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NOTICE INVITING TENDER
NO. SDSC SHAR/Sr.HPS/PT/SMPC/UNIT-2/51/2022-2023

On behalf of President of India, Sr. Head, Purchase & Stores, SDSC SHAR, Sriharikota invites **on line quotations** for the following:

Sl No	Ref. No.	Description	Qty.
01	SDSC SHAR/SMPC-U2 PURCHASE/SH202200129701 e-procurement - [Two Part basis]	REALIZATION OF HOT WATER SYSTEM	1 Lot.

Last Date for downloading of tender documents : 23.11.2022 upto 14:00 hrs.
Due date for bid clarification online : 16.11.2022 upto 17:00 hrs.
Due Date for submission of bids online : 23.11.2022 upto 14:00 hrs.
Due Date for opening of tenders : 23.11.2022 at 14:30 hrs.

Instructions to Tenderers:

Tender fee and EMD not applicable for tenders submitted through EGPS

1) For full details/scope of work and terms and conditions etc., please see the enclosed annexures.

2) **Interested tenderers can download the e-tender from ISRO e-procurement website https://eproc.isro.gov.in and submit the offer online in the e-procurement portal.**

3) Tender documents are also available on ISRO website www.isro.gov.in , ISRO e-procurement website https://eproc.isro.gov.in and SDSC SHAR, Sriharikota website www.shar.gov.in. The same can be downloaded and offer shall be submitted online in the e-procurement portal.

4) Tenderers shall submit their offers within the given time as specified above and last moment rush for bid submission shall be avoided. Request for new vendor approval shall be submitted online and the same shall be intimated by mail (mentioned in the tender document) referring the tender number.

5) Sr. Head, Purchase and Stores, SDSC-SHAR, Sriharikota reserves the right to accept or reject any/or all the quotations.

Sr. Head, Purchase and Stores
Satish Dhawan Space Centre, Sriharikota

Date: 02-11-2022

Tender Document for Realization of Hot Water System

Satish Dhawan Space Centre- SHAR

Indian Space Research Organisation

Sriharikota

October- 2022

INDEX

SCOPE OF THE WORK
PART-A

Annexure-A

1. Scope of work

Introduction:

1.1. Scope of work involves supply of equipment, required materials, erection, testing and commissioning of the Water Circulation system for Integrated Sample Processing Facility (Building no: 651), SMPC-2, SDSC-SHAR.

1.2. Party has to supply Water tanks, Centrifugal pumps coupled with electric motors, SS pipes, SS fittings& flanges, SS Strainer, manual valves, Gaskets and Items related to Instrumentation systems as per the details mentioned in this tender document.

1.3. SS bolts and nuts along with two washers, SS U-Clamps, MS angles, channels for the pipeline support, Anchor fasteners/Bolts shall be supplied.

1.4. Party has to supply the material as per technical specifications mentioned in the tender document.

1.5. Party shall supply all the necessary items which are required for the successful commissioning of the Water Circulation System but are not mentioned in the list of items.

1.6. Supply of paints is in the party's scope. All the required consumables for painting like painting brush, thinner, wire brush, emery, cleaning cloth, ladders, any other approach platforms etc. shall be in the party scope.

1.7. Installation of all items including tray fixing, cable laying and cable terminations and the items provided by department are in the party's scope as per Section-F of this document.

1.8. All tools, consumables and accessories like cable glands, lugs, ferrules, cable trays etc., required for the successful completion of installation, testing & commissioning of all electrical & instrumentation systems is in the scope of party.

1.9. Party has to quote the cost details of each item and also lump sum cost for the entire scope of work as per the format given.

1.10. Party has to send the catalogue/specifications of heating elements, pumps, pipe lines, valves, fittings and other items and drawing of Hot Water Tank along with their quotation.

1.11. Party shall provide warranty for 12 months for entire system from the date of commissioning at SDSC SHAR.

1.12. Prior to commencement of fabrication, all fabrication drawings of hot water tank shall be sent to purchaser for approval. Party shall take up fabrication work only after obtaining approval from purchaser

1.13. Party has to offer for inspection of hot water tank, pumps, heating elements, valves, pipe lines, pipe fittings and other items before dispatch to SDSC, SHAR. Party shall also submit all test certificates and calibration reports including hydro test certificate for verification.

1.14. Party has to submit final as built drawings (soft copy &Hard copy) of Hot water

system and operation & maintenance manuals for all other items.

2. Schedule of work/Items to be supplied by the party is as follows:

Sl.No.	Description	Quantity
1	Realization of Hot water system includes Fabrication &supply of hot water tank, erection and commissioning of associated systems like pumps, heating elements, pipe lines, valves, fittings & accessories and instrumentation systems as mentioned in this tender document	1 lot*
2	Fabrication and supply of Hot water tank with heating elements and insulation as per specification given in Part-C	01 No.
3	Supply of Heating elements as per specification given in Part-D	as per Qty given in Part-D
4	Supply of Water circulation pumps as per specification given in Part-D	02 Nos.
5	Supply of SS Non-Return Valves as per specification given in Part-D	04 Nos.
6	Supply of SS Strainers as per specification given in Part-D	04 Nos.
7	Supply of SS Two piece Manual Ball valves as per specification given in Part-D	as per Qty given in Part-D
8	Supply of CAF gaskets as per specification given in Part-D	as per Qty given in Part-D
9	Supply of SS Pipe Lines as per specification given in Part-D	as per Qty given in Part-D
10	Supply of SS Pipe fittings, Flanges, U-Clamps sets, and SS studs& nuts, CS Anchor fasteners as per specification given in Part-D	as per Qty given in Part-D
11	Supply of Pressure gauges as per specification given in Part-D and 1/2" Isolation valves with suitable adopters	04 Nos. each
12	Supply of items related to Instrumentation systems as per specification given in Part-F	As per Qty given in Part-F

* consists of all items (Sl.No.02-12) listed in above table

3. Items provided by Department

3.1. Electrical items:

List of items (Not in scope of bidder for supply) are given below:

- i-MCC panel
- Supply of earthing cable
- Supply of power cable
- Supply of Junction boxes

3.2. Free electricity and water will be provided by the Purchaser (SDSC SHAR) for the erection, testing and commissioning works at the site. Bidder shall take this into account while quoting the price.

3.3. Material handling equipment like trailer, fork lift / hydra will be provided based on the availability.

3.4. Instrumentation items: As per Part-F of this document

4. Inspection

4.1. Party shall offer purchaser for inspection of hot water tank before applying insulation at the party's site. During the inspection, party shall offer for verification of all relevant Material test certificates and DP test reports.

4.2. Party shall perform water leak test in presence of purchaser before applying insulation and after completion of all fabrication works related to hot water tank. Also, party shall arrange for Visual Dimension Inspection (VDI) after completion of all fabrication works as per approved drawings. Party shall generate reports related to VDI and water leak test and submit to purchaser.

4.3. Party shall submit all relevant test certificates for Heater elements, valves, pumps, strainers, pressure & temperature transmitters, Pipes & pipe fittings, etc., items mentioned in this tender document along with the supply of each item.

