isolated from the combustion heat through a suitable mechanism. The speed / stroke length and stroke velocity of the cylinders should vary with respect to the load on the boiler. The frequency and speed of the grate should be modulated with respect to the load on the boiler. The moving grates should assure the progression of the fuel on the grates and a controlled residence time for good burnout of the fuel.

**Combustion equipment should consist of:**

**Inclined / Horizontal moving grate incorporated in the furnace of the boiler with:**

- Sidewalls of the grate in refractory concrete
- Cast iron grate bars with high chrome content
- Fuel pushing device in sectional steel with hydraulic actuators

#### **Hydraulic OR mechanical group**

- Oil reservoir, filter, oil level gauge, manometer, thermostat, level switch, de-aerator, return filter
- Plunger pump
- Directional valve with electronic regulation unit for each grate section and pusher, on-off valve for the last grate section and feed doors
- Supporting frame
- Hydraulic piping between group and cylinders

#### **Steel frame with sectional casings**

##### **One Set Primary air circuit**

- Primary air fan
- Distribution of primary air.
- Manually operated dampers for the different primary air zones.

##### **One Set Secondary air circuit**

- Secondary air fan
- Distribution of secondary air.
- Manually operated dampers for the different sections and for the total airflow

##### **One Set Insulation with rock wool and cladding**

#### **Fuel feeding system**

- Feedings system consisting of screw / rotary feeder, VFD& service hopper. (Feeding System to be suitable for all fuels above – 100% firing capacity. Fully automatic capacity control to be incorporated up to a load of 30%.

**Note: The feeding system should be of multiple / single designed such that it requires no removal / fittings / alterations while change of fuel. The feeding system should be able to adapt to the various fuels on as it is basis. The change of fuels should be done manually.**

#### **AIR CONTROL**

- The flow of primary air should be regulated by independent manually dampers.
- The flow of secondary air should be regulated by independent manually dampers.
- The ID fan should be controlled based on steam pressure

#### **ANCILLARIES**

- Two Centrifugal feed water pump assembly with motor (1 working + 1 Standby) to feed water to feed water tank to boilers shell.
- One Induced draught fan with motor and base frame
- Primary and Secondary air fans

#### **PIPING WORK**

- One set IBR piping between feed water pump/s and boiler.

#### **MOUNTING AND FITTINGS**

##### **IBR APPROVED**

- Stop valves on feed water discharge line
- Non return valves on feed water discharge line
- One Main steam stop valve
- One blow down system (manual Blow down control system)
- Two Single port spring loaded safety valves
- One Air vent valve
- One Isolating valve for pressure gauge (steam)
- Two Gauge glasses with shields
- Two Membrane panel blow down valve
- One Main shell blow down valve
- One Drain valve for level controller
- One Isolating Valve for inspection gauge
- One Isolating valve for pressure gauge (Water)
- Single Element Drum Level Controller.

#### **FUEL CONVEYING & HANDLING SYSTEM**

The fuel needs to be conveyed from the yard (Loading Point) to the coal Crusher or a fuel processing Machine and from the Fuel Processing to crusher. The fuel will then be conveyed from the crushed storage bunker to the fuel feeding system on the boiler. Supplier to design a suitable fuel conveying system and storage hopper as per their design requirement. The entire conveyer will be a standard type arrangement to avoid any dust in the surrounding environment.

#### **DE-ASHING SYSTEM**

A de-ashing system all points – Bed Ash, Bag-filter, APH, MDC etc should be provided. Bed ash should be removed with the help of water jacketed screw conveyor and removal should be automatic and continuous. Continuous ash removal should also be provided at other ash discharge points also.

#### **AIR POLLUTION CONTROL EQUIPMENT**

### **BAG FILTER (PULSE-JET TYPE)**

The dusty flue gas coming out of the Boiler should be routed through the Bag filter before they pass to the chimney. The maximum temperature withstanding capacity of the nomex / ryton bags is 190 Deg.C. In case the flue gas temperatures rise below 170 Deg. C. the RTD based pneumatically operated control valve will bypass the flue gases through the Mechanical Dust Collector.

**The outlet emission from bag filter should be < 100 mg/nm<sup>3</sup>**

### **MECHANICAL DUST COLLECTOR**

MDC should consist of:

Collection Tube  
Outlet or Discharge tube  
Inlet Guide Vanes  
Dust Discharge Boot

The dust laden flue gases enter the MDC and then inside the collection tube. At the entry of the collection tubes the inlet guide vanes guide the path of the gases.

### **SINGLE ELEMENT DRUM LEVEL CONTROL SYSTEM**

The feed water level should be controlled through a Mobrey or process variable (PV) coming from the drum level transmitter. This signal is compared to a set point and the difference is a deviation value. This signal is acted upon by the controller which generates corrective action in the form of a proportional output. The output is then passed to the boiler feed water valve, which then adjusts the level of feed water flow into the boiler drum

The single Element Drum Level Control System consists of the following:

- Isolation valve – 2 Nos for each system

### **BOILER AUXILIARIES**

#### **1. Refractory - 1 Lot**

- Supply of Refractory – Castable refractory to be used as per standard specifications required for lining complete furnace. No brick refractory to be used.
- Application of the Refractory at site shall be a part of supplier scope.

#### **2. Piping- 1 Lot**

- Feed Water Piping from Tank to Boiler Feed Water Pumps.
- All hardware like bends, flange, gasket etc as required.
- Complete set of isolation and non return valves required in the feed line.

- Drain Piping from Water Wall, shell & boiler, level gauge etc.
- Safety Valve Exhaust Piping from Safety Valves up to the Boiler House Outlet.
- Air Vent Piping from auxiliary valve up to boiler house outlet.
- Blow down Piping from Blow down Valve to the Blow down Pit.

### 3. Ducting- 1 Lot

- Combustion Air Ducting from FD fan to Primary & Secondary Air Chambers.
- Flue Gas Ducting from Boiler to APH. APH to Mechanical Dust Collector and Mechanical Dust Collector to bag filter to ID fan.
- Ducting from ID Fan to Chimney.

### 4. RO Water plant- 1 Lot

RO plant	: Output of 5000 Lts/Hr.
RO Plant Configuration	: 80% generation (20% Rejection)
Raw Water quality	: To be checked by bidder at site.
Feed pump for RO Plant	: Suitable capacity – 1+1 Nos
Source of Water	: soft water Tank
Destination of RO Water	: Boiler Feed water tank

**Details to the RO Plant along with thruput required, P&ID and membrane details to be included in the offer.**

### 5. Feed Water Tank- 1 No. – 5 KL Capacity

#### **Feed Water Tank – MOC SS 202**

Inclusive of

- Nozzles
- Inlet & Outlet Valves
- Level Gauge Tank.

### 6. Support Structure & Platform- 1 Lot

Support Structure made out of standard rolled channels and beams are provided where-ever required and necessary.

### 7. Electrical & Control Cables with Control Panel- 1 Lot

Complete supply cabling from panel to field drive motors and control cables from panel to field instruments shall be provided

- Cabling from PCC to Boiler MCC/Panel
- Cabling from Control Panel to Boiler Mounted Instruments
- Cabling from Control Panel to FD Fan
- Cabling from Control panel to all rotary or ancillary drives in supplier scope.
- Cabling from Control panel to ID Fan

## **8. Fuel Feeding Hopper- 1 Lot**

- Fuel Feeding Hopper made up of IS 2062 Material with Chute for fuel feeding

The hopper shall be sized suitably to hold the fuel required for firing and provided with suitable stiffeners for strengthening

## **9. CONTROL AND SAFETY EQUIPMENT- 1 Lot**

All the legal safety measures should be taken with regard to pressure, water level and flue gas temperature. In the scope of supply you can find the complete list of the control and safety equipment. The following control logic should be incorporated.

### **Fuel Circuit**

- The fuel in the hopper should be regulated manually and the fuel conveyer should be stopped and started based level of fuel in the hopper.

### **Fuel Flow& Air Control**

#### **Coarse Control**

- The fuel feeding system controlled through VFD with an interlock based on the load on the boiler. PA motorized dampers, Secondary air motorized dampers and the quantity of fuel.
- All primary air and secondary air motors damper motors should be controlled through the manually with respect to the load fluctuations on the boilers up to 40% of the rated capacity.

### **Safety Interlocks**

- Pressure Range for furnace pressure control. In case of positive pressure PA & SA Fan Trip.
- Pressure Switch in Drum – Boiler Trip in case of high pressure
- Mobrey level Control for extra low water level in drum – Boiler Trip
- Outlet stack Temperature of Boiler High (> 170 Deg.C) .

### **Auxiliary Controls for Boiler House Equipments**

#### **Fuel Circuit**

- Crushed Fuel Storage Hopper Full – Crusher & Conveyer Stop manually.
- Crushed Fuel Storage Hopper Empty – Crusher & Conveyer Start manually.

## Feed Water Tank

- Feed Water Tank water low – Transfer Pump Start
- Feed Water Tank water level High – Solenoid Valve Close / Transfer Pump Stop.

### Scope of supply

#### **CONTROL AND SAFETY EQUIPMENT**

- 1 Pc. pressure switch for steam pressure high
- 1 Pc. Safety pressure switch
- 1 Pc. Low water level protection
- 1 Pc. Low water level protection with float
- 1 Pc. High water level protection with float
- 2 Pc. Water level gauges
- 2 Pc. Safety valves
- 1 Pc. Flue gas temperature control with digital display (for incorporation in the control panel)

#### **Control panel, PLC including control.**

A Programmable Logical Controller (PLC,) controls the process. The PLC should be mounted on a durable control panel. The visualization system should give the operator a quick overview of the major process values of the installation. Furthermore, it should allow showing the text-based alarm messages. Experienced programmers who have an in-depth knowledge of the process program the PLC. Before shipment, the control system should be completely tested in order to have a trouble-free start-up on site. The combination of all these aspects results in a stable and reliable control system. The control system has the following major functions:

- Continuous **alarm feedback at abnormal condition.**

### Scope of supply

#### **A. Power section:**

- 1 Set Main switch and further for each motor:
  - Incl. A manual selection switch
  - Incl. An indicator lamp
  - Incl. A motor contactor (or star-delta for motor exceeding 18 kW)
  - Incl. The required motor rated fuses
  - Incl. An automatic thermal overload switch (for protection against abnormally high current)

**B. Regulation and safety equipment:**

1 Set The regulation and control of the installation is assured by a PLC.  
Incl. The control panel includes all regulation and safety equipment:  
Incl. Water level controller (1 point control)

**13.2 Automatic PID based PRS with PT and I/P converter for 10.5 -3.5 Bar duty with isolation, bypass and Steam trap**

Capacity : As per BOQ

Qty : As per BOQ

Type : PID & PT based PRS

Pressure : 10.5 to 3.5 Bar

Accessories : Inlet & outlet isolation manual glandless type valve, Bypass valve, steam trap , safety valve and other accessories as per OEM

**13.3 Steam pipes, valves & Fittings for complete plant (HP & LP) with insulation**

Capacity : As per BOQ

Qty : As per BOQ

HP piping & its insulation shall be as IBR.

For LP steam piping MS 'C' class pipes (ERW) IS 1239/3601/4736 shall be used. Insulation of glass wool (min 50 mm) with 22 Gauge aluminum cladding to be considered in the scope.

**13.4 Condensate pipes, valves & Fittings for complete plant with insulation including min. 7 nos. of condensate transfer pumps**

Capacity : As per BOQ

Qty : As per BOQ

MOC : MS "C" Class



There shall be complete condensate collection system from individual/group of consumption points in the plant to boiler feed tank

Following minimum area condensate to be collected through Automatic condensate pumping trap;

1. All Pasteurizer and heater in process hall – no condensate is allowed to be drained in process hall
2. Processing CIP kitchen – 4 circuits
3. Fermented CIP kitchen -2 circuits
4. Ice cream plant CIP kitchen – 3 circuits
5. Ice cream pasteurizer and THE for heating in mix preparation area
6. Paneer milk heater at first floor

All condensate line shall be insulated inside and outside with hot insulation of min 50 mm insulation and 22 Gauge aluminum cladding.

### **13.5 Steam Water Mixing battery with pressure gun for various location of the plant**

Capacity : As per BOQ

Qty : As per BOQ

This shall be used for floor cleaning with 1/2 "steam line and 1" raw water line with isolation valve for both.

There shall be mixing chamber and manual regulator in mixing battery.

10-meter hot water resistance flexible hose with pressure gun to be considered for each mixing battery with SS stand.

## **14. Refrigeration Section**

### **14.1 Ammonia based Refrigeration system with screw compressor (1W+1S) for milk & milk product plant with economizer, Ammonia Receiver (1+1), Accumulator, PHE type condenser, PLC based control system, VFD for compressor etc.**

Qty : As per BOQ

Capacity : As per BOQ

The proposed system shall comprise of;

Compressor	: Ammonia based screw compressor with economizer
Suction temp	: -5 Deg. C
Condensing temp	: +36 Deg. C
Condenser & Chiller	: PHE type
Oil Cooling	: Water Cooled
Duty	: To generate chilled water at 0.5 Deg. C with 50% load on IBT and 50% load on PHE chiller

The brief specification of the proposed system is follows;

1. Screw Compressor
  - a. Capacity : As per BOQ
  - b. Type : Single stage with twin helical screw design suitable for ammonia with economizer
  - c. Rpm : 2950 or as per OEM design
  - d. Accessories :
    - a) Suction & Discharge line stop valves
    - b) Suction & discharge line check valve
    - c) Suction scale trap with strainer
    - d) Horizontal oil separator with coalescer filter
    - e) Bye-pass arrangement
    - f) Oil level switch in oil reservoir
    - g) Electric heater with thermostat in oil separator
    - h) Pre-lube oil system with oil pump.
    - i) Dual Oil filters
    - j) Step less automatic capacity control system
    - k) Unloaded starting
    - l) Dual Safety Valve
    - m) Compressor motor coupling and guard

- n) Shell & Tube type water cooled oil cooler fitted with inlet / outlet connections, valves & fittings
- o) Flooded type horizontal Shell & Tube economizer each fitted with the following controls/accessories.
  - 1. Solenoid Valve with Strainer and isolating valve.
- p) VFD starter for each compressor
- q) PLC control for each compressor with touch screen OP
- r) Motors for above compressor, TEFC with 415 volts, 3 phases, 50 Hz, AC supply, 2950 rpm with slide rails for compressor
- s) Oil charging system for screw compressor
- t) Chain pulley block with I beam for removal of motor and compressor for maintenance

## 2. PHE Condenser

Capacity : To meet the above compressor capacity with 20% safety

Type : Ammonia plate heat exchanger

MOC : SS 316

Water in Temp. : 32 Deg. C

Water out Temp.: 36 Deg. C

Ammonia Temp. : 40 Deg. C

Note : CIP system for ammonia condenser, skid mounted with 50 L tank and SS 304 pump with flexible acid proof hose to be considered in the scope

## 3. Ammonia receiver

Capacity : As per OEM design with 100% radiography

Qty : As per OEM design

Following but not limited to accessories to be considered for Ammonia receiver;

1. liquid inlet and outlet valves,
2. charging valve,

3. dual safety valve,
4. 2 nos. purge valve,
5. drain valve, pressure gauge,
6. liquid gauge glass indicator with valve.

The vessel shall be of IS:2002 / SA 516 and IS: 2002 Clause –I and all the welding joints are tested 100% radiographed.

#### 4. Ammonia Accumulator

Capacity : As per Design

Qty : As per Design

Type : Horizontal LP accumulator

Size : Suitable for -5 Deg. C suction temp. application for IBT  
& PHE Chiller

The accumulator shall be complete with suction gas outlet of doom type with mist eliminator and valve, suction gas inlet valve, suitable liquid outlet valve to pumps including one no. as spare for future, oil drain connection with receiver of 50 Litres capacity complete with heating arrangement, gauge tapping with valves, mounting pads for two nos. level switch, dual safety valve, pressure gauge, manual fill connection with necessary valves, vapor vent connection from pumps complete with valves.  
All mild steel structure for the accumulator shall be spray galvanized.

The accumulator comprising of the following accessories;

- a) DANFOSS make Level Transmitter
- b) DANFOSS make liquid level switch for high & low-level safety.
- c) Frost free heavy-duty level glass.
- d) DANFOSS make Pressure Regulating Valve

#### 5. Ammonia circulation system

Capacity : Suitable

Qty : 1 W + 1 S pump

Canned motor open type re-circulation system suitable for -5 °C SST complete with pump for ammonia re-circulation, 7.5 HP TEFC Squirrel Cage Induction type 4 pole motor suitable for operation on 400/440 V, 50 Cycles and accessories comprising suction strainer, suction and discharge valves, check valves. Pump will be supplied with 2 nos. pressure differential switch

6. Automatic air purge system

Qty : 1 Set

Multi point (6 Points) electronic Air purger operating on 220 Volts, 50 Hz. The purger includes gauge glass, one no. electronic purger controller, solenoid valve, thermostatic expansion valve, strainer, liquid seal trap and metering valve.