4.4. Joint fit-up report, DP and Hydro-test reports of pipelines shall be submitted after completion of erection.

4.5. Final inspection of hot water tank and all other items shall be carried out at supplier's site within the due date i.e16 weeks from the date of P.O placement.

5. Delivery Period

5.1. Delivery date is essence of this contract. Party shall adhere to the delivery date mentioned in this tender and same shall be confirmed along with the offer. In case Party is unable to meet the delivery schedule, the offer is liable for rejection.

5.2. Delivery schedule shall be given as below:

S. No.	Item Description	Time line
1.0	Date of placement of P.O (T_0)	T_0
1.1	Submission of GA & Fabrication drawings and P&ID by supplier (T_1)	T_0+3weeks
1.2	Approval of GA & Fabrication drawings and P&ID by department(T_2)	T_1 + 2 weeks
1.3	Supply of Hot water tanks with heaters, Centrifugal pumps, SS Non-Return valves (NRV), SS Strainer, Two piece flanged ball valves, necessary SS pipes & fittings,	

	Insulation material, Flanges, U-clamps, Gaskets, pressure gauges, Anchor fasteners, Structural steel and Items related Instrumentations for realization of hot water system at ISPF, SMPC-2(T3)	T_2+ 11weeks
1.4	Completion of erection, testing & commissioning of water circulation systems for ISPF, SMPC-2(T4)	T_3+12weeks

Intermediate milestones identified shall be met with mutually agreement after placement of order.

6. Drawings:

10.1. A schematic drawing (P&ID) is attached for reference. However, party shall prepare the detailed P&I diagram for the Water Circulation System and shall submit to Department for approval within three weeks from the date of Purchase Order release.

10.2. The drawings shall indicate all dimensions and details of equipment, materials of construction etc.

10.3. For all revisions of the drawing, Bidder shall ensure that all revisions are clearly encircled with revision numbers marked on the drawing.

10.4. Bidder shall also ensure that general details of revisions are indicated for each revision in the revision block of the drawing along with the date and signed by the approving authority.

The following drawings are attached for reference

1. P&ID of hot water circulation system (ref.: P&ID drg.no. 651-002 dt. 07.06.22)
2. Hot water tank (ref.: Hot water tank drg.no. 651-001 dt. 06.07.22)

TERMS & CONDITIONS
PART-B

1. General Terms

1.1. One set of proposal document along with the drawings is issued. Bidder shall sign and stamp each page of proposal as token of his acceptance & submit along with his offer.

2.1. The proposal shall be completely filled in all respects and shall be submitted together with requisite information. Any offer incomplete in any particulars is liable for rejection.

3.1. Bidders shall submit their quotations in firm figures and without qualifications or variations or additions in the terms of the Tender documents. Proposal containing qualifying expressions such as "subject to minimum acceptance" or "subject to prior sale" or any other qualifying expressions or incorporating terms and conditions at variance with the terms and conditions incorporated in the Tender documents are liable to be rejected.

4.1. Cost quoted shall be firm and fixed through the contract period up to completion of total work.

5.1. Price shall be quoted in Indian National Rupee.

6.1. During the erection, testing and commissioning of Hot water system at site in Sriharikota, the supplier has to make his own arrangements for boarding, lodging and transportation of his men and materials.

7.1. Bidder should award any part of the work under the scope of this tender to any sub vendor only after obtaining necessary approval from the department. Bidder shall submit relevant information as required by the department. Department has every right to accept or reject the proposal submitted. Approval of the department is no way relieves the bidder from his responsibility and the bidder is wholly responsible for execution of work as per the specifications, terms, and conditions mentioned in this document.

8.1. Bidder shall indicate clearly such of those works planned to offload to his sub-vendor.

9.1. For standard bought out components whose details were furnished in the tender either in the form of catalogue/data sheet, the contractor shall strictly adhere to the respective makes only.

10.1. In case Bidder suggests any changes in the Make, same shall be supported with complete technical details including need for such changes proposed. Alternate make suggested by the Party shall be better than the make suggested in this tender document. Department has the right to accept or reject the changes in the suggested make/vendors list

11.1. Satish Dhawan Space Centre – SHAR (SDSC-SHAR), Sriharikota is declared as prohibited place under official secrets act 1923. Hence during execution of site works, necessary security requirements enforced by the department from time to time shall be followed strictly.

12.1. Free electricity and water will be provided by the Purchaser (SDSC SHAR) for the erection and commissioning works at the site. Bidder shall take this

into account while quoting the price.

13.1. Quote shall be based on F.O.R. Sriharikota. Prices shall be quoted as per the Price Format provided in this tender document. All the Taxes and duties applicable shall be indicated clearly in quotation separately.

14.1. All direct and indirect costs associated with the preparation and submission of Bid (including clarification meetings and site visit, if any), shall be to Bidder's account and the Department will in no case be responsible or liable for those costs, regardless of the outcome of the Bid process.

2. GST and Other costs, if any

2.1. GST as applicable by HSN code.

3. Validity of offer

3.1. Bid shall remain valid for acceptance for a period of six months from the due date of submission of the Bid.

3.2. The Bidder shall not be entitled during the said period to revoke or cancel his Bid or to vary the Bid except and to the extent required by Department in writing.

3.3. Bid shall be revalidated for extended period as required by Department in writing.

3.4. In such cases, unless otherwise specified, it is understood that validity is sought and provided without varying either the quoted price or any other terms and conditions of Bid finalized till that time.

4. Performance Bank Guarantee

4.1. A Bank Guarantee for 03% of the order value shall be provided along with supply towards the performance of the system. The Bank Guarantee should be from a Nationalized / Scheduled Bank in Rs.100/- non-judicial stamp paper valid till the successful completion of warranty period plus 60 days. This will not carry any interest and shall be returned to you after successful completion of warranty period against your request. In case of non-performance/poor performance the Bank Guarantee shall be forfeited.

5. Security Deposit

5.1. If Order value exceeds Rs. 5 Lakhs, A Bank Guarantee for the faithful execution of the contract / PO for 3% of the order value shall be provided immediately after receipt of the order towards the performance of the contract. The Bank Guarantee should be from a Nationalized / Scheduled Bank in Rs.100 non-judicial stamp paper valid till the completion of the total scope of work / delivery period as per the order plus 60 days. This will not carry any interest and shall be returned to you after successful completion of full scope of work against your request. In case of non-performance/poor performance the Bank Guarantee shall be forfeited. If you didn't submit the BG within the specified period, this order is liable to be cancelled

6. Combined Bank Guarantee

6.1. In case, if You are unable to provide two separate BGs, i.e., one for SD and one for PBG, you can submit a combined BG for SD & PBG for 3% of the Order value valid till the completion of total contractual obligation (i.e. Delivery period + Warranty period + 60 days). Party has to confirm the same.

7. Payment terms:

7.1. **Our Normal payment term:**

100% payment will be made within 30 days from the date of receipt, erection, commissioning, demonstration and final acceptance of the system at our site.

7.2. **If advance payment is requested by the bidder/supplier, and then the following payment terms will be considered:**

- 30% of supply portion as advance against submission of Advance Bank Guarantee for an equivalent amount.
- 60% of supply cost after receiving the items at site on pro-rata basis, balance 10% of supply cost along with 100% erection & commissioning cost plus 100% taxes & duties within 30 days from the date of receipt, erection, commissioning, demonstration and final acceptance of the system at our site.