7. Ammonia controls and safeties

Qty : 1 lot

It shall be as per OEM standard preferably DANFOSS make considering PLC SCADA based refrigeration system

**14.2 Ammonia based Refrigeration system with screw compressor (1W+1S) for milk & milk product cold store, Curd Blast Room, with economizer, Ammonia Receiver (1+1), Accumulator, PHE type condenser, PLC based control system, VFD for compressor etc.**

Qty : As per BOQ

Capacity : As per BOQ

Duty : To maintain milk cold store temp @ 3 Deg. C. Evaporation Temp. shall be -5 Deg. C and Condensing Temp. shall be +40 Deg. C

All other specification shall be same as per main refrigeration system except chilled water tank/IBT and other chilled water equipment.

A separate chain pulley block to be installed with I beam for maintenance of compressor and motor.

**14.3 Ice bank Tank for chilled water generation with all standard Accessories including IBT coil of suitable RMT as per relevant IS code, Chilled water circulation pump (2W+1S), PUF insulation etc.**

Capacity : To meet the peak load requirement of refrigeration load during morning & evening can reception

Type : outdoor IBT with PUF insulation

MOC : MS minimum 6 mm wall & 8 mm bottom and agitator plate with PUF insulation and corrosion resistance paint from inside

Compartment : two

The tank shall be complete with necessary stiffening arrangements. The tank shall include a central baffle and guide end plates at all corners of the tank.

The tank shall be complete with flanged outlet, return water connections, overflow and make up water inlet with float valve, etc. The tank shall be painted as per standard specification.

**Ice Accumulation Coil** fabricated out of 32 mm Seamless SA 106, Sch. 40 pipe having a total length of suitable RMT. The coil shall be designed suitable for Over Feed System with necessary liquid inlet / outlet and gas inlet / outlet valves. THE COIL SHALL BE SPRAY GALVANIZED AFTER ITS FABRICATION.

For each compartment Liquid feed assemblies comprising of Strainer, Liquid Solenoid Valve, Metering Valve, Isolating Valve, valved By-pass, pump out connection, valved & plugged complete with Automatic Ice thickness switch.

IBT insulation shall be done with 80 mm thick PUF panel. The brick wall shall be constructed around it is in purchaser's scope. Ladder required for approach and safety railing shall be considered in scope.

Suitable dia. Belt driven Agitator with motor to be considered in the scope.

**IBT Cover** suitable for In-door type made of Pre-Engineered Sandwiched Panels complete with 80-mm thick complete and the size shall be suit to ice Bank tank and it shall be supplied with 2 nos. SS collapsible handles

#### **Chilled Water Circulation Pump**

Capacity : To meet the peak load requirement

Qty : 2 W +1 & provision for future connection

Type : Vertical

MOC : SS 304 & casing of CI

Motor : TEFC, IE3 motor of suitable rating for operation with VFD and with SS protection cover

Starter : VFD driven

Accessories:

Fitter, NRV, Isolation valves, Suction & Discharge header, Magnetic flowmeter in discharge line , TT in inlet & outlet line, Pressure Transmitter etc.

**NOTE: Supplier must submit the IBT coil calculation with the offer.**

#### **14.4 PLC-Scada based system for complete plant operation through control room**

Qty : As per BOQ

Capacity : As per BOQ

The proposed system shall include, but not limited to the following;

- a. PLC Panel with required I/o & power supply module for sequential operation of Dairy refrigeration system and cold store refrigeration system
- b. ES+OS industrial grade PC with 16 GB memory, 2 GB graphic memory, 512 GB SSD & 1 TB HDD with I7 10<sup>th</sup> generation processor with 29" LED monitor
- c. Original software with licenses for above operation
- d. Connectivity with Main PLC system for data transfer
- e. Table & Chair (2 nos.) for refrigeration control room
- f. Other hardware for networking
- g. Any other specific requirement for automatic operation

#### **14.5 PHE chiller for return line**

Capacity : As per BOQ

Qty : As per BOQ

Duty : To pre-chill the water

The pre-chiller will have refrigerant liquid inlet, vapour outlet, water inlet and water outlet connections. The pre-chiller shall be with laser welded cassettes along with Neoprene gasket etc.

Controls & Instruments for the above chiller comprising the following;

- a) 1 No. Electronic Float Switch
- b) 1 No. Liquid Line Solenoid Valve
- c) 1 No. Digital Temperature indicator cum controller
- d) Anti-freeze thermostat
- e) Back pressure regulating valve

Capacity : to take 50% of load of IBT

Inlet / outlet temp of water: 16 / 10 Deg. C

#### **14.6 Cooling tower with circulation pump (1W+1S) for refrigeration system**

Capacity : As per BOQ

Qty : As per BOQ

Type : FRP casing cooling tower with high temp fills, Pump type shall be of CS, Centrifugal with bronze impeller

Fan : Aero dynamically designed with aluminum blades and direct coupled motor

The cooling tower shall be complete with inlet, outlet, overflow flanged & drained connection and water distribution system and water distribution system, special shaped baffle plates and replaceable plastic fills.

**Note: Consider separate cooling tower for chilled water and cold store application.**

#### **14.7 Ammonia Pipes, valves & Fittings with puff insulation**

Capacity : As per BOQ



Qty : As per BOQ

MOC : Heavy Duty MS "C" Class pipes

Insulation : PUF slab of suitable thickness as per pipeline size with aluminum cladding

#### **14.8 Chilled Water pipes, valves & Fittings with puff Insulation**

Capacity : As per BOQ

Qty : As per BOQ

MOC : GI " B" Class

Insulation : PUF slab of suitable thickness with aluminum cladding

#### **14.9 First charge of ammonia & lubrication**

Qty : As per BOQ

Capacity : As per BOQ

All type of oil required for first charge and Ammonia shall be considered in the scope

### **15. Comp. Air Generation & Distribution**

#### **15.1 Screw non lubricating Air compressor (Air cooled) with HOF dryer, VFD driven with air duct for exhaust and all standard accessories including communication with mail PLC**

Quantity : As per BOQ

Capacity : As per BOQ

Type : Screw Type, Non-lubricating Oil Free, Air- cooled design

Controls : Suitable for automatic operation with variable frequency drive & necessary instruments for energy saving

Accessories : Pre-filter, after cooler, VFD and control panel, ducts for hot air and fresh air, terminal filters, bird guard etc.

The compressor should have all controls for auto operation and data transmission of air consumption and pressure monitoring to DCS

#### **15.2 Freon based standalone refrigerated Dryer with all standard accessories**

Capacity : To meet the above compressor capacity

Qty : As per BOQ

Type : Freon Based Refrigerated dryer

Compressor : 2 nos. in each dryer (1W+1S)

The proposed unit shall be self-standing and connected in line with compressor outlet line in such a way that any compressor can be connected to any dryer

#### **15.3 Air Receiver with All standard Accessories including inlet/outlet valves, automatic drain valve, pressure gauge etc**

Quantity : As per BOQ

Capacity : As per BOQ

Material : Stainless-steel

Type : Vertical cylindrical

Mounting : Self-supporting

Accessories : Inlet & outlet nozzles, auto drain valves, pressure transmitter, pressure & temp gauge, safety valves, condensate drainpipe, Automatic timer-based drain valve etc.

#### **15.4 Compressed Air SS pipes, valves & Fittings for complete plant**

Quantity : 1 Lot

Complete air distribution shall be through SS 304 pipeline. From main line, a line should be tapped for particular sections and accessories considered are isolating valve, air filter regulator and distribution plate. From distribution plate, nylon tube should be provided to connect to the utility points. Instruments tubing more than 1 meters should be laid in protective flexible hose / conduit.

### **16. Water Treatment & Distribution**

Water treatment and distribution system should be adequate to take care of entire Dairy. The plant operations to be controlled from local control panel. Hydro flow water pumps should be controlled by differential pressure switches to be installed in the water line downstream of Hydro flow system.

Scope of supply starts from underground water sump.

The water circuit for Raw Water shall be:

Incoming water → Multi grade filter → Activated carbon filter → Raw water sump → Hydro-flow system → water distribution piping.

The water circuit for Soft Water shall be:

Raw water sump → Raw water pumps → Softening plant → Soft water sump → Hydro-flow system → water distribution piping.

The water circuit for Soft Water shall be:

Raw water sump → Raw water pumps → Softening plant → Soft water sump → Hydro-flow system → water distribution piping.

#### **16.1 Raw Water pump (2W+1S)**

Capacity : As per BOQ

Qty : As per BOQ

Type : Centrifugal with back pull impeller

Duty : To feed the raw water to water filtration plant

Accessories : Filter, Inlet outlet butterfly valves, NRV in outlet line etc.

#### **16.2 Water Filtration plant comprising media filter, Activated carbon filter**

##### **Multi Grade Filtration:**

Capacity : As per BOQ

Qty : As per BOQ

Duty : For filtration of incoming raw water

The incoming raw water is passed through a multi graded filter to reduce the suspended solids present in the raw water. This filter is to be provided to keep a check on the suspended solids. The suspended particles in the raw water get entrapped in the filter media.

**Activated Carbon Filter:**

Capacity : As per BOQ

Qty : As per BOQ

Duty : For removal of odor from the incoming raw water

**16.3 Filter water hydro flow system (1W+1S)**

Quantity : As per BOQ

Capacity : As per BOQ

Pump Type : Vertical Multistage, Centrifugal Type

Accessories : The skid mounted system shall consists of a Suction & Discharge manifold with isolation valves, Pumps as mentioned above, Hydro pneumatic Tank of suitable Capacity, VFD For control of the speed as per varying demand, a Pressure Transmitter in the discharge line and necessary controls & electrical control panel.

Duty : To feed Raw Water to the various duty points as per plant requirement

**16.4 Filter water Feed pump to soft water plant (1W+1S)**

Capacity : As per BOQ

Qty : As per BOQ

Type : Centrifugal with back pull impeller

Duty : To feed the Filtered raw water to the softening plant

Accessories : Filter, Inlet outlet butterfly valves, NRV in outlet line etc.

**16.5 Water Softening plant**

Capacity : As per BOQ

Qty : As per BOQ

Type : Semi-Automatic

Time between minimum 5 Lac liters operation two regeneration. Operating hours of Softening plant is maximum 8 hours in a day.

**16.6 Soft water Hydro flow system (2W+1S)**

Qty : As per BOQ

Capacity : As per BOQ

Duty : To feed Soft Water to the various duty point as per plant requirement

Pump Type : Vertical Multistage, Centrifugal Type

Accessories : The skid mounted system shall consist of a Suction & Discharge manifold with isolation valves, Pumps as mentioned above, Hydro pneumatic Tank of suitable Capacity, VFD For control of the speed as per varying demand, a Pressure Transmitter in the discharge line and necessary controls & electrical control panel.

**16.7 Raw/Filtered & Soft Water pipes, valves & Fittings**

Capacity : As per BOQ

Qty : As per BOQ

MOC : GI "B" class

**17. Electrical System & Distribution**

**17.1 Two Pole Structure**

Capacity : AS per BOQ

Qty : As per BOQ

Type : 2 Pole/4 Pole structure for HT incoming power

Accessories : All standard accessories as per MPSEB regulations

Paint : High temp. Aluminum paint

Earthing : As per MPSEB standard

**17.2 HT cable from Two pole structure to HT breaker & HT breaker to Transformer**

Capacity : Suitable

Qty : 1 Lot

Type : HT XLPE, with aluminum Armored, Suitable for 33

KV HT Voltage

Rating : As per requirement

**17.3 HT breaker with all standard Accessories and UV relay**

Qty : As per BOQ

The system should include :

- HT panel with CT/PT and controls
- VCB one no as incomer
- VCB two no. as outgoing (for two transformer)
- Earth fault & under voltage relay

The brief specification of HT pane shall be as follows;

1. 11 KV, triple draw out type electrically operated vacuum circuit breaker, complete with all accessories. The spring charging motors shall be 240V AC.
2. Shunt trip coil for operating on 110V DC
3. Voltage relay similar to GEC make VAGM 22- 2 nos. for two phases.
4. Set of relays similar to GEC make CDG-61 relay to provide combined protection for over current, short circuit & earth leakage complete with accessories overcurrent setting 50-200% earth fault setting 10-40%.
5. TNC switch for emergency tripping
6. Indicating lamps on, off, trip circuit healthy with pushbutton, auto trip, spring charged & spares suitable for operation on AC supply.
7. Three numbers single phase dry type cast resin insulated potential transformer accuracy class 1.0 with secondary HRC fuses for protection. Rating 33kV/110V, 100VA.
8. Wound type cast epoxy resin insulated high voltage current transformer as per IS: 2705 of suitable ratio, with double required burden (minimum 15VA) for metering & protection. The CTS shall also be suitable for withstanding the rated short circuit current. Class of accuracy for metering shall be 1.0 & for protection 10P10. Rating 400/5/5,
9. Ammeter flush mounting type of frame size 144 sq. mm & scaled for rated voltage with selection switch.

10. Voltmeter flush mounting type of frame size 144-sq. mm & scaled for rated voltage with selection switch.
11. Adequate auxiliary contacts & wiring for interlocking circuits fault annunciations, indicators etc.
12. Provision for cable termination kits suitable for bottom entry of 3C X 240sq-mm XLPE cable.
13. Window annunciator facia with alarm bell.
14. Load manager which measures (current, voltage, kVA & PF) of Enercon make. (model no EM 3380 or higher with communication)
15. Power factor transducer having 4-20mA output.
16. Suitable kVA transducer having pulse & 4-20mA output.
17. High speed tripping relay type equivalent to VAJH /3 GEC Alsthom make.

Breaker trolley and handle for operation to be included in the scope of supply

#### **17.4 Oil Cooled Transformer (11 KV to 415V) with all standard Accessories**

Capacity	: As per BOQ
Qty	: As per BOQ
Type	:Oil type, Suitable for outdoor installation, air-cooled
Duty	: 11 KV to 415 V
Instruments and controls	: Oil and winding temp. indicator and control, Buchholtz relays, on load tap changer etc.
Accessories	:Air breather, conservator, explosion vent, radiator marshalling box etc.
Efficiency	: Not less than 98 % at full load.

#### **17.5 DG set with All standard Accessories & Synchronizing Panel**

It is proposed to provide the standby power for carrying out essential operation in case of power failure. The DG set as per the quantity and capacity appearing in BOQ shall be considered with AMF system and synchronizing panel. The DG will be selected for continuous duty operation of in. 8 hours. The facility shall be self-contained, and it should

be possible to hook up the power supply into the power control center. The Supplier should ensure that the DG supply is connected to the essential feeders provided on the PCC. The division on essential and non-essential load distribution on the PCC with isolation breaker will be the responsibility of the Supplier.

Type : Air cooled DG set in acoustic enclosure complete with silencer and chimney

Construction : Standard packaged unit

Duty : 430 V ac

capacity : As per BOQ

QTY : As per BOQ

Instrumentation & Control: Standard as per the IE rules

Rating: The capacity mentioned in the BOQ is KVA electrical

Note:

- a. Synchronizing panel with suitable rating ACB to be considered
- b. Diesel charging system to be included in the scope of supply

#### **17.6 PCC with two incomers**

Type : Suitable for indoor installation with incomer from 1 transformer and 1 from DG

Qty : As per BOQ

Construction : Modular compartmentalized construction and split into two sections with motorized bus coupler

Feeders : Incoming feeders with motorized circuit breakers (with ETU), outgoing feeders up to 800 Amps. with MCCB protection and above 800 Amps. with motorized circuit breakers. Various feeders are as mentioned above

Instruments and controls : Digital Ammeters & voltmeters for individual feeders. Energy meters wherever required. All controls shall be built-in type. Rigid mechanical and electrical interlocking wherever required

All the ACB & MCCB in PCC shall have communication facility and all data to be transferred to MIS system for report generation for individual feeders



## 17.7 APFC panel with Active Harmonic Panel

REQUIRED QUANTITY : As per BOQ

RATING : Supplier to specify

The Brief Technical Descriptions of major items to be supplied shall be as follows;

### 1. Load Details

Load Voltage : 3 Phase, 415 V

Load Power : As per Peak load

Type of Connected Load: Linear + Non-Linear inductive type

Load Power Factor :0.85 Lagging

### 2. Technical Details of APFC Panel & active harmonic panel

Rated voltage : 415volts

TSC panel rating : Supplier to specify

System Frequency : 50Hz, +/-1Hz

Number of steps : Five (min)

Reactor in series with capacitor: As per design to limit the inrush current

Incoming Switchgear : ACB- suitable rating

kVAR of each branch : Supplier to specify

TSC branch connection : Internal Delta

Ampere rating for selection of AHF shall meet harmonic suppression as per full load.

### Overload rating

Current : 20% of the designed value

Voltage : 10% continuous, 15% for 30minutes with 50% duty cycle

Switching device : Thyristor

Control of switching : Auto / Manual override

Tuning : Tuned to avoid the harmonic current to enter in.

Panel Temp. : 50° Maximum

Insulation : 2.5kV rms for one minute

First level protection : HRC fuse

Second level protection: ACB- suitable rating

Type of conductors : Copper

Type of bus bar : Aluminum electrolytic grade

Type of inductor : Gapped Iron Core

Type of Capacitor : Metalized polypropylene (MPP) self-healing type

Fuse : HRC

Controller : Supplier to specify

Protection CT : xxx/1Amp.