Note:

If advance is requested, interest will be loaded for advance payment as per Marginal Cost of Lending Rate (MCLR) of RBI and will be added to the landing cost for comparison purpose.

7.3. **Mode of payment:**

Bidders can submit the banker details and payments can be made through NEFT/RTGS/ECS through PFMS.

8. Liquidated damage

8.1. Since, delivery is the essence of this order. If the supplier's defined scope of work is not made by the end of delivery period, liquidated damage will be levied @ 0.5 % per week or part thereof subject to a maximum of 10% of value of undelivered stores.

9. Packing & Forwarding

9.1. The supplier will be held responsible for the stores being sufficiently and properly packed for transport by rail, road, sea or air, to withstand transit hazards and ensure safe arrival at the destination. The packing and Marking of packages shall be done by and at the expenses of the Supplier.

10. Warranty

10.1. The Hot water system shall be guaranteed against any manufacturing defects for a period of 12 months from the date of commissioning. For defects noticed during the warranty period, replacement rectification should be arranged at free of cost within a reasonable period of such notification.

11. Make-In-India(MII) Clause Bidder

11.1. For this procurement, provisions contained in Public Procurement (Preference to Make in India), Order 2017 issued by Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce & Industries vide letter No. P-

45021/2/2017- PP(BE-II) dated 16.09.2020 & directives related shall be followed. Accordingly, you are requested to indicate the percentage of local content in the material, clearly mentioning the details of location(s) at which value addition is made in line with clause 9 to O.M dated 16.09.2020 referred above. It may be noted that Local Content shall not include services such as Transportation, Insurance, Installation, Commissioning, Training and after sales service support like AMC/CMC etc.

12. Bidder Qualification Criteria

12.1. The Bidder should be Company/Society/Firm registered in India since last 3 (Three) years or more. Company Profile along with documentary evidence of services offered and all relevant enclosures to be submitted.

12.2. During Last three years, the bidders should have successfully completed either of the following works.

(a) Fabrication of items or

(b) Erection & commissioning of piping system.

12.3. One Similar completed fabrication work not less than Rs. 20.0 Lakhs,

12.4. Two Similar completed fabrication works each not less than Rs. 14.0 Lakhs each,

12.5. Three similar completed fabrication works each not less than Rs. 11.0 Lakhs each.

12.6. Purchase orders and Satisfactory Work completion certificate by the end user for the previous executed orders shall be submitted without which offer will not be considered.

12.7. Technical compliance to the specification of tender document shall be vetted by the bidder with signature and office seal as a token of acceptance of the specifications, terms & conditions without which offer will not be considered.

12.8. The firm must provide a self-declaration that there is no complaint/vigilance inquiry against them in any Govt. /Department /PSU and they have not been black listed by any Govt. Department/PSU.

13. Price and Technical Bids:

Documents comprising the bid:

13.1. This is e-procurement tender. All the documents need to be scanned and attached to the bid under “documents solicited from Vendor” form. In case it is not possible to upload due to higher file size, hard copy of the balance documents (without any price figures) shall be submitted physically before due date.

13.2. Offers shall be sent online only using standard digital signature certificate of class III with encryption / decryption. The tenders authorized online on or before the open authorization date and time only will be considered as valid tenders even though the bids are submitted online.

13.3. The tenderer must authorize bid opening within the time stipulated in the schedule by SDSC SHAR. Otherwise the online bid submitted will not be considered for evaluation.

On-line bids shall consist of the following: -

Part –1: Technical and un–priced commercial part

13.4. Technical and un-priced commercial part shall comprise the following documents/information. All the documents shall be scanned and uploaded in the ISRO e-procurement portal.

13.5. Submission of bid letter along with one set of tender specification document duly signed and stamped as token of acceptance. Scanned copy shall be uploaded in the ISRO e-procurement portal.

13.6. Power of attorney in favour of authorized signatory of the bid/ proposal documents.

13.7. Unfilled price formats (as per table no. 01 &02) given in Annexure-D of tender document (i.e. masking the prices) shall be submitted. **If the prices are indicated in the formats, the quotation/bid will be rejected.**

13.8. Compliance statement as per Annexure-B.

13.9. Any other relevant document, bidder desires to submit.

13.10. Deviations, if any, w.r.t technical and commercial terms & conditions shall be clearly brought out under deviation list in Annexure-C. If deviations are not listed in the given format, it will be presumed that the bidder is adhering to all the specification and terms & conditions given in this document. Deviations listed elsewhere in the tender document will not be considered.

Note: All the above documents shall be uploaded in the ISRO e-procurement portal.

Part -2: Price Bid

13.11. The schedule of prices shall be read in conjunction with all the sections of proposal document. For lump sum contract, the prices quoted by the Supplier shall be firm and fixed for the completion of the work, unless stated otherwise. The price must be filled in the online bid with the 'Schedule of Prices'. The price bid format is given in Annexure – D i.e., Table-1 and Table-2 shall be uploaded in the Documents related to price bid.

Bid submission:

13.12. Bid shall be submitted in two parts

a. Part-1: Techno-Commercial Part of the Bid.

b. Part-2: Price Part of the Bid.

13.13. Offers should be submitted On-line using standard digital signature of class -3 with encryption/decryption options.

13.14. Prices shall be mentioned in the space/column provided in the ISRO e-procurement portal only for such purpose.

13.15. Physical copy of the bid will be accepted only in case if the file size is bigger and not possible to upload the same. In such case, the hard copy shall be submitted within due date. Documents received after due date will not be considered.

13.16. Prices quoted should be on the basis of F.O.R. Sriharikota.

13.17. Bids duly filled in by the Bidder should invariably be submitted as stipulated in the e-procurement portal.

13.18. Department may open Part-1 of the bid on the due date of opening at convenience. Price bid (Part-2) of the bid of the technically and commercially acceptable bids shall be opened at a later date.

13.19. Department reserves the right to reject any or all the Bids without assigning any reasons thereof.

14. Bid Evaluation:

14.1. The bidder shall provide all the relevant data/information/details required for evaluating the bid technical and commercially in the specific formats enclosed with the tender. Apart from this, Bidder is free to add any other relevant information.

14.2. In respect of Two-Bid system, the technical Bids forwarded by the Bidders will be evaluated by the Department with reference to the tendering specifications. The compliance of Technical Bids will be determined on the basis of the parameters specified in the tendering specifications. The Price Bids of only those Bidders will be opened whose Technical Bids will meet the technical evaluation criteria.

14.3. During evaluation, Department may request Bidder for any clarification on the bid/ additional documents/ information required. Bidder shall submit all clarifications/ additional documents/ information requested in original. If not submitted within the stipulated time department has right to reject such bids.

14.4. Bidder must provide the point-by-point compliance to the technical specifications along with deviations. The tender can be rejected if the deviations are not acceptable to the Department.

14.5. Performance of Bidder on similar nature of works executed/ under execution shall be taken into consideration before selecting the Bidder for opening his price bid.

14.6. The time schedule for completion is given in the Proposal document. Bidder is required to confirm the completion period unconditionally.