Protection PT : 415/8.6Volts

Measurement PT : XXXX / 110 volt (11 kV side)

Measurement CT : XXX / 1amp, 11 kV side, burden 5VA (max)

Cooling : Forced Air

Communication with panel: profibus/profinet port should be available at controller,

Discharge device on Capacitor:

Residual voltage : 50 volts

Time : 3 minutes

Panel : CRCA with powder coating, with Siemens GRAY color shade (RAL-7032)

Dimensions of panel: Supplier to specify

### **3. Capacitor Details**

Rated voltage : 415

Rated frequency : 50

Dielectric : Polypropylene

Phase : Single

Container : Aluminum

Mounting arrangement: Stud type

Maximum over voltage: 1.2 times

Maximum over current: 1.3 times

Capacitance tolerance: +10%

Maximum ambient temp.: 55Deg

Internal connection : Single phase

Discharge devices : Resistor

Capacitor type : MPP dielectric

Watt losses per unit : <0.2watts / kvar

Unit Kvar Capacity : 10

Protection class : IP – 43

Protection against over voltages & transients : Yes

Protection against harmonics, Stringent harmonic duty

Capacitor : Heavy duty

Capacitor bushing details: Pin type connector

Terminal detail : Two stud at top of the capacitor.

**Tests on capacitor:**

Following tests shall be carried out for selected capacitor;

Routine tests as per IS 2834 / IS 13585.

Visual inspection

Sealing Test

Test for Output & Capacitance

Insulation resistance test.

Voltage test between Terminals.

Voltage Test between terminals & containers.

Test for efficiency of discharge device

Measurement of Tangent of dielectric loss angle (Tan delta)

Type Test

Thermal stability test.

Tan delta & capacitor loss test

Capacitance discharge test.

#### **17.8 iMCCs for complete plant**

Type : Suitable for indoor installation with a provision for expansion.

Qty : 1 Lot

Feeders : Incoming feeders from both the sections of power control center to MCC for essential loads. All outgoing feeders shall have isolation facility, fuse, contactor, microprocessor-based overload protection relay with communication facilities & Display, necessary operating controls etc. All feeders above 10 HP shall have Star Delta starter with ammeters.

Instruments : Process status transmitter up to central control Management system. All necessary interlocks and controls.

**Note: Only processing section of feeder to be considered as IMCC based control and utility section MCCs shall be hard wired.**

#### **17.9 Duct able Air Conditioning system for MCC room to maintain 26 Deg. C Temp.**

Capacity : As per BOQ

Qty : As per BOQ

This shall be a standalone duct able Air conditioning system to maintain 26 Deg. C temp in the MCC room

**17.10 Power & Control cables for complete plant**

**Power Cable**

Qty : 1 Lot

All LT power cables shall be weatherproof, PVC sheathed, steel armored, PVC coated, aluminum conductor cables to be used for load more than 10 HP. For less than 10 HP load, Armored CU Cable shall be used. Copper cable less than 2.5 shall not be used for power.

For separators and homogenizers & other special machine/equipment, type of cable to be used as per OEM recommendation only

**Control Cables**

Qty : 1 Lot

All control cables shall be PVC, copper armored cable of suitable rating. Less than 1.5 sq. mm cable shall not be used for power control cable. Please note that all control cable required is armored type and Supplier strictly follow the same. Deviation shall not be entertained as it is a specific requirement of the purchaser.

**17.11 Earthing (power and Electronic) for complete plant**

Qty : 1 Lot

To provide earth pits and earthing cables to all sections of the plant with a max. earth resistance of one ohm or as per the regulations of local Electrical Inspectorate.

The earth pits and earthing system of instrumentation, computers and controls shall not share the earthing system of electrical power equipment.

All earthing mains shall be galvanized. The earthing to the equipment will be with the help of PVC coated aluminum cable.

All earthing drawings are to be submitted ( for insurance purpose as per safety norms )

Separate Earthing pit to be considered for automation and instrumentation system.

**17.12 Perforated GI cable trays**

Qty : 1 Lot

These shall be perforated type, heavy duty, inward bend shape, manufactured from mild steel conforming to IS-226 and hot dip galvanized as per IS-2629/BS-729 for laying of cables. Width of cable tray shall be as per the requirement. Height to be minimum 50 mm and thickness of plate shall be 1.5 mm upto 300 mm cable tray width. For cable trays having width more than 300 mm, height to be 75 mm and thickness of plate shall be 2.0 mm. Cable trays shall be of standard lengths of 2.5 M. Necessary accessories of cable trays such as coupler side plates for joining cable trays, bends, riser, inside riser, tee etc. shall also be supplied.

**Cable trays shall be of GI perforated type of suitable width as required. Cable tray for automation network/ instrument/signal cables shall be separate from power & control cables.**

**Note: Supplier to consider top cover for cable trays.**

**17.13 RCP & JB for electrical system**

Qty : 1 Lot

To be installed wherever necessary as per detailed engineering. All the JBs in process areas shall be of SS/Semi-transparent poly carbonate type, IP 67.

**17.14 Mics electrical items - GI conduits, rubber mat etc.**

**Conduits**

Quantity :1 Lot

For laying of cables under floor, GI class 'A' pipes shall be used. For laying cable in air whereas cable trays are not being used, GI 'A' class pipe shall be used. Size of pipe shall depend upon the overall outer diameter of cable to be drawn through pipe. No pipe less than 40 mm dia. shall be used for this purpose.

**In milk & milk product handling area conduit, in process / CIP / waterlogged area and wherever required, of SS-304 tubes, shall be used. Drop down conduit from cable tray to individual motor within the plant building in process area shall be of AISI 304. Outside process area & MCC room shall be GI.**

**Rubber mat**

Qty : 1 Lot

To be supplied for complete electrical installation at PCC room as well as for All MCC.

Following safety and electrical items/equipment to be considered in the scope;

1. 33 kV operating rod
2. 33 kV suitable hand Gloves
3. Fire buckets with stand for fire safety in transformer/switch yard

4. Fire extinguisher (**CO2 base**) for electrical HT substation, PCC room, MCC room, control room and other strategic area – 15 nos.

**Electrical Gloves**

Qty : 1 Lot

**HT Operating Rod**

Qty : 1 Lot

HT Operating Rod provide a safe way to operate a High Voltage Equipment

**Fire Bucket**

Capacity : As per BOQ

Qty : As per BOQ

Fire Buckets with stand for fire safety in Transformer, Switch Yard and D.G. Set.

**18. Laboratory Equipment**

- 18.1 pH meter, Tabletop (Range 0-14)
- 18.2 Fat Testing Machine - Milko scan FT1 (Make Foss)
- 18.3 Milk Adulteration screening machine Make Indi foss
- 18.4 Water bath for MBRT (Ambient temp. 37 Deg. C) MOC: SS
- 18.5 Butyrometer Water Bath (Ambient 67 Deg. C) MOC: SS
- 18.6 Hot Air Oven (Ambient temp: 160 Deg. C)
- 18.7 Hot Air Oven (Ambient temp: 110 Deg. C)
- 18.8 Digital Byutro - refractometer (Make ATAGO)
- 18.9 Sodium & potassium Analyzer (Thermo Scientific Orion make)
- 18.10 Refrigerator
- 18.11 Acidometer (Titreno plus 877) Make: Metrohm
- 18.12 Centrifugal Machine Type: REMI R8-C (Swingout heads with graduated glass tube) R 82 - A -4 x 50 ml - 4000 rpm -2050
- 18.13 Analytical Balance
- 18.14 Analytical Balance
- 18.15 Water Distillation plant (Quartz Boiler Distillation)
- 18.16 Levibond comparator with disc for phosphate test of milk
- 18.17 Laminar Flow
- 18.18 Cooling incubator Ambient temp: 25 Deg. C
- 18.19 Bacteriological Incubator Ambient Temp: 37 Deg. C
- 18.20 UPS system with 20 min battery back up
- 18.21 Bursting Strength Machine for corrugated box testing (Range 01-40 Kg/cm<sup>2</sup>)
- 18.22 Deep Freezer
- 18.23 Laboratory working platform with washing points and cupboards
- 18.24 Centralized Air conditioning system (Duct AC for 24 hrs duty)

- 18.25 AUTO CLAVE 121 DEG C WITH DIAL PRESSURE GAUGE MAKE: STANDARD (10 Litres)
- 18.26 GERBER MACHINE MAKE: BINNY
- 18.27 PROTIEN ANALIZER MAKE: STANDARD
- 18.28 Glassware for complete laboratory
- 18.29 Digital Moisture Balance OHAUS make
- 18.30 Digital Thickness Gauge MITUTOYO make
- 18.31 Vortex Moisture Standard make
- 18.32 Slotted angel Rack for self-life sample
- 18.33 Handheld pH meter for Curd pH testing
- 18.34 HOT PLATE SS TOP (Temp Range: 250 deg.)
- 18.35 BOILING WATER BATH AMBIENT TEMP:100 DEG (outer body SS plate & 14 gauge SS plate inner(chamber) body)
- 18.36 Commercial gas connection
- 18.37 Hand Blender ISI Brand

## 19. SS & MS Structural Supports

**SS-304 structures for platforms, product/ CIP/ utility pipes, cable tray supports, crossover/ working table etc.**

All supports inside the plant/corridor & tanker bay shall also be of SS-304 box section (2.5 mm thk. minimum).

Below mentioned areas are to be considered for SS-304 structural and fabrication work:

- SS304 structural supports for all product/ CIP/ Utility piping, cable trays/conduits etc. in the tanker reception and tanker dispatch area
- SS 304 Collapsible platform and railing for tanker reception, dispatch and CIP bay.
- SS304 structural supports for all product/ CIP/ Utility piping, cable trays/conduits etc. all production area, CIP area, Indoor plant corridor etc.
- Self-supported SS304 platforms for approach of all Indoor product tanks of milk, cream, CIP etc. with staircase and SS railing.

In addition to all above mentioned requirement required SS structural platform & supports shall be provided as per functional requirements of the plant operation and maintenance.

**MS (GI) structures for outdoor pipe bridge, silo / tank platforms etc.**

- These shall be provided for fabricating platforms, outdoor pipe support on service bridges etc.
- These shall include ISMB, ISMC, MS box section, angles, flats, bars, MS plates, chequered plate, handrails of minimum 900 mm height, toe guard etc. The platforms shall have frame underneath and bracing members of suitable sections. Access ladders and structural supports of B class



pipe/ISMC channel shall be provided within the scope of the works for structural works quoted.

- MS 5mm thick chequered plate for the trenches shall be provided wherever required as covers, platform, partition etc.

Below mentioned areas are to be considered for GI/MS structural work:

- Outdoor pipe bridges for all product/ CIP/ Utility piping, cable trays etc.

In addition to all above mentioned requirement required GI/MS structural platform & supports shall be provided as per function requirement of the plant operation and maintenance.

**SS Dimple plate for platform shall be minimum 1.6 mm thick.**

## **20. Miscellaneous Items & Equipment**

### **20.1 Hygienic Equipment for complete plant**

- **Taski Machine for plant cleaning (Swingo 455E)**

Type : Industrial with Vacuum and detergent washing facility

Qty : 4 Nos.

- **Genitor Trolley for cleaning**

For general cleaning of plant floor area

Type : Standard with MOP and washing broom

Qty : 2 Nos.

- **Cobweb Cleaning Boom**

For removal of cobwebs.

Type : Telescopic with extension rod

Qty : 3 Nos. (minimum)

- **Telescoping Glass cleaning boom**

For glass cleaning of the plant

Type : Telescopic with height adjustment

MOC : Aluminium light weight

Qty : 2 Nos.

- **Hand wash**

For plant hand wash facilities at approved location

MOC : SS 304 with drainpipe

QTY : 3 Nos.

- **Feet Scrubber**

Standard feet scrubber (sample to be approved from purchaser)

QTY : 3 Nos.

- **Hand Sanitizer**

Transparent with automatic operation

Qty : 3 Nos

- **Hand Dryer**

Qty : 3 Nos

High quality hand dryer with automatic operation

- **SS Dustbin**

Qty : 5 Nos

Medium sized SS dustbin for plant and office area

- **SS Bench for Hygiene room**

Qty : 4 Nos

For hygiene room/change room

- **Insectocutor**

Qty : 20 Nos

To be kept in plant area as per approved location

- **Full man height mirror for hygiene room**

Qty : 4 Nos

For hygiene room

**20.2 Air conditioning for Dairy control room, refrigeration & Boiler control room, Laboratory**

Capacity : As per BOQ

Qty : As per BOQ

Type : Split Air conditioner with standby compressor

Accessories : Copper piping with insulation and condensate drainage

Make : Daikin, GE, Blue star

Duty : Continuous

**20.3 Workshop tools for mechanical work**

The list shall be as per BOQ

QTY : As per BOQ

Make shall be standard and need to be approved from the purchaser before procurement in the event of placement of order.

**20.4 Electrical tools for complete plant**

The list shall be as per BOQ

QTY : As per BOQ

Make shall be standard and need to be approved from the purchaser before procurement in the event of placement of order

**20.5 Pressure ventilation system for process section and pouch packing section with 15-17 air changes**

Qty : As per BOQ

There shall be 2 separate system for;

1. Milk processing section
2. Milk/BM/Curd Packing Section

The system (each) shall comprise of;

- a. 5- & 10-micron filters for incoming air
- b. Blower/fan of Suitable capacity for supply and exhaust air.
- c. GI Ducting (square) of suitable size for supply and exhaust with Supports
- d. Manual Damper of suitable size (Square)
- e. Supply and exhaust fan of suitable size

Note:

1. The Supplier shall have to consider area as per approved layout
2. All the area minimum air changes as mentioned shall be considered
3. Supplier to take approval from the purchaser for make and capacity in the event of placement of order

**20.6 Passenger lift for plant**

**20.7 Goods Lift for plant**

**20.8 CCTV camera (IP type) & DVR system for complete plant**

No of Camera : As per BOQ (rotating & fixed)

Quantity : As pr BOQ

Make : Hik vision or equivalent

Type : IP based CCTV system

The system shall be consist of;

- a. NVR (Network based video recording) System (HIKVISION model 128 - CH (DS-96128NI-E24/H) or equivalent) with 4 TB HDD and facility to upload back up to USB
- b. Fixed camera with High resolution 3 MP(HD)
- c. Rotating Camera 5 MP (HD type) with 360 Deg. Rotation.
- d. All camera Power supply shall be given through PoE switch
- e. Supporting structure cable tray and SS conduits
- f. Control Cabling with shielded cable.
- g. Joystick and keyboard
- h. Other accessories for complete system
- i. 55" HD LED TV for IP based CCTV system

**20.9 Music & PA system for plant**

Qty : As per BOQ

The system shall comprise of;

- a. Blue Ray Player
- b. Set of Speakers (to be installed in the plant area as per approved layout) – 24 speakers
- c. High Quality Microphone (Wired) -2 nos.
- d. Wireless Microphone (High Quality) -2 nos.
- e. Power and control cabling
- f. Support, structure, cable tray, conduit etc required for system

**20.10 Milk & CIP pumps one no. (min) of each type as spare**

Capacity : As per BOQ

Qty : As per BOQ

Supplier to quote spares pumps minimum one no for each type of pumps required as a spare for safe and reliable operation of the plant.

All specifications shall be as per item no 1.17

Following minimum, but not limited to, pumps to be considered;

1. Milk Reception pump (1 No.)
2. Milk transfer pump from RMS to past. (1 No)
3. Milk Transfer pump from PMS to HMST (1 No)
4. Milk transfer pump from PMS to product tank (1 No)
5. CIP forward pump (3 nos. each for 3 forward pump of each CIP kitchen)
6. CIP Return pump (3 no. of each type)
7. Cream transfer pump (1 No)

If any other pumps are required in addition to above pumps, Supplier has to clearly mention in the offer.

**21. Training & Service Cover**

**As per section 4 – Project Management point no 4.8**

Qty : 1 Lot

**22. Spares for 2 Years normal operation**

Qty : As per BOQ

Capacity/size : As recommended by OEM

**23. Erection & Commissioning**

Qty : 1 Job

The scope of E & C includes unloading at site, unpacking, shifting, positioning, erection, testing and commissioning of all above items/equipment (from Sr. no 1 to 21) including the following;

- A. The Supplier has to carry out the complete erection, testing and commissioning of the Equipment for Milk, Cream Processing & storage, pouch packing, Fat Handling, on turnkey basis.
- B. The works shall be carried in the best workman like manner in conformity to the relevant codes of practices of BIS or international standards applicable for Dairy Process, mechanical and electrical installations.
- C. While unloading the equipment, Erection, testing and commissioning of Milk processing and utility machinery all the safeties related to men, machinery and material shall be in the scope of the contractor hence every care has to be taken along with necessary insurance coverage till the handing over of the machineries in working conditions to the purchaser.
- D. The erection works including the following.
  - shifting of equipment from the unloaded place, decorating, aligning, fixing to foundations, placing on foundation,
  - connecting to the pipelines of product and utilities and installation of piping.
  - Connecting to the electrical power Control Centre, MCC, Power cables, control cables with proper termination and providing of Communication cables, etc. and preparation of single line Diagram etc is part of this job.
  - Starting and commissioning and trial runs.
- E. Supplier shall arrange and demonstrate the commissioning & performance trial runs of the entire plant as per the technical rated parameters offered in the technical proposals.
- F. During Testing and trial period, necessary operating guidelines and practices should be explained to the operating personnel and shall be trained accordingly.
- G. Training of the personnel of purchaser at different stages of assembling, installation and operations etc. should be provided. Service Engineer/key person shall stay for minimum 30 days for assistance and train the Milk Union personnel in running of the plant (after product trials are over).
- H. The Statutory Obligations related to various equipment such as DG/Gas generating Set electrical including getting statutory approvals will be part of this job. AND it is the sole responsibility of the turnkey contractor/firm to ensure the said statutory approvals from electrical inspectorate /Madhya Pradesh State Electricity Board or any other bodies required to be taken, shall be obtained and produced while commissioning of the Plant. Fees for such approval shall be reimbursed by purchaser on submission of receipt.