14.7. SDSC SHAR reserves the right to reject any bid if technically/commercially not meeting the requirement/terms & conditions. Such decisions by the SDSC SHAR shall bear no liability whatsoever consequent upon such decision.

14.8. Total price inclusive of all taxes, duties, shall be considered for arriving L1 (Overall Lowest) and awarding the contract as per the procedures.

14.9. 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 will prevail

and the total price will be corrected. If there is a discrepancy between words and figures, the amount in words will prevail for calculation of price.

14.10. As all the items within tender specification are inter dependent, splitting of the order is not possible. Hence overall lowest bidder will be considered.

14.11. Department reserves the right to inspect the contractor shop floor/premises for evaluation, if required. After evaluating the contractor, decision of the Department is final.

15. Site visit

15.1. Bidders may plan to visit and examine the site and it's surrounding to familiarize themselves of the existing facilities and environment and may collect all other information which he may require for preparing and submitting the Bid and entering into the tender if required. Bidders shall visit within 15 days from the date of tender enquiry. Claims and objections due to ignorance of existing conditions or inadequacy of information will not be considered after submission of the Bid and during implementation.

16. Arbitration

16.1. In the event of any dispute/s, difference/s or claim/s arising out of or relating to the interpretation and application of the Contract, such dispute/s or difference/s or claim/s shall be settled amicably by mutual consultations of the good Offices of the respective Parties and recognizing their mutual interests attempt to reach a solution satisfactory to both the parties. If such a resolution is not possible, within 30 days from the date of receipt of written notice of the existence of such dispute/s, then the unresolved dispute/s or difference/s or claim/s shall be referred to the Sole. Arbitrator appointed by the Parties by mutual consent in accordance with the rules and procedures of Arbitration and Conciliation Act 1996 as amended from time to time. The arbitration shall be conducted in SDSC. The expenses for the Arbitration shall be shared equally or as may be determined by the Arbitrator. The considered and written decision of the Arbitrator shall be final and binding between the Parties. The applicable language for Arbitration shall be "English" only.

Work under the Contract shall be continued by the CONTRACTOR during the pendency of arbitration proceedings, without prejudice to a final adjustment in accordance with the decision of the Arbitrator unless otherwise directed in writing by the DEPARTMENT or unless the matter is such that the works cannot be possibly continued until the decision (whether final or interim) of the Arbitrator is obtained.

In case order is concluded on the Public Sector Undertakings, the following Arbitration Clause will be applicable:

In the event of any dispute(s) or difference(s) relating to the interpretation and application of the provisions of the commercial contracts between ISRO/SDSC SHAR & Central Public Sector Enterprises (CPSEs)/Port Trusts inter se and also between ISRO/SDSC SHAR & CPSEs and Government Departments/Organizations (excluding disputes concerning Railways, Income

Tax, Customs & Excise Departments), such dispute(s) or difference(s) shall be taken by either party for resolution through the "Administrative Mechanism for Resolution of CPSEs Disputes (AMRCD)", as mentioned in the Office Memorandum F No. 4(1)/2013-DPE(GM)/FTS-1835 dated 22nd May, 2018 issued by the Director of the Department of Public Enterprises (DPE) under the Ministry of Heavy Industries and Public Enterprises, Government of India.

17. Applicable Law and Jurisdiction

17.1. The laws of India shall govern this purchase order for the time being in force. The Courts of Andhra Pradesh, India only shall have jurisdiction to be with and decide any legal matters or disputes what so ever arising out of the purchase order.

18. Force Majeure

18.1. Should a part or whole work covered under this purchase order be delayed due to reasons of Force Majeure which shall include legal lock-outs, strikes, riots, civil commotion, fire accident, quarantines, epidemic, natural calamities and embargoes the completion period for work, equipment referred to in this agreement shall be extended by a period not in excess of the duration of such Force Majeure. The occurrence shall be notified within reasonable time.

TECHNICAL SPECIFICATIONS
PART-C

1. Hot Water Tank (Quantity – 01 no.)

1.1. Scope includes preparation of fabrication drawing, fabrication, erection and commissioning of Hot water system at SDSC SHAR.

1.2. Brief details of hot water tank to be fabricated are as follows:

Sl.No	Description	Specification
1	Material of construction	SS 304L/316L
2	Tank volume	1000 lit (approx.)
3	Quantity	01 No.
4	Internal dimensions	900 (L) x 900 (W) x 1200 (H) mm (approx.)
5	Operating conditions	40±5 ^{o}C & Atmospheric pressure
6	Wall thickness	• All Inner walls including bottom plate shall be of 5 mm thick • All outer walls shall be of 3 mm thick and bottom plate shall be 5 mm
7	Insulation material between inner & outer walls	Phenolic foam slabs (Brand name: Phenotherm)

1.3. Tank should be made out of SS 304L/316 L and the gap between inside and outside SS plates shall be stuffed with Phenolic foam Insulation material as per the drawing attached. (ref.: Hot water tank drg.no. 651-001 dt. 07.07.22)

1.4. Single plates shall be used for fabrication of tank. Welded plates are not accepted.

1.5. Dimensions (Overall) and internal details shall be as per the enclosed drawing and the Supplier shall prepare detailed Fabrication Drawings and shall be sent to the Purchaser for approval. Fabrication shall be taken up only after the final approval by the purchaser. The fabrication shall be carried out using tested and qualified materials only.

1.6. Detailed quality assurance plan (QAP) to be followed during fabrication and testing of hot water tank. It shall be submitted to the Purchaser for approval prior to the commencement of fabrication.

1.7. All the nozzles shall be of seamless type (MOC- SA 312 TP 304 L / 316L). The nozzles shall be provided on the tank as shown in drawing. All the nozzle flanges shall be of SS forged quality & shall conform to ANSI B 16.5. All ports shall be suitably terminated with standard flanges.

1.8. GTAW process shall be followed with high purity Argon gas purging and shielding, right from root to final passes for all butt welds and fillet welds. SMAW is not acceptable. Welding consumables (filler wire) shall be used as per AWS classification or ER 316L.

1.9. Certified welder shall be employed for carrying out fabrication work and welder qualification certificates shall be submitted for review.

1.10. Weld area at inner and outer side of tank shall be buffed.

1.11. Water tank shall be provided with stiffeners on bottom plate. Channel ISMC 50 shall be used as stiffener with gap of 300 mm between two successive channels.

1.12. Material test certificates are to be provided confirming to SS 304L /316L.

1.13. 100% DP test to be done for root pass as well as final pass for all weld joints.

1.14. All welds shall follow the standards for welding method of steel plates with supports, Door hinges etc.

1.15. Phenolic foam material shall be used as insulation of hot water tank and it shall be made available during inspection of water tank.

1.16. Suitable provisions shall be made to mount RTDs, level switch etc. as shown in the drawing. Supplier shall supply all necessary fittings, adopters required for fixing the field sensors at no extra cost.

1.17. Swing type door (MOC-Aluminium) shall be provided on top side with door stopper as shown in the drawing. Neoprene gasket shall be bonded on the tank at door closing area.

1.18. Provisions shall be made for draining and fresh water addition.

1.19. Tank should have a name plate permanently fixed on leg support.

1.20. Lugs shall be welded at suitable locations on the inner surface to retain glass wool in position. After fixing Phenolic Foam Insulation material, outer SS plates shall be welded to tank as shown in drawing.

1.21. Heaters shall be provided horizontally at the bottom of the tank.

1.22. Tank shall have visual level indicators; inspection covers as per standard industrial practice.

1.23. All ports shall be suitably terminated with standard flanges.

1.24. Heater compartment shall be provided with suitable swing type door. 3mm sheets shall be used for making compartment. Door shall be provided with handle and magnetic lock to retain in closed condition.

1.25. Only pre-buffed SS sheets with mirror finish shall be used for fabrication.

1.26. Two numbers of earth boss shall be provided on the leg support.

1.27. Outer wall of water tank shall be painted.

1.28. Painting of water tank shall be as per clause no.15 mentioned in tender document.

1.29. After fabrication of hot water tank, it shall be cleaned, packed properly and dispatched to the purchaser site. After receipt, if it is found damaged, supplier shall rectify the same at free of cost.

1.30. QAP to be followed for fabrication of hot water tank is given in this document

1.31. Suggested list of suppliers for SS plates:

(a)M/s Nippon Steel & Sumitomo metal Corporation, (b)KOBE Steel, Japan,
(c)M/s POSCO (SeAH CCS), South Korea, (d) M/s Sandvik Asia Ltd, India,
(e)M/s Ratnamani Metals and Tubes, India,
(f)M/s DK Corporation, Korea,
(g)M/s Welspun

2. TESTING:

a) Testing of materials:

All the Plates used for fabrication shall be tested for physical and chemical properties as per ASTM E 1086 or Equivalent mentioned in QAP

b) Water fill test:

Tank shall be leak tested by filling it with clean potable water with chloride content of less than 25 PPM water before insulating the tank. The same test shall be repeated after completion of all works with heaters at party's site and receipt of tank at purchaser's site. Both will be witnessed by purchaser.

Nozzle & flange details: (MOC: SS304L/316L)

Nozzle						Flange		
Number	**Qty**	**Description**	**Size, NB**	**Schedule No.**	**projection**	**Std.**	**Rating**	**Type**
N1	01	Overflow	40	Sch 40	150 mm	ANSI B 16.5	#150	SORF
N2	01	Level sensor	25					
N3	01	RTD sensor	25					
N4	01	Drain	40					
N5	01	Suction	40					
N6	01	Spare	40					
N7	01	Spare	40					
N8	01	Inlet	25					
N9	01	Spare (Flange type)	25					
N10	01	Spare (Threaded Nipple)	25			NPT	--	--

QAP for Hot water tank

S. No.	Description	Method of check	Sample	Ref. Std./ acceptance norms	Format of record	Inspection		Remarks
						Party	M/s SHAR	
1	Visual inspection	Visual	100 %	No scratch, cracks, pitting/corrosion	Inspection report	P	R	
2	Dimensional check including orientation of nozzles	Dimensional	100%	As per approved drawing	Inspection report	P	R	
3	Physical and chemical properties of SS sheets, seamless pipes, Forged fittings.	Lab analysis	01 per heat/ lot	ASTM E 1086 or equivalent	Material test certificates	P	R	
4	Material test certificates for Insulation	Lab analysis	01 per lot	As per standard	Material test certificates	P	R	
5	Soundness of Root & Final pass	DP test	100%	As per ASTM/eq. standards	Weld Inspection report	P	R	
6	Leak test	Water fill test	100%	No leakage/no permanent deformation	Inspection report	P	W /R	For 3 hrs. duration
7	Painting	Visual	100%	As per the tender document	Inspection report	P	R	

Legend:
P: Perform **R: Review** **W: Witness**

3. List of documents to be submitted along with supply

Master production file for hot water tank shall contain the following documents:

- Brief introduction
- Purchaser Order
- Approved fabrication drawings
- As-built drawing
- Bill of materials with history and tracing reference
- Material test certificates.
- Welding layouts.
- Inspection reports
    - Fit up history and DP testing reports of all weld joints
    - Dimensional report
    - Leak test report
    - Any other stage wise inspection reports
- Name plate details

PART-D
(Technical specification of Items to be supplied)

1. Heaters

1.1. Party shall supply09 nos. of heater flanges & 02 nos. of thyristors of which 06 nos. of heater flanges & 01 no. of thyristor shall be installed in hot water tank.

1.2. Make of heaters – M/s. Sanjosh Engineers, Thane/Elmech Heaters, Chennai

1.3. Immersion type heater shall be provided as per details provided.

1.4. 07 nos. of heaters shall be fitted to tank with asbestos gasket in between.

1.5. Suitable SS bolts (A2, Grade 70), nut washers shall be used for fixing of heaters. Make DFL/Unbrako/TVS/APL

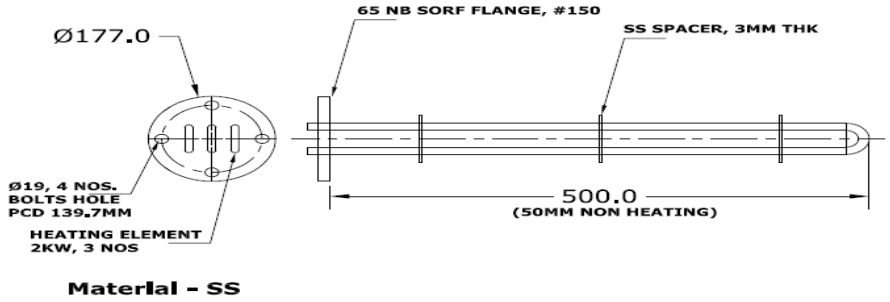


Fig.1 Typical arrangement of heater/heater flange

Table 1. Specification of Water Heaters

Sl.No.	Description	Specification
1	Heater bank	18kW banks---2 Nos.—On/OFF 03 Nos. of Heater flanges shall form 18kW bank. (Volatge-230V). Each Heater flange shall have 03Nos. of heating elements each 2 kW (Total 6kW). 18kWx2 banks are required for ON/OFF. 9kW Bank shall form an individual bank which shall be controlled by Thyristor. (230V each element)
	Spare capacity	03 No's (Heater flanges) –each 6 kW & 01 No.(Thyristor)-9 kW
2	Configuration	2 Nos. Heater banks ON/OFF 1 no. Heater bank (Thyristor)
3	Resistance of each element	26-28Ω ±10%
4	Insulation Resistance	>10Mega Ohms
5	Flange dia. (mm)	177Ø
6	PCD (mm)	139.7Ø

7	Bolt Holes (mm)	19Ø, 4Nos
8	Spacer for each element(mm)	65Ø,3mm thk.
9	Plate Flange	65NB, B16.5 &150#
10	Total heating element length	500mm (including 50mm not heating)
11	Total heating element effective length	450mm
12	Material of Construction	SS 304L/316 L

1.6. All dimensions are in mm.

1.7. Test certificate for Insulation resistance shall be produced along with items.

1.8. Test certificate for Element resistance shall be produced along with items.

1.9. Heaters shall be tested by completely immersed in water. Performance certificate for all heaters shall be obtained from manufacturer and same shall be provided along with item.