#### **Special Notes to Suppliers**

1. The successful Supplier shall provide 2 sets of manuals test certificates & drawings.

2. If the manufacturers upgrade their technology or change existing technology, shall ensure to render service and supply spare parts for the existing /supplied, period of minimum 15 Years.
3. Any deviation in the technical specification has to be clearly mentioned and it is the decision of purchaser to accept OR reject.
4. The tender process consisting of Technical Bid and commercial bid.
5. The Prices should not be mentioned in the Technical Bid.
6. A tender, not complying with any one of the above conditions is liable to rejection. Incomplete proposal is liable to be rejected.
7. The tenderers are requested to go through the Terms and Conditions, detailed in this document, before filling out the tender.
8. The Suppliers shall quote in Indian Rupees. The prices are fixed for the contract period.
9. The Layout drawings are attached for reference. Supplier to submit all data mentioned in the "Drawing, data & documentation section" along with the offer failing to which bid shall be considered nonresponsive and shall be rejected without giving any reason thereof.

**BOQ FOR 1.0 LLPD DAIRY PROJECT FOR HARINGHATA DAIRY**

BOQ FOR 1.0 LLPD DAIRY PROJECT FOR HARINGHATA DAIRY				
Date: 20/03/2023				R2
	Description/ Head	Capacity	Qty	UOM
<b>1.0</b>	<b>Raw Milk Reception &amp; Storage</b>			
	<b>Can Reception</b>			
1.01	Incoming Can Conveyer (powered) with MS platform	Approx. 14 Meter	1	Set
1.02	Can Tipping Bar	Suitable	1	No.
1.03	Can Washer with oncoming & Outgoing Conveyer with lid washer	Suitable	1	No.
1.04	Electronic Weigh Bowl with weigh scale	600 Kg	1	Nos.
1.05	Can Scrubber with Lid Scrubber	500 L	1	Nos.
1.06	SS dump Tank (Double Compartment 500 L each)	1000 L	1	Nos.
1.07	Pipe in Pipe filter for Cow Milk	Suitable	1	Nos.
1.08	Pipe in Pipe filter for Buffalo Milk	Suitable	1	Nos.
1.09	Raw Milk Transfer Pump for Cow Milk	15 KLPH	1	No.
1.10	Raw Milk Transfer Pump for Buffalo Milk	15 KLPH	1	No.
1.11	Raw Milk Chiller (Cow Milk)	15 KLPH	1	No.
1.12	Raw Milk Chiller (Buffalo Milk)	15 KLPH	1	No.
1.13	Can Reception Panel for Milk Unloading & CIP Operation	Suitable	1	Set
	<b>Tanker Reception</b>			
1.14	FDA Approved Tanker reception Hose (6 meter) with rubber rings for safety	76mm	2	No.
1.15	SS Dearation Vessel	150 L	1	No.
1.16	Inline Filter (Pipe in Pipe)	30 KLPH	1	No.
1.17	Milk Transfer Pump (1+1 cold Standby)	30 KLPH	2	Nos.
1.18	Raw Milk Chiller for Tanker Milk	30 KLPH	1	No.
1.19	Burst Rinse system for tanker milk recovery	Suitable	1	Set
1.20	Dummy Manway for Tanker CIP with turbine	Suitable	2	Nos.
1.21	Tanker CIP forward Hose	38.5 mm	4	Nos.
1.22	Tanker CIP Return Hose	63.5 mm	2	Nos.
1.23	Tanker CIP Return Pump	Suitable	1	No.
1.24	Electronical Weigh Bridge for tanker	50 MT	1	Set
1.25	Tanker Reception Panel for Milk Unloading & CIP Operation (Touch Screen PLC- OP based) in addition to control room operation	Suitable	1	Set
1.26	SS Railing with SS collapcible platform for Tanker Bay (Suitable for 2 tanker bay - 1 present & 1 future)	Suitable	1	Set
1.27	Raw Milk Silo	30 KL	2	Nos.
1.28	Raw Milk Silo inter connecting platform with railing & approach ladder in SS 304 construction	Suitable	1	Set
1.29	Bird Cage for raw Milk Silo with openable door	Suitable	4	Nos.



1.30	Milk Transfer pump to Past -1 (1W+1 Cold Standby)	20 KLPH	2	Nos.
1.31	Milk Transfer pump to Past -2 (1W+1 Cold Standby)	10 KLPH	2	Nos.
1.32	Inter Silo cum Dispatch Pump	30 KLPH	1	No
1.33	CIP Return Pump for Raw Milk Silo	Suitable	1	No.
1.34	Pneumatic Valve Battery for Raw Milk Silos	Suitable	1	Set
1.35	SS Pipes, Valves & Fitting for Raw Milk Reception Section	Suitable	1	Lot
<b>2.0</b>	<b>Reconstitution Section</b>			
2.01	Recon. Milk Preparation cum Storage Tank	5 KL	1	Nos.
2.02	Powder Blending System with Table mounted hopper and shear & booster pump with accessories	500 Kg/Hr	1	Set
2.03	PHE type Chiller for recon milk chilling in recirculation mode	10 KLPH	1	No.
2.04	Recon. Milk Transfer pump to Raw Milk silo, curd milk storage tank & past Balance Tank	10 KLPH	1	No.
2.05	CIP Return Pump for Recon. Tanks	Suitable	1	No.
2.06	Pneumatic Valve Battery for Reconstitution Section	Suitable	1	Set
2.07	SS Pipes, Valves & Fitting for Reconstitution Section	Suitable	1	Set
<b>3.0</b>	<b>Milk Processing, Storage &amp; Transfer</b>			
3.01	Milk Pasteurizer with all standard accessories. Fully automatic with all instruments and pneumatic valves for remote operation through central control room.	10 KLPH	1	Set
3.02	Tri-purpose Cream separator with all standard accessories & Hydro flow system for separator	10 KLPH	1	Set
3.03	Online Bactofudge with All Standard Accessories	10 KLPH	1	Set
3.04	Online Standardizer with all standard Accesories	10 KLPH	1	Set
3.05	Milk Homogenizer with All standard Accessories and hydraulic pressure regulating mechanism with suction & Discharge dampener, Suction pressure transmitter, PLC with OP, All safety instrument and controls	10 KLPH	1	Set
3.06	Seal Cooling system for homogenizer with tank, Chiller and circulation pump	Suitable	1	Set
3.07	Manual Hoist with I beam for separator bowl lifting	2 MT	1	Set
3.08	Pasteurizer Milk Storage Tank	30 KL	2	Nos.
3.09	CIP return pump for Past. Milk Storage tank	Suitable	1	No.
3.10	Milk Transfer Pump to HMST Line -1	20 KLPH	1	No.
3.11	Milk Transfer Pump to HMST Line -2	20 KLPH	1	No.
3.12	Milk Transfer to Curd/Butter Milk Section /Paneer Section	10 KLPH	2	No.
3.13	Inter Silo cum Dispatch cum re pasteurization Pump for Past Milk with VFD	30 KLPH	1	No.
3.14	Past Milk Dispatch Chiller	30 KLPH	1	No.

3.15	Past. Milk Valve battery as per design and logic	Suitable	1	Set
3.16	SS Pipes, valves & Fittings for complete section	Suitable	1	Lot
<b>4.0</b>	<b>Cream Processing, Storage &amp; Transfer</b>			
4.01	Raw Cream Storage tank	2 KL	1	No
4.02	Raw Cream transfer pump to cream pasteurizer	3 KLPH	1	No.
4.03	Cream pasteurizer with all standatd accessories, Fully automatic with all instruments & valves for remote operation through central control room	3 KLPH	1	Set
4.04	Pasteurized Cream Storage Tank	3 KL	2	Nos.
4.05	Cream tranasfer pump to CBMM machine (Lobe pump) + CIP forward pump	1 KLPH	1	No.
4.06	Cream Transfer pump to Cream Dispatch/Raw Milk Silo/Milk Past balance tank	3 KLPH	1	No
4.07	CIP return pump for raw & past cream storage tank	Suitable	2	No
4.08	Pneumatic Valve battery for raw & past cream storage tank as per design & operation philosophy	Suitable	2	Set
4.09	SS Pipes, valves & Fittings for complete section	Suitable	1	Lot
<b>5.0</b>	<b>Milk Packing &amp; Storage</b>			
5.01	Horizontal Milk Storage Tank for Pouch Milk	10 KL	3	Nos.
5.02	PHE for rechilling of Pouch Packing Milk in milk up line	20 KLPH	2	Nos.
5.03	Inline Filter (Pipe in Pipe) for HMST outgoing line	Suitable	2	Nos.
5.04	Detergent based Crate washer with pre-cleaning, air drying attachment and crate twister	1200 Crate per hours	2	Set
5.05	2 Tier Crate Conveying System for Pouch packing	Suitable	1	Set
5.06	High Speed Packing Machines for Milk Packing	10000 PPH	2	Nos.
5.07	5/6 Liters FFS packing machine	720 PPH	1	No.
5.08	Seal Water Cooling System with 500 L Insulated tank, PHE, Pump & Automatic temp controlling system and make up water	Suitable	1	Set
5.09	Leakay Pouch cut open tank (500 L, SS 304 Insulated) with transfer pump and PHE type chiller with automatic level control & CIP facility	Suitable	1	Set
5.10	Pouch washing trough with secondary chilled water THE	Suitable	2	Set
5.11	3 D Crate Counter for Filled Crate conveyer to milk Cold Store	Suitable	1	Nos.
5.12	SS Cross over Bridge for Conveyer	Suitable	2	Nos.
5.13	Pneumatic valve battery for HMST fillinf, emptying & CIP as per technical specifications	Suitable	1	Lot
5.14	Pasteurized Milk Recovery tank	3 KL	1	No.
5.15	Past Milk Transfer Pump to RMST/Rinse Milk Recovery Tank	10 KLPH	1	No.
5.16	CIP return pump for HMST/Past Milk Recovery tank	Suitable	1	Lot

5.17	Milk Cold Store for 1.0 ILPD pouch Milk with 3 nos of doors and 2 nos of hatch door	17.5 x 14 Mtr	1	Set
5.18	SS Pipes, valves & Fittings for complete section	Suitable	1	Lot
<b>6.0</b>	<b>Curd &amp; Yoghurt Processing &amp; Packing</b>			
6.01	SMST for curd/butter milk/Paneer milk storage	5 KL	3	Nos.
6.02	Powder Blending System with Table mounted hopper and shear & booster pump with accessories	500 Kg/hr	1	Set
6.03	PHE with Circulation for SMST	10 KLPH	1	No.
6.04	Milk Transfer Pump to Curd Pasteurizer	3 KLPH	1	No.
6.05	Curd Milk Pasteurizer with fully automatic operation from control room including all the instruments & Pneumatic valves	2 KLPH	1	Set
6.06	Curd Milk Homogenizer	2 KLPH	1	Set
6.07	Past. Curd Milk Storage tank	5 KL	2	Nos.
6.08	Curd Milk heater (4-45 Deg,c) with all standard Accessories, instruments, pneumatic valves and automatic operation from the control room	3 KLPH	1	Set
6.09	Curd Inoculation cum Balance tank	1.5 KL	2	Nos.
6.10	Crate washer for Curd /BM line	1200 Crate/Hr	1	No
6.11	Manual two tier crate conveying system for empty & filled crate up to incubation room and cold store	Suitable	1	Set
6.12	Curd FFS Packing Machine (Common for BM & Curd)	5000 PPH	2	Nos.
6.13	Rotary Curd Cup Filling Machine with All standard Accessories, Outgoing conveyor & Inkjet Printer	2400 Cup /Hr	1	No.
6.14	Matka packing machine (5 Kg/6Kg) with sealing & coding	120 matka	1	Set
6.15	SS trolley for cup curd & matka packing	Suitable	1	Lot
6.16	Curd Incubation Room with Electrical heating system	6 x 4.5 x 3 Meter	1	Set
6.17	Curd Blast room with insulation panel, Standalone freon based refrigeration system, 2 nos of manual sliding doors and other standard accessories. Product to be cooled from 45 Deg. C to 2 Deg. C in 2 hours	6x 6 x 4 Meter	1	Set
6.18	Curd Setting tank	2 KL	3	No.
6.19	Sugar mixing system	500 Kg/hr	1	Set
6.20	Mixing tank for chakka sugar, flavour & fruits	500 L	3	Nos.
6.21	Circulation pump with chiller	5 KLPH	1	No.
6.22	Lassi transfer pump to curd past/packing machine	2400 Cup /Hr	1	Set
6.23	CIP return pump for SMST	Suitable	1	No.
6.24	CIP return pump for pouch packing machine	Suitable	1	No.
6.25	CIP return pump for cup filling machines	Suitable	1	No.
6.26	CIP return Pump for Mixing tanks	Suitable	1	No.
6.27	Pneumatic valve battery for SMST area	Suitable	1	Set

6.28	SS Pipes, valves & Fittings for complete section	Suitable	1	Lot
<b>7.0</b>	<b>Butter Milk Processing &amp; Packing</b>			
7.01	Butter milk pasteurizer	3 KLPH	1	Set
7.02	Curd Setting Tanks	5 KL	2	Nos.
7.03	Butter Milk Circulation pump	5 KLPH	1	No.
7.04	Butter Milk Shear Pump	5 KLPH	1	No.
7.05	Butter Milk Circulation chiller	5 KLPH	1	No.
7.06	Butter Milk Transfer Pump to BM pasteurizer	5 KLPH	1	No.
7.07	Butter Milk Thermizer with All standard Accessories and instruments and controls for fully automatic operation from the central control room	5 KLPH	1	Set
7.08	HMST for Butter Milk	5 KL	2	Nos.
7.09	CIP return pump for Curd Setting tanks	Suitable	1	No.
7.10	CIP return Pump for Butter Milk HMST	Suitable	1	No.
7.11	Pneumatic Valve battery for curd setting tanks as per design and technical specifications	Suitable	1	Set
7.12	Pneumatic valve battery for Butter Milk HMST filling, emptying & CIP as per technical specifications	Suitable	1	Set
7.13	SS Pipes, valves & Fittings for complete section	Suitable	1	Lot
<b>8.0</b>	<b>Ghee Processing &amp; Packing</b>			
8.01	Continuous Butter Making Machine for White Butter with all standard Accessories, SS control panel, Balance tank, Chiller for BM etc	800 Kg/Hr	1	Set
8.02	On line butter melting machine with all standard accessories and hot water generation system with circulation pump and hopper	1 MT/Hr	1	Set
8.03	Pre-stratification tank	1 KL	1	Nos.
8.04	Seram Separator for sweet butter milk with all standard Accessories	1 KLPH	1	Set
8.05	Ghee Boiler	1 KL	2	Nos.
8.06	Ghee Settling cum storage tank with tower water circulation	3 KL	2	Nos.
8.07	Ghee Clarifier with all standard Accessories & operating panel	1 KLPH	1	Set
8.08	Ghee Balance tank with circulation pump for packing (VFD Driven)	500 L & 2 KLPH	1	No.
8.09	Ghee pouch packing machine for 500g & 1 Kg Pouch	720 PPH	1	No.
8.10	Ghee Tin Packing line for 15 Kg tin with all standard Accessories incoming & outgoing conveyer, online , inkjet printer etc	30 tin/Hr	1	Set
8.11	Ghee residue recovery system	Suitable	1	Set
8.12	Local control panel for Ghee processing operation	Suitable	1	Set
8.13	SS Pipes, valves & Fittings for complete section	Suitable	1	Lot

<b>9.0</b>	<b>Paneer Processing &amp; Packing</b>			
9.01	Paneer milk Heater with all standard Accessories with regeneration section including all the instruments for automatic operation from the central control room (4-95-85 Deg C)	1 KLPH	1	Set
9.02	Paneer Vat (insulated) with CIP & Dosing nozzle rod	500 L	2	Set
9.03	Citric Acid Dosing tank (Insulated Jacketed) with agitator, CIP nozzle and temp. control valve and controller	1000 L	1	Set
9.04	SS working platform for paneer vat and dosing tanks	Suitable	1	Lot
9.05	Weigh collection trough	Suitable	1	No
9.06	Paneer hoops (in SS construction)	Suitable	70	Nos.
9.07	Pneumatic paneer press with 4 stations with all standard Accessories, pneumatic switches, FR unit, timers and whey collection tray	Suitable	2	Set
9.08	Paneer block cooling tank	2 KL	2	Nos.
9.09	Chilled Water circulation pump with fitter and UV light treatment	5 KLPH	2	Nos.
9.10	Chiller for dipping tank	5 KLPH	2	Nos.
9.11	Pasteurized Chilled water storage tank	5 KL	1	no
9.12	Paneer block drying tunnel with high speed fan, SS enclosure and straight through conveyer	Suitable	1	Set
9.13	Paneer block cutting machine for 200/500/1000 g block	Suitable	2	Nos.
9.14	Double chambered vacuum packing machine	Suitable	2	No
9.15	Whey transfer pump to whey storage tank	2 KLPH	1	no
9.16	Raw Whey Storage tank (insulated)	5 KL	1	Nos.
9.17	Whey transfer pump to paneer milk heater and chiller	2 KLPH	1	No
9.18	Double section whey Chiller with cooling tower water section	2 KLPH	1	No.
9.19	Chilled whey Storage tank	5 KL	1	No
9.20	Whey dispatch pump	10 KLPH	1	No.
9.21	control panel for local operation of paneer section	Suitable	1	Set
9.22	SS Pipes, valves & Fittings for complete section	Suitable	1	Lot
<b>10</b>	<b>Rinse Milk Recovery Section</b>			
10.01	Balance tank for rinse milk recovery system	500 L	1	No.
10.02	Milk circulation pump	5 KLPH	1	No.
10.03	Rinse Milk Chiller	5 KLPH	1	No.
10.04	Rinse Milk Storage tank	5 KL	1	No.
10.05	Rinse Milk Transfer Pump with VFD & Magnetic Flow Meter	10 KLPH	1	No.
10.06	Valve battery for rinse milk recovery system	Suitable	1	No.
10.07	SS Pipes, Valves & Fitting for complete section	Suitable	1	Lot

<b>11</b>	<b>CIP Section</b>			
	<b>Conc. Lye &amp; Acid Storage</b>			
11.01	Conc. Lye unloading pump	10 KLPH	1	No.
11.02	Conc. Acid unloading pump	10 KLPH	1	No.
11.03	Concentrated Lye Storage tank	8 KL	1	No.
11.04	Concentrated Acid Storage tank	8 KL	1	No.
11.05	Acid & Lye Dosing system for process & fermented CIP	Suitable	2	set
11.06	SS Platform for CIP Kitchen	Suitable	1	Lot
11.07	Pneumatic Valve Battery for CIP forward & Return Circuit	Suitable	1	Lot
11.08	SS Pipes, valves & Fittings for complete section	Suitable	1	Lot
	<b>Process CIP Kitchen</b>			
11.09	Lye Tank	8 KL	1	No.
11.10	Acid Tank	8 KL	1	No.
11.11	Hot Water Tank	8 KL	1	No.
11.12	Recuperation Tank	8 KL	1	No.
11.13	Fresh Water tank	8 KL	1	No.
11.14	Sterilization tank	500 L	3	Nos.
11.15	Recirculation pump for lye & Acid	5 KLPH	2	Nos.
11.16	CIP forward pump	15 KLPH	3	Nos.
11.17	CIP Heater (THE)	15 KLPH	3	Nos.
11.18	Duplex filter for CIP return line	15 KLPH	3	Nos.
11.19	SS Platform for CIP Kitchen	Suitable	1	Lot
11.20	Pneumatic Valve Battery for CIP forward & Return Circuit	Suitable	1	Lot
11.21	SS Pipes, valves & Fittings for complete section	Suitable	1	Lot
	<b>Fermented CIP Kitchen</b>			
11.22	Lye Tank	5 KL	1	
11.23	Acid Tank	5 KL	1	
11.24	Hot Water Tank	5 KL	1	
11.25	Recuperation Tank	5 KL	1	
11.26	Sterilization tank	500 L	2	
11.27	Recirculation pump for lye & Acid	5 KLPH	2	Nos.
11.28	CIP forward pump	10 KLPH	2	
11.29	CIP Heater (THE)	10 KLPH	2	
11.30	Duplex filter for CIP return line	10 KLPH	2	
11.31	SS Platform for CIP Kitchen	Suitable	1	Lot
11.32	Pneumatic Valve Battery for CIP forward & Return Circuit	Suitable	1	Lot
11.33	SS Pipes, valves & Fittings for complete section	Suitable	1	Lot
<b>12</b>	<b>Automation &amp; Instrumentation</b>			
12.01	PLC system with power supply, CPU, IM, necessary hardware including Main PLC panel RIO panels, communication cables, etc for complete plant automation	Suitable	1	Lot

12.02	System software development including original licenses for development software, OS,ES software and programming back up	Suitable	1	Lot
12.03	Engineering Station + Operator Station with 29" LED Monitor with Latest Industrial grade PC configuration at the time of ordering. (1 OS + 1 ES/OS out of which OS with dual monitor)	Suitable	2	Nos.
12.04	Networking Hardware including Communication bus cable, power cable, control cable, RIO panel cable, router, modem for internet connectivity, FO cable & Accessories	Suitable	1	Lot
12.05	SS Conduits & GI cable trays for instruments & Control cabling	Suitable	1	Lot
12.06	MIS system including MIS server , MIS clients (7 Nos. for various section), MIS networking hardware, Software development and software licenses including software backup	Suitable	1	Lot
12.07	Network Printer for ES + OS & MIS (1 A3 color laser + 4 A4 B/W Laser )	Suitable	3	Nos.
12.08	UPS system for Complete Automation system for LMP	Suitable	1	Nos.
12.09	Control & PLC earthing for complete plant (Separate from power earthing)	Suitable	1	Lot
	<b>Instrumentation</b>			
12.10	Level Switches	Suitable	1	Lot
12.11	Pressure Transmitters	Suitable	1	Lot
12.12	Flow Switches	Suitable	1	Lot
12.13	Temp. Transmitter with sensor	Suitable	1	Lot
12.14	Magnetic Flow meters	Suitable	1	Lot
12.15	Mass Flow Meters	Suitable	1	Lot
12.16	Control valves 2 way & 3 Way	Suitable	1	Lot
12.17	Level Transmitters	Suitable	1	Lot
12.18	Conductivity Transmitter	Suitable	1	Lot
12.19	Manual gauges for temp, pressure etc	Suitable	1	Lot
12.20	SS pneumatic valves (2 way/3 Way / Butterfly) for complete plant	Suitable	1	Lot
<b>13</b>	<b>Steam Generation &amp; Distribution</b>			
12.01	Solid Fuel Fired Boiler with All standard Accessories, maintenance platform,, economiser, APH PLC based control system with O2 trimming & Boiler management system, Chimney, RO plant with dosing system for boiler feed water etc	2 MT/Hr	2	Set
12.02	Automatic PID based PRS with PT and I/P converter for 10.5 -3.5 Bar duty with isolation, bypass and Steam trap	Suitable	1	Set

12.03	Steam pipes, valves & Fittings for complete plant (HP & LP) with insulation	Suitable	1	Lot
12.04	Condensate pipes, valves & Fittings for complete plant with insulation including min. 7 nos. of condensate transfer pumps	suitable	1	Lot
12.05	Steam Water Mixing battery with pressure gun for various location of the plant	Suitable	6	Nos.
<b>13</b>	<b>Refrigeration Section</b>			
13.01	Ammonia based Refrigeration system with screw compressor (1W+1S) for milk & milk product plant with economizer, Ammonia Receiver (1+1), Accumulator, PHE type condenser, PLC based control system, VFD for compressor etc	200 TR/Hr	1	Lot
13.02	Ammonia based Refrigeration system with screw compressor (1W+1S) for milk & milk product cold store, Curd Blast Room, with economizer, Ammonia Receiver (1+1), Accumulator, PHE type condenser, PLC based control system, VFD for compressor etc	45 TR/Hr (minimum)	1	Lot
13.03	Ice bank Tank for chilled water generation with all standard Accessories including IBT coil of suitable RMT as per relevant IS code, Chilled water circulation pump (2W+1S), PUF insulation, etc	Suitable	1	Lot
13.04	PLC-Scada based system for complete plant operation through control room	Suitable	1	Lot
13.05	PHE chiller for return line	Suitable	1	set
13.06	Cooling tower with circulation pump (1W+1S) for refrigeration system	Suitable	1	set
13.07	Ammonia Pipes, valves & Fittings with PUF insulation	Suitable	1	Lot
13.08	Chilled Water pipes, valves & Fittings with PUF Insulation	Suitable	1	Lot
13.09	First charge of ammonia & lubrication	Suitable	1	Lot
<b>14</b>	<b>Comp. Air Generation &amp; Distribution</b>			
14.01	Screw non lubricating Air compressor (Air cooled) with HOF dryer, VFD driven with air duct for exhaust and all standard accessories including communication with mail PLC	200 CFM	2	Set
14.02	Freon based standalone refrigerated Dryer with all standard accessories	Suitable for above	2	set
14.03	Air Receiver with All standard Accessories including inlet/outlet valves, automatic drain valve, pressure gauge etc	Suitable for above	3	Nos.
14.04	Compressed Air SS pipes, valves & Fittings for complete plant	Suitable	1	Lot
<b>15</b>	<b>Water Treatment &amp; Distribution</b>			
15.01	Raw Water pump (2W+1S)	15 KLPH	3	Nos.



15.02	Water Filtration plant comprising media filter, Activated carbon filter	15 KLPH	1	set
15.03	Filter water hydro flow system (1W+1S)	15 KLPH	1	set
15.04	Filter water Feed pump to Soft water plant (1W+1S)	15 KLPH	2	Nos.
15.05	Water Softening plant	15 KLPH	1	set
15.06	Soft water Hydro flow system (2W+1S)	20 KLPH (each)	1	set
15.07	Raw/Filtered & Soft Water pipes, valves & Fittings	Suitable	1	Lot
<b>16</b>	<b>Electrical System &amp; Distribution</b>			
16.01	Two Pole Structure	Suitable	1	Set
16.02	HT cable from Two pole structure to HT breaker & HT breaker to Transformer	Suitable	1	Job
16.03	HT breaker with all standard Accessories and UV relay	Suitable	1	set
16.04	Oil Cooled Transformer (11 KV to 415V) with all standard Accessories	1250 KVA	1	set
16.05	DG set with All standard Accessories & Synchronising Panel	830 KVA	1	set
16.06	PCC with two incomer	Suitable	1	Set
16.07	APFC panel with Active Harmonic Panel	Suitable	1	set
16.08	iMCCs for complete plant	Suitable	1	Lot
16.09	Ductable Air Conditioning system for MCC room to maintain 26 Deg. C Temp.	Suitable	1	set
16.1	Power & Control cables for complete plant	Suitable	1	Lot
16.11	Earthing (power and Electronic) for complete plant	Suitable	1	Lot
16.12	Perforated GI cable trays	Suitable	1	Lot
16.13	RCP & JB for electrical system	Suitable	1	Lot
16.14	Misc electrical items - GI conduits, rubber mat etc	Suitable	1	Lot
<b>17</b>	<b>Laboratory Equipment</b>			
17.01	pH meter, Table top (Range 0-14)	Range 0-14	1	No.
17.02	Fat Testing Machine - Milko scan FT1 (Make Foss)	Suitable	1	No.
17.03	Milk Adulteration screening machine Make Indi foss	Suitable	1	No.
17.04	Water bath for MBRT ( Ambient temp. 37 Deg. C) MOC: SS	12 x 7 x 9 "	1	No.
17.05	Beutrometer Water Bath (Amb. 67 Deg. C) MOC: SS	12 x 16 x 10"	1	No.
17.06	Hot Air Own (Amb temp: 160 Deg.C)	60 x 60x 90 cm	2	No.
17.07	Hot Air Own (Amb temp: 110 Deg.C)	36 x 36 x 36 cm	1	No.
17.08	Digital Byutro - refractometer (Make ATAGO)	Suitable	1	No.
17.09	Sodium & pottasium Analyzer (Thermo Scientific Orion make)	Suitable	1	No.
17.1	Refrigerator	210 Liters	2	No.
17.11	Acidometer (Titreno plus 877) Make: Metrohm	Suitable	1	No.
17.12	Centrifugal Machine Type: REMI R8-C (Swingout heads with graduated glass tube) R 82 - A -4 x 50 ml - 4000 rpm -2050	Suitable	1	No.
17.13	Analytical Balance	300g	1	No.

17.14	Analytical Balance	1.5 Kg	1	No.
17.15	Water Distillation plant (Qurtz Boiler Distillation)	5 Liters/Hr	1	No.
17.16	Levibond comparator with disc for phosphate test of milk	0-46 Disc	1	No.
17.17	Leminar Flow	3 x 2 x 2 Bench size	1	No.
17.18	Cooling incubator Ambient temp: 25 Deg. C	36 x 36 x 36 cm	1	No.
17.19	Becterillogical IncubatorAmb. Temp: 37 Deg. C	36 x 36 x 36 cm	1	No.
17.2	UPS system with 20 min battery back up	3 KVA	1	No.
17.21	Bursting Strength Machine for corrugated box testing (Range 01-40 Kg/cm2)	Suitable	1	No.
17.22	Deep Freezer	440 L	2	No.
17.23	Laboratory working plattform with washing points and cupboards	Suitable	1	No.
17.24	Centralized Air conditioning system (Duct AC for 24 hrs duty)	Suitable	1	Set
17.25	AUTO CLAVE 121 DEG C WITH DIAL PRESSURE GAUGE MAKE : STANDARD (10 Liters)	Suitable	1	No.
17.26	GERBER MACHINE MAKE : BINNY	Suitable	1	No.
17.27	PROTIEN ANALIZER MAKE : STANDARD	Suitable	1	No.
17.28	Glassware for complete laboratory	Suitable	1	Set
17.29	Digital Moisture Balance OHAUS make	Suitable	1	No
17.3	Digital Thickness Gauge MITUTOYO make	Suitable	1	No
17.31	Vortex Misture Standard make	Suitable	1	No
17.32	Slotted angel Rack for self life sample	Suitable	1	No.
17.33	Hand Held pH meter for Curd pH testing	Suitable	1	No.
17.34	HOT PLATE SS TOP( Temp Range: 250 deg)	Suitable	1	No.
17.35	BOILING WATER BATH AMBIENT TEMP:100 DEG (outer body SS plate & 14 gauge SS plate inner(chamber) body )	Suitable	1	No.
17.36	Commercial gas connection	Suitable	1	No.
17.37	Hand Blender ISI Brand	Suitable	1	No.
<b>19</b>	<b>SS &amp; MS Structural Supports</b>	Suitable	1	Lot
<b>20</b>	<b>Miscellaneous Items &amp; Equipment</b>			
20.01	Hygienic Equipment for complete plant	Suitable	1	Lot
20.02	Air conditioning for Dairy control room, refrigeration & Boiler control room, Laboratory	Suitable	1	Lot
20.03	Work shop tools for mechanical work	Suitable	2	Set
20.04	Electrical tools for complete plant	Suitable	3	Set
20.05	Pressure ventilation system for process section and pouch packing section with 15-17 air changes	Suitable	2	Set
20.06	Passenger lift for plant	Suitable	2	Nos.
20.07	Goods Lift for plant	2 MT	2	Nos.
20.08	CCTV camera (IP type) & DVR system for complete plant	20 Fixed +10 rotating	1	Lot

20.09	Music & PA system for plant	Suitable	1	Lot
20.10	Milk & CIP pumps one no. (min) of each type as spare	Suitable	10	Nos.
<b>23</b>	<b>Training &amp; Service Cover</b>	Suitable	1	Job
<b>24</b>	<b>Spares for 2 Years normal operation</b>	Suitable	1	Lot
<b>25</b>	<b>Erection &amp; Commissioning</b>	Suitable	1	Job
<b>26.</b>	<b>CIVIL WORKS :</b>			
<b>26.01</b>	<b>Milk Processing &amp; Production Area</b>		3867	Sqm
<b>26.02</b>	<b>Utilities &amp; Services</b>		660	Sqm
<b>26.03</b>	<b>Tankar Bay</b>		221	Sqm
<b>26.04</b>	<b>Weigh Bridge Cabin</b>		15	Sqm
<b>26.05</b>	<b>Service Bridge/Steel work</b>		20	MT
<b>26.06</b>	<b>Hard Park</b>		700	Sqm
<b>26.07</b>	<b>Toilet Block</b>		35	Sqm
<b>26.08</b>	<b>UG Sump</b>		2 lakh	Litres
<b>26.09</b>	<b>Fire Hydrant System</b>	As per drawing based on site visit		
<b>26.10</b>	<b>Equipment +Silos Foundations</b>	As per drawing based on site visit		
<b>26.11</b>	<b>ETP (Civil work)</b>	As per drawing based on site visit		
<b>26.12</b>	<b>Drainage &amp; Plumbing</b>	As per drawing based on site visit		
<b>26.13</b>	<b>Roads</b>	(for 6 mtr)	150	rmt.
<b>26.14</b>	<b>Internal Electrification &amp; Street Lighting</b>	As per drawing based on site visit		
<b>26.15</b>	<b>Miscellaneous items</b>		1	lot
<b>26.16</b>	<b>Landscaping &amp; Development</b>	As per drawing based on site visit		
<b>26.17</b>	<b>Rain water Harvesting</b>	As per drawing based on site visit		
<b>26.18</b>	<b>Service Bridge Column for Utilities</b>	As per drawing based on site visit		
<b>26.19</b>	<b>Borewell</b>	As per drawing based on site visit		
<b>26.20</b>	<b>Entrance Gate</b>	As per drawing based on site visit		