1.10. Heater shall be fitted withdraw type, sheeted, immersion type tubular heating elements.

1.11. Each heater shall be provided with Earth leakage MCB.

1.12. All the electrical terminations shall be watertight.

1.13. All electrical cables shall be properly routed through glands.

1.14. Elements/ banks shall be arranged/ connected in such a way that failure of few elements does not affect the uniformity of heat drastically.

1.15. Guarantee certificate for 12 months' duration from the date of supply.

1.16. QAP to be followed for Water heaters shall be as per QAP table no.1

Table no. -01.
QAP for Water Heaters

S. No.	Description	Method of check	Sample	Ref. Std./ acceptance norms	Format of record	Inspection		Remarks
						Party	M/s SHAR	
1	Insulation resistance	Insulation resistance test	100 %	As per relevant standards	Test certificate	P	R	
2	Element resistance	Element resistance test	100%		Test certificate	P	R	
3	Functioning in water	Water test	100%		Test report	P	R	

Legend:
P: Perform **R: Review** **W: Witness**

Final Documents to be submitted along with supply:

1. Inspection/test reports as per approved QAP.
2. Performance test reports.
3. Installation, operation and maintenance manual.
4. Standard warranty/guarantee certificate.

2. Water Pump

Quantity	:	2 nos.
Make	:	Kirloskar/KSB/Microfinish/Beconwier/ Mather & plat
Type	:	Monoblock pump
Mech. Seal	:	Eagle Bergman or reputed make
Flow rate	:	3000 LPH (approx.)
Medium of handling	:	DM water (Sp.Gr.:1.0)
Head	:	23m (approx.)
Suction Size	:	32 mm(approx.)
Discharge Size	:	25 mm (approx.)
Suction condition	:	Flooded
Casing & Cover	:	ASTMA 351 Gr CF8M
Impeller (Semi open)	:	ASTMA 351 Gr CF8M
Shaft	:	AISI 304 /316/410
Shaft sleeve	:	AISI 304 /316/410
Wear plate	:	CF8M
Shaft Sealing	:	Mechanical seal (MOC-Tungsten Carbide)
Base Frame	:	SS 304 / 316 Fabricated & Epoxy Painted
Coupling	:	Cast Iron(suggested: M/s Fenner/ Lovejoy)
Coupling guard	:	Aluminium Fabricated
NPSHA	:	09 mlc
NPSHR	:	Bidder to Specify
Nozzle orientation	:	End suction-top discharge
Motor	:	Kirloskar/BBL/Siemens/ABB, DOL starter, class IE2 or better
Motor rating kW/ RPM	:	Bidder to Specify
Operating temperature	:	40 to 50 ^{0}C
Spare mechanical seal	:	2 nos., Eagle Bergman or reputed make
Bearing make	:	SKF / FAG
Scope of supply	:	Pump with Mechanical Seal, Drive Motor & Accessories (baseplate, coupling, coupling guard, foundation bolt, motor mounting bolt). Each Pump shall be fully assembled and coupled with motor on base plate.

Note:

1) Supplier shall furnish foundation details for pump along with foundation bolts
2) The direction of rotation shall be clearly marked either by incorporating it on the casing or by an arrow on a separate SS metal plate securely fitted to the casing
3) The required NPSH at duty point shall be specified in the offer
4) A stainless-steel name plate of 2 mm thickness shall be provided and securely attached by stainless steel pins at an easily accessible point on the pump. The same shall be stamped with the minimum information.
5) Pump performance test report and material certificate of components to be provided along with the pump as per standards mentioned in QAP.
6) Party shall assemble the mechanical seal to the pump at their premises. Defects/leakages if any observed during trials after installation at our site, the party shall rectify the same at free of cost.
7) Provisions for priming to be provided
8) Party shall provide operating/instruction manual, spare parts catalogue and standard warranty/guarantee certificate along with the pump.
9) QAP to be followed for water pump shall be as per QAP table no.2

Table no.02
QAP for Water Pump

S. No.	Description	Method of check	Sample	Ref. Std./ acceptance norms	Format of record	Inspection		Remarks
						Party	M/s SHAR	
1	Visual inspection	Visual	100 %	No scratch, cracks, pitting/corrosion	Inspection report	P	R	
2	Physical and chemical properties of Pump casing, impeller, shaft, shaft sleeves and bearings	Lab analysis	01 per heat/ lot	As per ASTM/eq. standards	Material test certificates	P	R	
3	Pump performance (Capacity, Head, Input Power, Efficiency)	Pump performance test	100%	API 610 or equivalent	Performance test report	P	R	
4	Painting	Visual	100 %	As per ASTM/eq. standards	Inspection report	P	R	

Legend:
P: Perform **R: Review** **W: Witness**

Final Documents to be submitted along with supply of water pump:

1. Relevant material test certificates
2. Inspection/test reports as per approved QAP.
3. Performance test reports.

4. Installation, operation and maintenance manual.
5. Standard warranty/guarantee certificate.
6. Spares as mentioned in the technical specification table.

3. 1'' Non Return Valve

S.no	Description	Specifications
1	Make	Leader/Marck/Audco/L&T/Virgo/Microfinish/ Velan/Flowserve/ Industrial Enterprises
2	Type	Wafer design with Flap type check valves
3	End Connection	Wafer type to suit between the flanges of ANSI B16.5, 150 #, RF
4	Size	1"
5	Pressure Class rating	150#
6	Quantity	4 nos.
7	Operating medium	DM water (Sp Gr.:1)
8	Valve body	SS 304 / 316
9	Operating Temp.	50 ^{o}C
10	Flow Pattern	Horizontal
11	Testing Code	API-598/Eq. Std.
12	End Connection	To suit between the flanges of ANSI B16.5, RF & class rating 150#
13	Valve Body Material	SS 304/SS316
14	Port Opening	Standard bore/Full bore
15	Soft seals	PTFE/VITON
16	Seat leakage on upstream side:	Bubble tight shut off

Note:
(1) QAP to be followed for NRV is given underQAP table no. 03
(2) Supplier shall provide the material test certificates and Hydro/pneumatic test certificates as per relevant standards mentioned in QAP table no.03
(3) No welding shall be attempted on the valve body/parts
(4) Tag plate shall be of SS /Aluminium.
(5) End protection: Body, end ports, flange faces and welding ends shall be covered with suitable close-fitting protectors to protect the machined ends and prevent ingress of dirt and moisture.
(6) Packing: Valves shall be packed as to minimize the possibility of damage during storage or transit.
(7) Spares: 02 sets of Spare servicing kits for valves shall be provided.