**PREFERRED MAKES OF BOUGHT OUT ITEMS**

<b>Item Description</b>	<b>Makes</b>
<b>MILK &amp; CREAM RECEPTION, PROCESSING</b>	
SS MILK, CIP & HOT WATER PUMPS	ALFA LAVAL/ GEA/ APV/ FRISTAM / IDMC
PHE TYPE MILK CHILLER / PASTEURIZER	TETRA PAK/ ALFA LAVAL/ KELVION / IDMC
PHE TYPE CREAM CHILLER / PASTEURIZER	ALFA LAVAL / TETRA PAK/ KELVION / IDMC
PHE/THE TYPE WATER & CIP SOLUTION HEATER	TETRA PAK/ KELVION / ZONAM/ HRS /ALFA LAVAL / IDMC
MILK & CIP HOSES	SAINT GOBIN / BLAUDIECK / GECITECH / MTG
CIP RETURN PUMP (SELF PRIMING)	ALFA LAVAL /APV / GEA / FRISTAM /IDMC
TRI-PURPOSE CENTRIFUGE (SELF CLEANING) & BACTOFUDGE	GEA WESTFALIA / ALFA LAVAL/ TETRA PAK / ANDRITZ
EPS / PUF INSULATION MATERIALS	FRICK / ICEMAKE / BLUESTAR / BEARDSSELL
SADDLES FOR COLD INSULATION	SUPERTHERM (LLOYD) / BEARDSSELL/
PPGI PUF PANEL	FRICK / ICEMAKE / BLUESTAR / BEARDSSELL
RESIN BONDED MINERAL WOOL	LLOYD / UP TWIGA / ROCKWOOL
COLD STORE DOORS & HATCH DOOR	METAFLEX / MIV
MILK SILO AGITATOR (SIDE MOUNTED, SLOW SPEED)	STELZER / NORD / INOXPA/PRG
POUCH FILLING MACHINES	SAMARPAN / NICHROME / RMC
MILK HOMOGENIZER	NIRO - SOAVI / TETRAPAK /APV / FBF
CURD CUP PACKING MACHINE	SAMARPAN /ISF / RMC
POWDER BLENDER	FRISTAM / ALFA LAVAL / IDMC
<b>INSTRUMENTATION, CONTROLS &amp; AUTOMATION</b>	
VFD	SIEMENS / SCHNEIDER / DANFOSS / Allan Bradly
LEVEL TRANSMITTER & INDICATOR	E&H / EMERSON / ANDERSON NEGLE
TEMPERATURE / PRESSURE TRANSMITTER	E&H / EMERSON / ANDERSON NEGLE
CONDUCTIVITY & PH TRANSMITTER	E&H / EMERSON / ANDERSON NEGLE
DENSITY TRANSMITTER	E&H / EMERSON / SIEMENS
RTD	ALTOP / GIC / RADIX
PID CONTROLLER	YOKOGAWA / JUMO / TATA HONEYWELL
FLOW SWITCH	DANFOSS / SWITZER / IFM, GMBH/ ANDERSON NEGLE
LEVEL SWITCH (FLOAT TYPE & VIBRATING FORK TYPE)	E & H, ANDERSON NEGLE , P & F E&H / EMERSON / SIEMENS / PUNE TECTROL ( ONLY FOR FLOAT TYPE )/ ANDERSON NEGLE /SAPCON
VORTEX / MAGNETIC FLOW METER	E&H / EMERSON / SIEMENS / ANDERSON NEGLE

MASS FLOW METER	E&H / EMERSON / SIEMENS /YOKAGAWA
CONTROL VALVE	SAMSON /DEMBLA
PRESSURE SWITCH / TEMP. SWITCH / THERMOSTAT	DANFOSS / SWITZER / INDFOSS
PRESSURE & TEMPERATURE GAUGE	GIC / WIKA / WAAREE
DUAL TYPE PRESSURE / TEMP GAUGES	GIC / WIKA/ WAAREE
LOAD MANAGER / POWER / ENERGY MONITOR	ROCKWELL / SIEMENS / ABB / L&T / CONZERV / SCHNEIDER
PC (PERSONAL COMPUTER)	COMPAQ/HEWLETT-PACKARD/IBM LENEVO/ ACER / DELL
DCS SYSTEM	SCHNEIDER /SIEMENS /ROCKWELL (ALLEN BRADLEY)
<b>ELECTRICALS</b>	
ELECTRIC MOTORS	SIEMENS / CROMPTON / ABB
AIR CIRCUIT BREAKER	SCHNEIDER / SIEMENS/L&T
MCCB	SCHNEIDER / SIEMENS/L&T
CONTACTORS	SIEMENS / SCHNEIDER/L&T
STARTER OVERLOAD RELAYS	SIEMENS / SCHNEIDER/L&T
TIMERS ELECTRONIC	SIEMENS / SCHNEIDER/L&T
SWITCH FUSE UNITS	SIEMENS / SCHNEIDER/L&T
MCBS	SCHNEIDER / SIEMENS /L&T/HAVELLS
PUSH BUTTONS	TEKNIC / ABB / SCHNEIDER / GE / ESBEE
INDICATING LAMPS (LED)	TEKNIC / SCHNEIDER
DIGITAL AMMETER & VOLTMETER	CONZERV / MECO / HPL SOCOMEC / RISHABH
ANALOG AMMETER & VOLTMETER	RISHABH / IMP / MECO / AE / EE
DIGITAL ENERGY METER	CONZERV/L&T / HPL SOCOMEC / SIEMENS
PVC CONDUIT & ACCESSORIES	PRECISION / CLIPSAL / P – PLAST / POLYCAB
POWER FACTOR METER	RISHABH / IMP / MECO / AE / CONZERV
CURRENT TRANSFORMER	KAPPA / MECO / AE / IMP / INDCOIL /BHARTI
LT POWER CABLES	POLYCAB / RPG ASIAN / HAVELL'S / KEI
LT COPPER CONTROL CABLES	POLYCAB / RPG ASIAN / HAVELL'S / KEI
SIGNAL & INSTRUMENT CABLE	POLYCAB / ICON /KEI/ HAVELL'S
POWER CAPACITORS	EPCOS / SCHNEIDER / KHATAU JHANKAR / SIEMENS / UNISTAR
APFC RELAY	SCHNEIDER /BELUKE / EPCOS / L&T / PHASITRON/ SIEMENS
CABLE TRAY	INDIANA / MEK / PILCO / ELCON / METALICA PRESSINGS / POWER CONTROLS / SILVER LINE
ISOLATING SWITCHES	SIEMENS / L&T / ABB / SCHNEIDER
HRC FUSES	L&T / SIEMENS / EE / C&S / BUSMANN / GE POWER
PLUG & SOCKET	LEGRAND / CLIPSAL/ SCHNEIDER / BCH / HENSEL

TERMINAL BLOCKS	WAGO / CONNECT WELL / ELMEX
ROTARY SELECTOR SWITCH	KAYCEE / SALZER / L&T / SIEMENS
CABLE GLANDS	COMMET / EX-PROTECTA / DOWELS / BRACKO
CABLE LUGS	DOWELS / COMMET
MECHANICAL INTERLOCK	L&T / SCHNEIDER / ABB /SIEMENS
ELECTRONIC SOFT STARTER	DANFOSS / L&T/ SIEMENS / ALLAN BRADLY / SCHNEIDER / ABB
SERVO VOLTAGE STABILIZER	EMERSON/SUVIK / HI-REL / ASABA/ KRYKARD
UPS	EMERSON-LIEBERT / HI-REL / APC / SUVIK / NUMERIC
SMF BATTERY	YUASA-ROCKET / FURUKAWA / EXIDE
HT VCB	Siemens /ABB / SCHNIEDER
TRANSFORMER	VOLTAMP / ABB/ TRANSFORMER & RECTIFIER
DG SET	CUMMINS / KIRLOSKAR GREEN / CROMPTION GREAVES
<b>VALVES &amp; PIPES (MS &amp; GI)</b>	
WATER VALVES ( BUTTERFLY / BALL)	AUDCO / SAUNDERS / INTERVALVE / BDK / CRESCENT / FESTO / DELVAL
WATER VALVES ( DIAPHRAGM)	SAUNDERS / BDK
NON-RETURN VALVE FOR WATER	AUDCO / INTERVALVE / BDK / LEADER
WATER FOOT VALVE	KIRLOSKAR / GG / LEADER
GI PIPES FOR WATER	TATA / JINDAL
MS PIPES FOR AIR, STEAM, CONDENSATE	TATA / JINDAL
NRV FOR AIR / OIL LINE	AUDCO / LEADER
SOLENOID VALVE FOR WATER LINE	DANFOSS / ROTEX / BURKERT / ASCO/FESTO
HOT WATER PIPE/ GLOBE VALVES	AUDCO / SPIRAX / ARMSTRONG, USA / BDK
<b>SS PIPES &amp; VALVES</b>	
SS PIPES	APEX TUBES / BHANDARI / HEAVY METAL / RATNAMANI/ RENSA
SS SEAT TYPE PNEUMATIC VALVES (MIX PROOF, TWO WAY & THREE WAY)	GEA TUCHENHAGEN / ALFA LAVAL/ APV/ TETRAPAK / IDMC / CIPRIANI
PNEUMATIC SS BUTTERFLY VALVES	GEA TUCHENHAGEN / ALFA LAVAL/ APV/ TETRAPAK / IDMC/ CIPRIANI
SS MANUAL SEAT & BUTTERFLY VALVES & FITTINGS	ALFA LAVAL / IDMC
<b>AIR COMPRESSORS &amp; AIR LINE FITTINGS</b>	
AIR COMPRESSOR (SCREW)	INGERSOL RAND /ATLAS COPCO
REFRIGERATED AIR DRYER	INGERSOL RAND / KAISER/ ATLAS COPCO

AIR LINES ACCESSORIES	FESTO / SMC
AUTO DRAIN VALVE	ULTRA FILTER / ZANDER/HYDINT
<b>WATER TREATMENT PLANT</b>	
WATER RO PLANT/ SOFTENING	ION EXCHANGE / THERMAX
HYDROFLOW SYSTEM	GRUNDFOS / MATHER & PLATT
<b>REFRIGERATION SYSTEM</b>	
SCREW COMPRESSOR UNIT	MYCOM / YORK / GEA GRASSO / FRICK
SEMI WELDED TWIN PLATE AMMONIA CONDENSER	ALFA LAVAL / KELVION
COOLING TOWER	WALCO / MIHIR / ADVANCE / GEA/ BALTIMOR
WATER PUMPS	KIRLOSKAR/BEACON / WILO
AMMONIA EVAPORATOR AIR COOLER	BLUE STAR/STAR COOLER/EVAPCO
<b>STEAM GENERATOR &amp; OTHER COMPONENTS</b>	
BOILER	THERMAX/ JNM / BALKRISHNA BOILER
STEAM VALVES	AUDCO / JNM/ SPIRAX / ARMSTRONG / BDK
PRS	JNM/ THERMAX
<b>LABORATORY EQUIPMENT</b>	
SODIUM & POTASSIUM ANALYZER	THERMO SCIENTIFIC /ORION
ACIDOMETER	FOSS ELECTRIC / METROHM
PH METER	FOSS ELECTRIC / METTLER / METROHM
MILK SCANNER	FOSS ELECTRIC / PERTEN INSTRUMENT
LAB FURNITURE	GOWARDHANDAS / GODREJ
<b>MISCELLANEOUS ITEMS</b>	
GEARED MOTOR / GEAR BOX	PBL / POWER MASTER / ELECON / IC BAUER/ BON FIGOLIC / EURO DRIVES
HOT WATER-WATER MIXING BATTERY	ARMSTRONG/ SPIRAX/ JN MARSHALL / SWASTIK
STRUCTURAL STEEL	SAIL / TISCO / RINL / IISCO / ESSAR
ELECTRONIC WEIGH BRIDGE (PIT LESS)	METTLER TOLEDO / SARTORIUS / ESSAE
CRATE WASHER /CAN WASHER	VISHWKARMA / SWASTIK
CRATE CONVEYING SYSTEM	VEGA / ACASARALA
MUSIC & PA SYSTEM	SONY / YAMAHA / BOSE
SS STRUCTURAL	TATA / JINDAL

**Note:** Wherever approved makes is not mentioned, Supplier has to take approval in writing from the purchaser.

**SUB SECTION – 6**  
**BATTERY LIMIT**



**BATTERY LIMITS**

Bidder will be responsible to undertake all the works involved in completing the project within the battery limits prescribed below.

**STEAM:**

Steam generation and Distribution including, PRV, HP & LP Piping, isolation valves, NRV, condensate trap, condensate piping from various equipment to boiler house, hot Insulation, cladding, support, and distribution up to all equipment shall be in the scope of supply.

**POWER:**

Power shall be made available at Two pole structure. Distribution thereafter including PCC panel, MCC, Power & Control cable (HT & LT), all equipment earthing, cable trays, SS/MS conduits, support, gland termination etc. shall be in the scope of this tender.

**RAW WATER & SOFT WATER:**

Raw water shall be made available in underground tank. Distribution thereafter including soft water generation, piping, valves, NRV, supports etc. shall be in the scope of this tender.

**MILK:**

Milk shall be provided by Purchaser at the outlet of tanker and can reception dock. Distribution thereafter including all pipes support, valves, NRV, insulation etc. shall be in the scope of this tender.

**CIP CHEMICALS:**

CIP chemical shall be made available at the outlet of concentrated lye/acid tanker. Distribution thereafter shall be in the scope of this tender.

**COMPRESSED AIR:**

Compressed Air shall be tapped from the nearest running header and distribution thereafter including SS pipes, supports, Header, flexible connection, instant fitting etc. shall be in the scope of this tender.

**REFRIGERATION:**

Generation and distribution of Chilled water including pumping, piping, cold insulation, support, cross over bridge etc. shall be in the scope of this tender.

**Civil Work:**

All type of civil work shall be in the scope of Purchaser.

**SUB SECTION – 7**  
**DEVIATION FROM TECHNICAL REQUIREMENT**

**7. Deviation from Technical Requirement**

7.01 This tender document provides guidelines for the process and equipment to be used in tender package and the “basis of design” and the “standards and specifications” define the qualitative parameters against which equipment will be required to perform.

7.02 It is incumbent on bidder to provide a fully detailed list of equipment and services, which they intend to provide a fully execute the contract in line with the tender requirement.

7.03 At various points in the tender the Purchaser has stated that alternative processes or alternative equipment will be considered. The Bidder as part of the bid document shall provide the fully detailed list of such alternatives, together with a consider rationale for employing such alternatives.

7.04 Items which deviate from the tender proposal, shall be as per design specifications of the bidder and shall be treated as a deviation from the text of this tender document. Deviated Item should fulfill the minimum performance parameters as specified in the tender.

7.05 This tender does not allow bidders to make exclusions from any part of tender packages for which they bid, and an incomplete list of equipment or an incomplete schedule of services to be provided would be considered as a non-responsive bid.

<b>Bidding Terms Deviation Statement Form</b>			
<b>Sr No</b>	<b>Clause Reference</b>	<b>Deviation</b>	<b>Remarks (Justification)</b>

**Above are the particulars of deviations from the requirements of the tender specifications. The technical specifications furnished in the bidding document shall prevail over those of any other document forming a part of our bid, except only to the extent of deviations furnished in this statement.**

Date:

**Signature of Authorised Signatory of Bidder/Supplier**

NOTE:

Above are the particulars of deviations from the requirements of the bidding conditions/ terms taken by the Bidder/Supplier. **Any statements written else.**

**Where there is no deviation, the statement should be returned duly signed with an endorsement indicating "No Deviations" above.**

**SUB SECTION – 8**  
**OPTIONAL ITEMS**

## **8. OPTIONAL ITEMS**

- 8.1 All items mentioned in the tender packages or in the basis of design as optional items shall be quoted based on equipment of the systems that are supplied "ready to pipe in". The price for such items shall include supply, installation, commissioning, and connections including all necessary piping, fitting, instrumentation, controls, utilities etc.
- 8.2 The entire system shall be designed with all provisions to include the optional items in such a way that no major changes would be required in the system. The provision shall be made in the system irrespective of whether these additional items are supplied or not. The specifications of optional items shall be the same as that of similar items mentioned in tender.
- 8.3 The cost of optional items shall not be included in the calculation of total bid price. If the Purchaser, for supply, selects optional items, the quoted price for the optional item shall include all incidental costs of installing that item as part of the contract.

**SUB SECTION – 9**  
**DRAWINGS, DATA & DOCUMENTATION**

## **6. DRAWINGS ENCLOSED WITH THE TENDER**

A set of site plan drawings is enclosed along with the tender document for bidder's reference.

### **1.1 DOCUMENTS REQUIRED FROM THE BIDDER**

#### **9.1.1 The Bidder must enclose the following Drawings with the Offer:**

- Mechanical Layout with tag number of each equipment as per BOQ
- P & ID for:
  - Past. Milk Storage section
  - HMST section
  - Curd, BM & Lassi Processing Section
  - Milk, BM & Curd Packing Section
  - Paneer Processing & Packing Section
  - Utility Generation & Distribution
  - CIP Kitchen & CIP route diagram
- GA drawings tanks & other major fabricated Equipment
- Single line diagram for electrical distribution system.
- Automation Architecture
- The bidder should follow the guideline for preparation of drawing as described by NDDDB – in general. Any deviation in thickness of material of construction and general arrangement will be specifically mentioned in the drawing as remark.

#### **9.1.2 The Bidder must enclose the following Charts/details with the Offer.**

- Load histograms/peak and average load for:
  - a) Steam
  - b) Electrical Power
  - c) Water (RO & raw)
  - d) Chilled water

Each histogram/consumption data is to be based on 24-hours basis and is to show clearly the hourly consumption, total daily consumption, peak load and average load.

- Hourly equipment wise Process Time Schedule (PTS) based on 24-hour time scale.
- Bar chart for project execution including personnel training program.

#### **9.1.3 The Bidders must enclose the following information in their Offer:**

- Category wise staff requirement for various productions and utility Section of the plant on shift and daily basis.

- Literature covering general and technical information for all equipment covered within the scope of the tender.
- Detailed calculations for selection of process and utility equipment based on utility consumption and process requirements.

**1.2 PERFORMANCE TESTS**

9.2.1 The bidder is required to detail the documentation proposed for performance tests of all major items of equipment and all major processes and services plant. This shall detail the guaranteed vs. actual throughput or output or performance (as relevant) and the tolerance of accuracy. Also, the test methods proposed to demonstrate that these guarantees have been met.

**1.3 FORMATS OF GUARANTEES:**

- Guarantees for throughput of various sections of plant supplied.
- Product quality.
- Weight and Measurement tolerance.
- Milk solid loss to ETP & Product Loss.
- Service consumption.
- Formats for performance tests.
- Procedure for carrying out the tests.
- Method of measurement
- Test duration
- Evaluation methodology

**1.4 UTILITIES CONSUMPTION**

The following tables are to be completed by the bidder and returned with bidding documents. This is mandatory and failure to comply may make the bid deemed non-responsive.

<b>Utilities Consumption Data (for 24 hrs. operation)</b>		
Steam	Peak Load Kg/hr. Average Load Kg/Hr. Total Load Kg/day Tolerance ± %	
Power	Peak Load kW Average Load (kW) Total Load kWh/day Tolerance ± %	
Soft & Raw Water (Separately)	Peak Load lt/hr. Average Load Lt/Hr. Total Load ltr. /day Tolerance ± %	
Air	Peak Load Nm3/hr. Average Load: Nm3/Hr. Total Load Nm3/day Tolerance ± %	



Chilled Water (temp in & out to be mentioned)	Peak Load TR/hr. Average Load TR/Hr. Total Load TR/day Tolerance ± %	
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**1.5 PRODUCT RECOVERY DATA (wherever applicable)**

Product loss assuming rated capacity operations follows.

Milk Loss	Filling Losses	
	Losses to ETP	

**1.6 DETAILS OF CONSUMABLE MATERIALS**

Bidder is to provide full details of all consumable materials and chemical used in the plant.

Details of Consumable Materials		
CIP chemical	Lye 100%	
	Acids 100%	

**SUB SECTION – 10**  
**PROCESS PERFORMANCE & CONSUMPTION**  
**GUARANTEE**

## **10. PROCESS PERFORMANCE & CONSUMPTION GUARANTEE**

If the plant or any part thereof does not give the agreed process performance and consumption guarantees during the warrantee period due to reasons attributable to the bidder, the bidder shall, subject to clause 10.1 and 10.2 below, the action shall be as detailed therein.

### **10.1 EQUIPMENT PERFORMANCE**

10.1.1 The satisfactory performance of the equipment/processing plant will be considered achieved if the plant operates above 98% of the rated capacity declared by bidder in the offer.

10.1.2 If the performance is between 95-98% of the rated capacity, penalty will be calculated at 2% of the rupee value of the contract, per 1% of shortfall.

10.1.3 If the performance is below 95%, the contractor will be required to upgrade the plant or replace the plant to comply with the above performance criteria. Otherwise, the plant will be deemed unacceptable.

### **10.2 SERVICES REQUIREMENT**

10.2.1 If measure demand of services in the plant is less than 102% of the consumption declared by the contractor, the buyer will accept that the service requirements has been achieved.

10.2.2 If the requirement of any of the services in the plant is between 102% and 105% of the declared demand, penalty will be charged at 2% of every 1% rise in consumption for each of the services which falls in the category of excessive demand. To this calculation, only the main services, steam, power, and chilled water will be considered.

10.2.3 If the measured demand for services and energy is above 105%, the contractor will be required to up-grade the plant or replace the plant to comply with the declared performance criteria. Otherwise, the plant will be deemed un-acceptable.

### **10.3 MAXIMUM LIABILITY**

10.3.1 The maximum liability of bidders on all counts of penalties including above, Liquidated Damages clause and other liabilities of any kind shall not exceed 10% of Contract value.

**SUB SECTION – 11**  
**CRITERIA FOR TECHNICAL EVALUATION OF BIDS**

## **11. TECHNICAL EVALUATION OF BIDS**

The Purchaser will check the technical merits of the bids based on the information supplied by the bidders taking in to account the following factors:

- a. Suitability of the process with regards to ultimate product quality conforming to the standards specified in the tender.
- b. Specifications of individual equipment as well as the system as a whole for material of construction, throughput, operating parameters, level of automation etc.
- c. Energy efficiency of individual equipment and system as a whole.
- d. Determination of filling accuracy of the product packaging machines and product losses.
- e. Product losses during processing and product manufacturing for individual equipment and ultimately in the effluent system.
- f. Consumption of consumable materials.
- g. Space requirement.
- h. Cost of spare parts.
- i. Advance technology offered.
- j. Utility and raw material consumptions provided by the bidder.

**SUB SECTION-12**  
**BIDDER'S MEETING**

## **12. BIDDERS MEETINGS**

Details of the proposed pre-bid meeting are contained in instruction to bidder's section- II. This will be general meeting at which all Purchasers of the tender document may attend.

- a. Bidders may also request technical discussions with the Purchaser/ client's project team before the tender closing date. Subjects for discussion at the technical meeting may include:
- Project management
  - Technical clarifications
  - Scope of supply
  - Concept of the design
  - Processes
  - Equipment designs
  - Equipment Bidders
  - Automation
  - Plant management
  - Quality control
  - Existing equipment to be utilized in the job
  - Battery limits
  - Acceptable alternatives
  - Equipment Bidders

This will be the only opportunity for bidders to discuss the project in detail with Purchaser before the commercial bid opening, and all technical matters should be resolved at meetings.

**SUB SECTION-13**  
**TECHNICAL QUALIFICATION APPLICATION**



**Table 3  
Technical Competency**

<b>Classifications</b>		
<b>SN</b>	<b>Category</b>	<b>Please (v)</b>
1	Manufacturer	
2	Clearing & Forwarding Agent	
3	Stockist	
4	Wholesale Dealer	
5	Authorized Reseller	
6	Authorized Service Agent	
7	Retailer	
8	Trader	
9	Others (please specify)	
<b>Details on Plant</b>		
<b>SN</b>	<b>Plant</b>	<b>Details</b>
1	Location	
2	Description	
3	Type	
4	Size of building	
5	Is property on lease or free hold?	
6	If on lease, indicate date of expiry of lease in each case.	
7	Others (please specify)	

<b>Plant Facilities</b>			
<b>SN</b>	<b>Facilities</b>	<b>Ans</b>	<b>Remark</b>
1	Space available for manufacturing (in m <sup>2</sup> )		
2	Space available for storage (in m <sup>2</sup> )		
3	Space available for inspection (in m <sup>2</sup> )		
4	Are buildings fire resistant? (Y/N)		
5	Are premises approved by Municipal fire Department? (Y/N)		
6	Are buildings under Municipal fire protection? (Y/N)		
7	Are power & fuel supply adequate to meet production requirements? (Y/N)		
8	Are adequate transportation facilities available? (Y/N)		
9	Are safety measures adequate for performance of proposed contract? (Y/N)		
10	Is adequate material handling equipment available? (Y/N)		
<b>Testing Facilities</b>			
<b>SN</b>	<b>Facilities</b>	<b>Details</b>	
1	List testing equipment available		
2	Give details of tests to be carried out on items offered.		
3	Details of the testing organizations available.		
<b>Quality Control Organization</b>			
<b>SN</b>	<b>Quality Control Method</b>	<b>Response</b>	

1	Are goods offered subject to Batch Test, Random Sampling or full 100% test for quality?	
2	Are tests carried out by factory employees or by a separate testing agency?	
3	Are independent Quality Control Organization checks made and certificates issued?	

**Manufacturing Capacity**

SN	Description of Equipment	Capacity	Units Manufactured		
			Current year	Last Year	2 <sup>nd</sup> last year
1					
2					

**Personnel/ Organization**

SN	Personnel in	Numbers in levels		
		Managerial	Supervisory	Skilled Workmen
1	Production			
2	Marketing			
3	Installation and commissioning			
4	Service			
5	Spare parts			
6	Administrative			

**Service Center nearest to our site location**

<b>Location</b>	
<b>Phone no</b>	

<b>SN</b>	<b>Information required on</b>	<b>Details</b>
1	Number of skilled employees	
2	Number of unskilled employees	
3	Number of engineering employees	
4	Number of administrative employees	
5	List of special repair/ workshop facility available	
6	The storage space available for spare parts (in m <sup>2</sup> )	
7	Value of minimum stock of spares available at all the service centres in respective currency	
8	List of the models/ types of equipment serviced by the Centre in last 2 years	

<b>References<sup>2</sup></b>					
<b>SN</b>	<b>Name of Organization</b>	<b>Address, Telephone, Fax, Contact Person</b>			
1					
2					
<b>List of components usually subcontracted</b>					
1					
2					
<b>Workload for the current and forth coming financial year on quarterly basis</b>					
<b>SN</b>	<b>Financial Year</b>	<b>Quarterly Workload as % of Total Capacity</b>			
		<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>
1	Current Financial Year				

<sup>2</sup> Names of two buyers to whom similar equipment are supplied, installed and commissioned in the past and to whom reference may be made by the Purchaser regarding the Bidder/Supplier's technical and delivery ability:

2	Next Financial Year				
---	---------------------	--	--	--	--

**List of major projects of similar size and nature previously executed**

SN	Name of the client	Project	Year of award	Year of completion	Capacity/ Products	Value (Currency)
1						
2						
3						
4						

**Type of equipment manufactured and supplied (M & S) during last 2 years**

SN	Equipment	Capacity	Qty	Projects	On Hand Order Qty
1					
2					
3					
4					

**Type of equipment manufactured, supplied, installed, and commissioned (MSIC)**

SN	Equipment	Capacity	Qty	Projects	On Hand Order Qty
1					
2					
3					
4					

**Schedules for furnishing technical data and certified drawings after receipt of orders**

1	
2	

<b>Number of weeks required for preparing a bid proposal</b>	
--	--

**SECTION-VI**  
**BIDDING TERMS DEVIATION**

<b>Bidding Terms Deviation Statement Form</b>			
<b>Sr No</b>	<b>Clause Reference</b>	<b>Deviation</b>	<b>Remarks (Justification)</b>

Date:

**Signature of Authorised Signatory of Bidder/Supplier**

NOTE:

Above are the particulars of deviations from the requirements of the bidding conditions/ terms taken by the Bidder/Supplier.

Where there is no deviation, the statement should be returned duly signed with an endorsement indicating "No Deviations" above.

## **SECTION-VII**



**SECTION-VII**  
**QUALIFICATION APPLICATION**

## Qualification Application Form

You must submit this form (Table 2 and 3), duly filled in, along with the supporting as per following checklist given in Table 1:

<b>Table 1 Checklist for Supporting's</b>	
<b>Supporting Required</b>	<b>Please (v)</b>
Latest Balance sheet filed with (Name of Authority) on (Date)	
Latest Profit & Loss Statement <b>from (date) to (date)</b> filed with (Name of Authority) on (date).	
Audited copies <sup>3</sup> of annual accounts and P & L account of <b>past 3 years</b>	
Certificate of Financial Soundness from Bankers of Bidder/Suppliers	
Income Tax Clearance Certificate (Latest)	
Sales Tax Clearance Certificate (Latest)	
Details of Income Tax Registration	
Details of GST Registration	
Organization Chart	
Annual Report of last three years	

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<sup>3</sup> Indigenous Bidder/Suppliers must attach copy of accounts audited under section **44 AB of Income Tax Act**. In case the accounts need not be audited, a Chartered Accountant or Manager of a Nationalized Bank should attest the information in this statement.

<b>Table 2 Financial Soundness</b>			
<b>General Information</b>			
	<b>Name</b>		
	<b>Address</b>		
	<b>Phones</b>		
	<b>Mobile</b>		
	<b>Fax</b>		
	<b>E-mail</b>		
	<b>Contact Personnel with designation</b>		
<b>Financial Information</b>			
S N	Description		Value (Rs)
1	<b>Cash Balance</b>	In Bank	
		In Hand	
		Total	
2	<b>Fixed Assets</b>	Gross	
		Net	
3	<b>Current Assets</b>	Inventories	
		Others	
		Total	
4		Bank Cash Credit	
		Sundry creditors	

	<b>Current liabilities</b>	Others	
		Provisions	
		Contingent Liabilities (including claims not acknowledged, please specify)	
		Total	
5	<b>Capital</b>	Share capital	
		Free reserves	
		Other reserves (please specify)	
6	Term loans from financial institutions and banks		
7	Working capital		
8	Net worth		
9	Debtors and advances considered good	More than 6 months	
		Less than 6 months	

<b>Significant Financial Ratios</b>			
<b>SN</b>	<b>Ratio</b>	<b>Definition</b>	<b>Value</b>
1	Current	Current Assets to Current Liabilities	
2	Acid Test	(Cash + temporary investment held in lieu of cash + current receivable) / current liabilities	
3	Solvency	Total Liability to Net Worth	
<b>Net Profit before Tax</b>			
<b>SN</b>	<b>Period</b>		<b>Value</b>
1	Current period		
2	During the last Financial Year		

3	During the year before last Financial Year	
<b>Financial Arrangements</b>		
<b>SN</b>	<b>Resources</b>	<b>Amount</b>
1	Own	
2	Bank Credits	
3	Others (Specify)	

<b>Sales</b>			
SN	Category of Customers	Value of orders to be executed/ anticipated Sales	
		Current	Next Financial Year
1	Government Department		
2	Commercial		
3	Others		
	Total		
<b>Annual Turnover</b>			
SN	Financial Year (Please begin with current year)	Turnover	
1			
2			
3			
4			
5			
6			

<b>Rate Contracts for the items to be supplied</b>			
<b>SN</b>	<b>Organization</b>	<b>Items</b>	<b>Valid till</b>
1	Directorate General of Supplies & Disposal, Government of India.		
2	National Cooperative Consumers' Federation of India Ltd		
3	Kendriya Bhandar		
4	Central Equipment Stores Purchase Organization for State Governments		
5	GCMMF/ other co-operative Dairies		
6	Others		

**SECTION-VIII**  
**COLLABORATORS' AUTHORIZATION FORM**

## Collaborators' Authorisation Form

Reference

Dated

**Managing Director,**

**West Bengal Livestock Development Corporation Ltd.**

**ARD Campus, LB 2, Sector-III,**

**Near 16 No. water tank,**

**beside Prani Sampad Bhawan,**

**Salt Lake City,**

**Kolkata 700106 West Bengal**

Dear Sir,

Bid Reference: \_\_\_\_\_

We, (Name of the Collaborator), an established and reputable Bidder of Technology and goods (Name of Technology & Goods) do hereby authorize (Name and address of **Agents**) to bid, negotiate, and conclude the contract with you against above mentioned Bid Reference for the above technology & goods supplied by us.

No company or firm or individual other than (Name of your sole agent/ distributor) are authorized to bid, negotiate, and conclude the contract in regard to this business against this specific Bid. (Strike out this, if not applicable)

We hereby extend our full guarantee and, warranty for the technology and goods offered for supply against this invitation for bid by the above firm.

Yours faithfully,

(NAME)

For and on behalf of

(Name of Manufacturers)

Note:

This letter of authority should be on the Letterhead of the Collaborators' concern and should be signed by a person competent and having the power of attorney to bind the Bidder.



# **APPENDICES I**

## **Contents**

1.  
Form of BG for Performance Security
2. Form of BG Against Advance Payment
3. Contract Form
4. Pro forma of Completion Certificate
5. Form of BG for Bid Security (EMD)
6. List of acceptable Banks for Bank Guarantees From Foreign / Nationalized / Scheduled Banks

**Form of BG for Performance Security  
(On the Non-Judicial Stamp Paper as per the Stamp Act of State Government)**

Bank Guarantee Number

Date:

This deed of performance guarantee made this \_\_\_\_\_ day of 20\_\_ (Two thousand \_\_\_\_\_) by (Name and address of the Bank) (herein referred to as the Bank) which expression shall unless repugnant to the context and meaning thereof includes its legal representatives, successors and assignees and the West Bengal Livestock Development Corporation Ltd., (hereinafter referred to as the WBLDCL) which expression shall unless repugnant to the context and meaning thereof include its legal representative, successors and assignees.

Whereas WBLDCL /its clients have awarded a Contract and Purchase Order bearing Number \_\_ dated \_\_\_\_\_ on (Name and address of the party) (hereinafter referred to as the 'Bidder') for the supply/ supply and erection and commissioning of \_\_. And whereas, the Bidder has agreed to submit a performance guarantee in the form of a Bank Guarantee to the WBLDCL in terms and conditions of the Bidding Document and the Contract which will be kept valid up to \_\_ calendar months from the date of Bank Guarantee (the period should be till end of warranty period). And whereas, the Bank and its duly constituted agent and officer has already read and understood the contract made between the WBLDCL and the Bidder.