4. Two piece flanged manual Ball valve

S.no	Description	Specifications
1	Type	Full Bore, Two-piece Ball valve Reduced bore, Two piece ball valve
2	Make	Leader/Marck/Audco/L&T/Virgo/Microfinish/ Velan/Flowserve/ BDK
3	End connections	RF Flanged Conforming to ANSI B 16.5, serrated
4	Mode of operation	SS Hand Lever
5	Valve body & Ball material	SS 304 / 316
6	Valve size & Quantity required	DN 15 -05 Nos. DN 25-15 Nos. DN 40- 05 Nos.
7	Design code	BS 5351/ASME B 16.34/ API 6D/BS-EN- ISO 17292
8	Testing code	BS 6755 Part –I/ API-598 / BS-EN-ISO 12266 part-I/IS-6157
9	Pressure class rating	150#
10	Leakage Class	Bubble Tight shut off
11	Face to face dimensions	As per ANSI B 16.10
12	Soft seals	PTFE/VITON
13	Stem, stem bush, stem nuts spacer materials	SS 304/316
14	Studs / nuts	A 193 Gr B 8M & A 194 Gr B
15	Lever material	SS 304/ 316
16	Working temperature	ambient to 50 Deg C

Note:

(1) No welding shall be attempted on the valve body/parts

(2) All non-wetted parts like gland nut, sleeve nut shall also be of Stainless Steel including lever/ handle with PVC lining. (Lever / Handle of GI with PVC lining is not acceptable).

(3) The valve offered shall be guaranteed for proper performance for a period of minimum of 12 months from the date of supply.

(4) The valves shall be tagged with details like serial number, size, class rating, and material of Construction.

(5) QAP to be followed for manual ball valve shall be as per QAP table no.3

(6) All flanged faces shall be Raise Face (RF), serrated.

(7) Tag plate shall be of SS /Aluminium.

(8) End protection: Body, end ports, flange faces and welding ends shall be covered with suitable close-fitting protectors to protect the machined ends and prevent ingress of dirt and moisture.

(9) Packing: Valves shall be packed as to minimize the possibility of damage during storage or transit.

(10) Spares: 02 Nos. of spare servicing kits for each valve size shall be provided.

Table no. 03.

QAP for manual Ball Valve& NRV

S. No.	Description	Method of check	Sample	Ref. Std./ acceptance norms	Format of record	Inspection		Remarks
						Party	M/s SHAR	
1.	Surface defects of all parts	Visual	100 %	No scratch, cracks, pitting/corrosion	Inspection report	P	R	
2.	Physical and chemical properties of body, bonnet, ball & stem (ball valves), body, disc, stem, lever (butterfly valves)	Lab analysis	01 per heat/ lot	EN 10204:2004/ 3.1 or equivalent	Material test certificates	P	R	
3.	Hydro shell / body test	Testing on RIG	100 %	EN 12266/ API 598/ BS 6755/ IS 6157/Eq. standard	Test reports	P	R	
4.	Hydrostatic seat test	Testing on RIG	100 %			P	R	
5.	Pneumatic seat test	Testing on RIG	100 %			P	R	

Legend:

P: Perform **R: Review** **W: Witness**

Final Documents to be submitted along with supply of manual valves:

1. Operational and maintenance manual.
2. Material test certificates.
3. Hydro & pneumatic test reports.

5. Strainer

S.no	Description	Specifications
1	Make	M/s MARCK/ Reputed make
2	Type	Y type
3	Size	1 1/2”
4	Quantity	4 nos.
5	Operating medium	DM water (Sp Gr.:1)
6	Valve body	Stainless Steel SS 304L / 316L
7	Operating Pressure & Temp	0.5 ksc & 50 ^{o}C
8	Flow rate	01 lit/sec (approx.)
9	Strainer mesh size	500 micron
10	Design pressure	5 Ksc

11	End Connection	Flanged, SORF, 150# as per ANSI B16.5
12	Body Material	SS 304/SS316
13	Strainer Mesh	SS 304L/316L
14	Studs & Nuts	SS 304/316
15	Studs / nuts	ASTM A 193 Gr.B8M & 194 GR B

Note:

(1) Material test reports for confirming MOC & test certificates for confirming Physical properties

(2) Hydro static leak test (1.5 X design pressure)

(3) QAP to be followed for the Strainer is as per QAP table no.4

Table no. 04.

QAP for Strainer

S. No.	Description	Method of check	Sample	Ref. Std./ acceptance norms	Format of record	Inspection		Remarks
						Party	M/s SHAR	
1	Visual inspection	Visual	100 %	No scratch, cracks, pitting/corrosion	Inspection report	P	R	
2	Physical and chemical properties of Main body, filter and Flanges.	Lab analysis	01 per heat / lot	As per ASTM/eq. standards	Material test certificates	P	R	
3	Hydro test	Hydro test	100%	As per relevant standards	Test report	P	R	

Legend:
P: Perform **R: Review** **W: Witness**

Final Documents to be submitted along with supply of strainer:

(1) Relevant material test certificates

(2) Inspection/test reports.

(3) Operation and maintenance manual.

6. Gaskets

Following gaskets shall be provided:

Sl. No.	Item Description	Size	Quantity
1.	Compressed Asbestos Fiber gasket(CAF)	1”	150
2.		1½”	50
3.		2”	30
4.		3”	30

Note:

(1) The above gaskets are inclusive of gaskets required for hot water tank and heaters.

(2) Gaskets shall be as per standard Flange Sizes ANSI B 16.5

(3) Gaskets shall be molded to size and shall not be cut from sheet.

(4) Any more Gaskets required to complete the realisation ofHot water system shall be supplied along with supply at free of cost.

(5) All gaskets shall be of 3 mm thick. All gaskets shall be smooth and uniform thickness shall be maintained at all places.

(6) QAP to be followed for gaskets shall be as per QAP table no.05

Table no.05
QAP for Gaskets

S. No.	Description	Method of check	Sample	Ref. Std./ acceptance norms	Format of record	Inspection		Remarks
						Party	M/s SHAR	
1.	Visual &Dimensional check	Visual and dimensional	100 %	No scratch, cracks, pitting/corrosion. as per standard Flange Sizes ANSI B 16.5	Inspection report	P	R	
2.	Hardness	Lab analysis	01 per each size	As per relevant standards	Test certificate	P	R	

Legend:
P: Perform **R: Review** **W: Witness**

Final Documents to be submitted along with supply of Gaskets:

1. Dimensional Inspection report.
2. Hardness test certificates.

7. Pipe lines

S.no	Description	Specification
1	Standard	ASTM A312 TP
2	Manufacturing Process	Seamless, Cold drawn
3	Material of construction	SS 304L/SS 316L
4	Edge preparation	As per ANSI B16.25
5	Length	5 to 7 m
6	Dimensional tolerance	As per ANSI B 36.19/ ASTM A.999
7	Quantity	1. 15 NB SS 304Lpipe (Sch. 40) – 10 m 2. 25 NB SS 304Lpipe (Sch. 40) – 50 m 3. 40 NB SS 304L pipe (Sch. 40) – 20 m

1. Testing:
   a) All pipes shall be hydro tested as per **ASTM A530.**
   b) All pipes shall be visually examined for absence of scratches, dents, surface irregularities, etc.
   c) Minimum one test specimen from each heat (ladle)/lot for each size of pipe and material shall be carried out mechanical testing like UTS, yield & percentage of elongation as per **ASTM A370 &** Chemical analysis as per **ASTM A751** and test results shall comply to ASTM A312.
   d) All the test certificates shall be produced during inspection.
   e) Dimensional standards of the pipes (i.e.ID, OD& wall thickness) shall comply as per ANSI B 36.10/ASTM A.999.
2. Hot extruded mother hollows/Pipes shall be used for manufacturing of seamless pipes.
3. Suggested list of suppliers for pipe lines:
   - M/s Sandvik Asia Ltd, India
   - M/s Ratnamani Metals and Tubes, India
   - M/s REMI
   - M/s Subhalaksmi
   - M/s Streamline industries
   - M/s Tubacex(Prakash steelage)
   - M/s Welspun
   - M/s Aravind Pipes

4. Pipes shall be cleaned and dried before dispatch. Ends shall be protected with suitable plastic caps to avoid entry of dust, water and foreign materials during storage and transportation.
5. Material shall be wrapped in polythene sheet and properly dispatch to site.
6. List of documents/reports required:
   - Dimensional and visual check reports
   - Raw material test certificates.
   - Hydro test reports

All the above reports / test results shall be bound neatly.