In consideration of the WBLDCL having agreed to award the contract/purchase order on the Bidder, we, (name of the Bank), do hereby guarantee, undertake, promise and agree to with the WBLDCL, its legal representatives, successors and assignees that the within named (name of the Bidder) their legal representatives and assignees will faithfully perform and fulfill everything within the Bidding Document and the Contract/Purchase order on their part to be performed or fulfilled, at the time (time being the essence of the contract) and in the manner therein provided, do all obligations thereunder and we further undertake and guarantee to make payment to the WBLDCL of Rs \_ (Rupees \_\_ only) being the 10% of the contract value, without any demur in case the Bidder, their legal representatives and assignees do not faithfully perform and fulfill everything within the Bidding Document and the Contract/Purchase order on their part to be performed or fulfilled, at the time and in the manner therein provided and do not willfully and promptly do all obligations hereunder.

In case, the Bidder fails to perform or fulfill the Contract/ Purchase Order as per the terms and conditions agreed upon, the WBLDCL is entitled to demand an amount equal to 10% of the Contract value from the Bidder and the demand made by the WBLDCL by itself will be conclusive evidence and proof that the Bidder has failed to perform or fulfill his obligations and neither the Bidder nor the Bank will be entitled to raise any dispute regarding the reasons for the failure of performance or fulfillment, on any ground.

We, (name of the Bank), do hereby undertake to pay an amount equal to 10% of the order value, being the amount due and payable under this guarantee without any demur, merely on a demand from the WBLDCL which has to be served on us before the expiry date of Bank Guarantee i.e. --/--/-- stating that the amount claimed is due by way of non-performance of the contractual obligations as aforesaid by the Bidder or by reason of the Bidder's failure to perform the said contractual commitments/Purchase Order, any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs -- (Rupees \_ only) being the amount equal to 10% of the total order value.

We, (name of the Bank), further, agree that the performance guarantee herein contained shall remain in full force and effect for a period of -- calendar months from the date of Bank guarantee (the period should be till end of warranty period) and till the WBLDCL certifies that the terms and conditions of the said contract/ purchase order have been fully and properly carried out by the said Bidder and accordingly discharge the guarantee, unless a demand or claim under this guarantee is made on us in writing by the WBLDCL on or before \_ , we shall be discharged from all liabilities under this performance guarantee thereafter.

We, (name of the Bank), further agree with the WBLDCL that the WBLDCL shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Bidding Document and the Contract/Purchase order or to extend the time of performance by the said Bidder from time to time or postpone for any time or from time to time and any of the power exercisable by the WBLDCL against the Bidder and to forebear or enforce any of the terms and conditions relating to the said Bidding Document and the Contract/Purchase Order and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Bidder, or for any forbearance, act or omission on the part of the WBLDCL to the said Bidder by any such matter or thing whatsoever which under the law relating to sureties would but for this provision have effect of so relieving us.

This guarantee shall be in addition to and without prejudice to any other securities or remedies which the WBLDCL may have or hereafter possess in respect of the goods supplied or intended to be supplied and the WBLDCL shall be under no obligation to marshal in favor of the Bank any such securities or funds or asset that the WBLDCL may be entitled to receiving or have a claim upon and the WBLDCL at its absolute discretion may vary, exchange, renew, modify or refuse to complete to enforce or assign any security or instrument.

The Bank agrees that the amount hereby guaranteed shall be due and payable to the WBLDCL on serving us with a notice before expiry of bank guarantee, requiring the payment of the amount and such notice shall be deemed to have been served on the Bank either by actual delivery thereof to the Bank or by dispatch thereof to the Bank by Registered Post at the address of the Bank.

In order to give full effect to the provisions of this guarantee the Bank hereby waives all rights inconsistent with the above provisions and which the Bank might otherwise as a guarantor be entitled to claim and enforce.

We, \_\_, undertake to renew the Bank Guarantee provided the request for the Bidder before the expiry of Bank Guarantee makes renewal.

We, \_\_, (Name of the bank) lastly undertake not to revoke this guarantee during its currency except with the previous consent of the WBLDCL in writing and the guarantee shall be a continuous and irrevocable guarantee up to a sum of Rs \_\_ (Rupees \_\_ only).

Notwithstanding anything stated herein before: (i) our liability under this guarantee is restricted to Rs \_\_ (Rupees \_ only) (ii) The Bank Guarantee shall remain in force till \_\_/\_\_/20\_\_ and (iii) The Bank is liable to pay the guaranteed amount or any part thereof under this Bank Guarantee only if the WBLDCL serves upon the bank a written claim or demand on or before \_\_.

Signature  
Seal  
Code Number  
Date:

Place:

Notes:

Bidders should ensure that the bankers, before submission of the bank guarantees, put seal and code number of the signatory.

Stamp paper is not required in case of foreign Bidders.

The value of stamp duty should be as per latest stamp act of local state government where the bank guarantee issued.

**Form of BG Against Advance Payment  
(On the Non-Judicial Stamp Paper as per the Stamp Act of State Government)**

Bank Guarantee Number \_\_\_\_\_

Date: \_\_\_\_\_

In consideration of the West Bengal Livestock Development Corporation Ltd., hereinafter called 'WBLDCL' having agreed to grant an advance of Rs \_ Rupees only) to M/s \_\_\_\_ (hereinafter called the said Bidder) under the terms and conditions of a contract/purchase order Number \_\_ dated \_ made between the WBLDCL and M/s \_ for the supply/ supply, erection and commissioning (hereinafter called the 'said contract/purchase order') on production of a Bank Guarantee for Rs \_ (Rupees \_ only). We \_\_ (hereinafter called 'the Bank') do hereby undertake to pay the WBLDCL an amount not exceeding Rs \_ (Rupees \_\_\_\_ only) against any loss/ damage caused to or suffered would be caused or suffered by the WBLDCL by reason of any breach by the said Bidder(s) of any of the terms and conditions contained in the said contract/ purchase order.

We, \_\_, do hereby undertake to pay the amounts due and payable under this guarantee without any demur merely on a demand from the WBLDCL which has to be served on us before the expiry date of Bank Guarantee i.e. \_\_ stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by the WBLDCL by reasons of any breach by the said Bidder(s) of any of the terms and conditions contained in the contract/purchase order or by reasons of the Bidder(s) failure to perform the said contract/purchase order, any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee shall be restricted to an amount not exceeding Rs \_ (Rupees \_\_ only).

We, \_\_, further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said contract/ purchase order and that it shall continue to be enforceable till all the dues of the WBLDCL, under, or by virtue of the said contract/purchase order have been fully paid and it's claims satisfied or discharged or till the WBLDCL certifies that the terms and conditions of the said contract/Purchase Order have been fully and properly carried out by the said Bidder(s) and accordingly discharge the guarantee unless a demand or claim under this guarantee made on us in writing on or before \_ , we shall be discharged from all liability under this guarantee thereafter.

We, \_\_, further agree with the WBLDCL that the WBLDCL shall have the fullest liberty without our consent and without affecting in any manner our obligation hereunder to vary any of the terms and conditions of the said contract/Purchase Order to extend time of performance by the said Bidder from time to time or to postpone for any time or from time to time any of the power exercisable by the WBLDCL against the said Bidder and to forbear or enforce any of the terms and conditions relating to the said contract/Purchase Order and we shall not be relieved from our liability by reason of any such variation, or extension or for any forbearance, act of omission on the part of the WBLDCL or any indulgence by the WBLDCL to the said Bidder or by any such matter or thing whatsoever which under the law relating to sureties would but for this provision have effect of so relieving us.

The Bank agrees that the amount hereby guaranteed shall be due and payable to the WBLDCL on serving us with a notice before expiry of Bank Guarantee requiring the payment of the amount and such notice

shall be deemed to have been served on the Bank either by actual delivery thereof to the Bank or by dispatch thereof to the Bank by registered post at the address of the Bank.

We, \_\_\_\_, lastly undertake not to revoke this guarantee during its currency except with the previous consent of the WBLDCL in writing.

We, \_\_\_\_, undertake to renew the Bank Guarantee provided the request for the said Bidder before the expiry of Bank Guarantee makes renewal.

Notwithstanding anything stated herein before: (i) our liability under this Bank guarantee is restricted to Rs. \_\_ (Rupees \_\_ only) (ii) The Bank Guarantee shall remain in force till \_\_\_\_20\_\_\_\_ and (iii) The Bank is liable to pay the guaranteed amount or any part thereof under this Bank Guarantee only if the WBLDCL serves upon the bank a written claim or demand on or before \_\_\_\_\_.

Signature

Seal

Code Number

Place:

Date:

Notes:

Bidders should ensure that the bankers, before submission of the bank guarantees, put seal and code number of the signatory.

Stamp paper is not required in case of foreign Bidders.

The value of stamp duty should be as per latest stamp act of local state government where the bank guarantee is issued.

## **Contract Form**

### **(On the Non-Judicial Stamp Paper as per the Stamp Act of State Government)**

THIS AGREEMENT made the \_\_ day of \_\_ 20\_\_ between \_\_\_\_\_, (hereinafter "the Purchaser") of the one part and \_\_ (hereinafter "the Bidder") of the other part.

WHEREAS the Purchaser is desirous that certain goods and ancillary services should be provided by the Bidder, viz (brief description of goods and services) and has accepted a bid submitted by the Bidder in response to the Purchaser's Bidding Document Reference \_\_\_\_\_ for the supply of those goods and services in the sum of Rs \_ (Rupees \_\_) (hereinafter "the contract price").

NOW THIS AGREEMENT WITNESS AS FOLLOWS:

In this agreement words and expressions shall have the same meaning as in the Terms and Conditions mentioned in Section III and Section IV and in other sections in the above-referred Bidding Document. The following documents shall be deemed to form, read, and construe as part of this agreement:

- The offer and the price schedule submitted by the Bidder and as accepted by the Purchaser.
- The schedule of requirement/ list of items and the technical specifications in the above referred Bidding Document.
- The terms and conditions in the above-referred Bidding Document.
- The Purchaser's purchase order Number \_\_\_\_\_: dated

In consideration of the payments to be made by the Purchaser to the Bidder as hereinafter mentioned, the Bidder hereby covenants with the Purchase to provide the goods and services and to remedy defects therein in conformity in all respects with the provisions of the Purchaser's purchase Order and Bidding Document.

The Purchaser hereby covenants to pay the Bidder in consideration of the provision of the goods and services and the remedying of defects therein, the contract price or such other sum as may become payable under the provisions of the purchase order at the times and in the manner prescribed in the Purchase order and bidding document.

IN WITNESS whereof the parties hereto have caused this agreement to be executed in accordance with their respective laws the day and year first above written.

Signed, sealed, and delivered by the authorized signatory for the Purchaser

In the presence of:

- 1.
- 2.

Signed, sealed, and delivered by the authorized signatory for the Bidder

In the presence of:

- 1.
- 2.

**Pro forma of Completion Certificate**  
**(To be issued by the Purchaser after successful commissioning of the supplied goods)**

Reference

Date

Subject: Certificate of commissioning of supplied goods/ PLANT

This is to certify that the plant section as detailed below has been received in good condition along with all the standard and special accessories (subject to short supply mentioned) in accordance with the Contract/ Specifications. The same has been installed and commissioned. The Performance Test has been done to our entire satisfaction and operators have been trained to operate the plant. The Bidder has fulfilled his contractual obligations satisfactorily (subject to unfulfilled obligations mentioned).

<b>Completion Certificate</b>		
<b>S N</b>	<b>Item</b>	<b>Description</b>
1	Contract Number & Dated	
2	Description of the plant	
3	Quantity	
4	Bill of Lading/ AWB (for Import Contract)/ LR/ RR & Dated	
5	Name of the vessel/ transporters	
6	Consignment Note Number & Dated	
7	Name of the consignee	
8	Date of Commissioning & Performance Test	



<b>Details of short supply and recoveries to be made</b>		
<b>SN</b>	<b>Description</b>	<b>Amount to be recovered</b>
<b>1</b>		
<b>2</b>		
<b>Details of unfulfilled contractual obligations</b>		
<b>SN</b>	<b>Description</b>	<b>Amount to be recovered</b>
<b>1</b>		
<b>2</b>		

Signature

Name, Designation & Stamp

Explanatory Notes for filling up the certificates on contractual obligations of the Bidder

- Bidder has adhered to the time schedule specified in the contract in dispatching the documents/ drawings pursuant to technical specifications.
- Bidder has installed and commissioned the plant in time (within the period specified in the contract) from the date of the intimation by the Purchaser in respect of the installation and commissioning of the units.
- Training of personnel as per contractual obligation by the Bidder has been done.
- In the event of documents having not been supplied or installation and commissioning of the plant have been delayed on account of the Bidder, the extent of delay should always be mentioned.

## Form of Bank Guarantee for Bid Security

(On Non-Judicial Stamp Paper as per the Stamp Act of Local State Government)

Bank Guarantee Number:

Date:

This Deed of Guarantee made this \_\_\_\_ day of 2022 (two thousand and twenty Two) by (Name and the address of the bank), hereinafter referred to as the Bank, which shall unless repugnant to the context and the meaning thereof include its legal representatives, successors and assignees and **the West Bengal Livestock Development Corporation Ltd.**, (hereinafter referred to as the WBLDCL) which expression shall unless repugnant to the context and meaning thereof include its legal representatives, successors and assignees.

Whereas the WBLDCL has invited Bids for the supply/ supply & installation of \_\_, by the Invitation to bid number \_\_\_\_\_

AND WHEREAS (Name and Address of the Bidder/Supplier) who having submitted their bids (hereinafter referred to as the Bidder/Supplier) and have agreed to deposit to the WBLDCL an amount indicated in the Invitation to bid as per the terms and conditions of the Bidding Documents. AND WHEREAS the WBLDCL is also willing to accept a Bank guarantee in lieu of payment by demand draft of an amount equivalent to the amount of Bid security required to be deposited by the Bidder/Supplier to the WBLDCL and the guarantee shall be kept **valid for 60 days** after the day of the opening of the bids.

In consideration of the WBLDCL having agreed to consider the Bid proposals having submitted by the Bidder/Supplier without depositing the amount of Bid security and against this Bank guarantee, we (name and address of the Bank) hereby undertake and guarantee to make payment to the WBLDCL the amount of Bid security or any part thereof not deposited by the Bidder/Supplier to the WBLDCL at any time (time being the essence of the Contract) when the WBLDCL asks for the same as per the terms and the conditions of the Bidding Document within 120 days from the date of opening of bids.

The Bank further undertakes not to revoke this guarantee during its currency except with the previous consent of the WBLDCL in writing and the guarantee shall be continuous and irrevocable guarantee up to a sum of Rs \_ (Rupees \_ only) provided always that any indulgence or forbearance on the part of the WBLDCL to the said Bidder/Supplier, with or without the consent of the Bank shall not prejudice or restrict remedies against the bank nor shall the same in any event be a ground of defence by the Bank against the WBLDCL.

In case the WBLDCL puts forth a demand in writing on the Bank for the payment of amount full or in part against this bank guarantee, the Bank will consider without demur that such demand by itself is a conclusive evidence and proof that the Bidder/Supplier has failed in complying with the terms and conditions stipulated by the WBLDCL in its Bidding Document and payment will be made to the WBLDCL without raising any disputes regarding the reasons for such failure on the part of the Bidder/Supplier.

The Bank shall not be discharged or released from this guarantee by any arrangement between the Bidder/Supplier and the WBLDCL with or without the consent of the bank or any alterations in the obligations of the parties or by an indulgence, forbearance shown by the WBLDCL to the Bidder/Supplier.

This guarantee shall be in addition to and without prejudice to any other securities or remedies which the WBLDCL may have or hereafter possess against the Bidder/Supplier and the WBLDCL shall be under no obligations to marshal in favor of the Bank any such securities or fund or asset that

the WBLDCL at its absolute discretion may vary, exchange, renew, modify, or refuse to complete or enforce or assign any security or instrument.

The Bank agrees that the amount hereby guaranteed shall be due and payable to the WBLDCL on serving us with a notice before expiry of Bank Guarantee requiring the payment of the amount and such notice shall be deemed to have been served on the Bank either by actual delivery thereof to the Bank or by dispatch thereof to the Bank by Registered Post at the address of the Bank.

In order to give full effect to the provisions of this guarantee the Bank thereby waives all rights inconsistent with the above provisions and which the Bank might otherwise as a guarantor be entitled to claim and enforce.

The guarantee shall remain in force until \_ and the bank undertakes to renew the Bank Guarantee provided the Bidder/Supplier before the expiry of Bank Guarantee makes the request.

Notwithstanding anything stated herein before: (i) our liability under this guarantee is restricted to Rs \_ (Rupees \_ only) (ii) The Bank Guarantee shall remain in force till \_ 20 \_ and (iii) The Bank is liable to pay the guaranteed amount or any part thereof under this Bank Guarantee only if the WBLDCL serves upon the bank a written claim or demand on or before \_.

Place: SIGNATURE  
Seal Code Number.

Note:

Bidder/Suppliers should ensure that the banker before submission of the bank guarantees puts the seal and code number of signatory.

Stamp paper is not required in case of foreign Bidder/Suppliers.

The value of stamp duty should be as per latest stamp act local state government from where the bank guarantee issued.

#### **List of Acceptable Banks for Bank Guarantees from Foreign/ Nationalized/ Scheduled Banks**

1. All Nationalized Banks