7. QAP to be followed for pipe lines shall be as per QAP table no.06

Table no.06
QAP for Pipe lines

S. No.	Description	Type of check	Sample	Ref. Std./ acceptance norms	Format of record	Inspection		Remarks
						Party	M/s SHAR	
1	Visual inspection	Visual	100 %	No scratch, cracks, pitting/corrosion	Inspection report	P	R	

2	Dimensional check	Dimensional	100%	As per standard	Inspection report	P	R	
3	Physical & chemical properties	Lab analysis	1 per heat /lot	ASTM A 370 & ASTM A 751	Material test certificates	P	R	
4	Leak test	Hydro test	100 %	As per ASTM A 530/999	test report	P	R	

Legend:
P: Perform **R: Review** **W: Witness**

Final Documents to be submitted along with supply:

1. Relevant material test certificates
2. Visual inspection report
3. Dimensional inspection report
4. Leak test report

8. Pipe fittings, Flanges, U-Clamps

S.no	Description	Specification
1	MOC	SS 304 /SS 316
2	Pipe fittings required	Elbows, Concentric reducer, Equal Tee, Unequal Tee, Union, Hex nipple, Pipe nipple
3	Flanges	-SORF, 150# -Material: A 182 GR F304L /316L -Dimensional standard : B 16.5
4	U-clamps set	- ASTM A 193 Gr. B8 (for all U-clamps, nuts, washers, sim-plate)
5	Type	Socket weld& Threaded as per the list
6	Quantity	As per the list given below

List of Pipe fittings:

Sl.No	Pipe Fitting	Type	Quantity
1	Elbow (90 Deg.)	Socket weld	15 NB -10 Nos.
			25 NB - 30 Nos.
			40 NB -10 Nos.
		Threaded-F	15/25/40 NB – 05nos. each
2	Equal Tee	Socket weld	25 NB - 10 Nos.
			40 NB -05 Nos.
		Threaded-F	15 NB -05 Nos.
			25 NB -05 Nos.
3	Union	Socket weld	25 NB - 35 Nos.
			40 NB - 05 Nos.
4	Flanges	SORF, 150#	15 NB -10 Nos.
			25 NB - 40 Nos.
			40 NB - 16 Nos.
			32 NB - 05 Nos.
		Blind, 150#	15 NB -5 Nos.

			25 NB - 10 Nos.
			40 NB - 05 Nos.
5	Hex. Nipple	Threaded	15NB (NPT) x M24 -5 Nos.
			20NB (NPT) x M24 -5 Nos.
			25NB (NPT) x M24-20 Nos.
			40NB (NPT) x M24 -5 Nos.
6	Pipe nipple (3" long)	Threaded-M (both sides)	15 NB -10 Nos.
			20 NB -10 Nos.
			25 NB - 20 Nos.
			40 NB - 10 Nos.
7	Suitable adaptor (1/2" X pressure gauge size)	Threaded	04 Nos.
8	Concentric reducer	Socket weld	25 x 15 NB - 10 Nos. 40 x 25 NB - 10 Nos.
		Threaded	25 x 15 NB - 10 Nos. 40 x 25 NB - 10 Nos.
9	Un-Equal Tee	Threaded-F	40 x 25 NB - 05 Nos. 25 x 15 NB - 05 Nos. 20 x 15 NB - 05 Nos.
10	U-Clamps with suitable nuts and washers	150 sets	
11	Suggested suppliers	M/s Sawan, M/s Gujrat infra, M/s Mechwell, M/s Rajmani, M/s Tube turn, M/s. Arvind pipes & fittings, M/s. Rajendra corporation–for fitings M/s Sanghvi, M/s RD Forge, M/s Rajmani,M/s Sawan, M/s. Arvind pipes & fittings, M/s. Rajendra corporation- for flanges	

Note:

1. All socket weld fittings shall be of Pressure class rating of 3000#
2. Dimensional standard to be followed for all socket weld fittings shall be as per B16.11.
3. Minimum one test specimen from each heat (ladle)/lot for each size and material shall be carried out mechanical testing ASTM A370 & Chemical analysis as per ASTM A751 and respective test certificates shall be provided.
4. Any more quantity required for completion of realization of system shall be supplied at free of cost.
5. QAP to be followed for all pipe fittings shall be as per QAP table no.07

Table no.07
QAP for Pipe fittings

S. No.	Description	Type of check	Sample	Ref. Std./ acceptance norms	Format of record	Inspection		Remarks
						Party	M/s SHAR	
1	Visual inspection	Visual	100 %	No scratch, cracks, pitting/corrosion	Inspection report	P	R	
2	Dimensional check	Dimensional	100%	As per standard	Inspection report	P	R	
3	Physical & chemical properties	Lab analysis	1 per heat /lot	ASTM A 370 & ASTM A 751	Material test certificates	P	R	

Legend:
P: Perform **R: Review** **W: Witness**

Final Documents to be submitted along with supply:
(1) Relevant material test certificates
(2) Visual & Dimensional inspection report

9. SS studs, Nuts & washers:
Stainless Steel fully threaded studs with two numbers of hexagonal nuts & two numbers of washers (one set consists of 1 no of stud + 2 nos. of nuts + 2 nos. of washers).

S.no	Description	Specification
1	MOC	-Studs: ASTM A 193 Gr.B8M -Nuts: ASTM A 194 Gr.8M -Washers: SS 316 (1.5 mm thick) -Dimensional standard : B 18.2
2	Size	M12 X 60 mm
3	Quantity	150 sets
4	Suggested list of suppliers:	• M/s. APL • M/s. UNBRAKO • M/s. KUNDAN • M/s. TVS • M/s. Venkateswara Industries, Chennai • M/s. Bharat Engg., Chennai • M/s. V.K Technical works, Hyd.

Note:
(1) All threads shall be made by Thread rolling method only and all Nuts shall be of forged quality only.
(2) The pitch of the threads shall be as per the standard.
(3) QAP to be followed for SS studs, Nuts & Washers shall be as per QAP table no.08

Table no.08
QAP for SS studs, nuts & washers

S. No.	Description	Type of check	Sample	Ref. Std./ acceptance norms	Format of record	Inspection		Remarks
						Party	M/s SHAR	
1	Visual inspection & Dimensional Inspection	Visual	100 %	As per standard	Inspection report	P	R	
2	Thread verification	Thread gauge	1 per heat /lot	As per standard	Inspection report	P	R	
3	Physical & chemical properties	Lab analysis	1 per heat /lot	As per standard	Material test certificates	P	R	

Legend:
P: Perform **R: Review** **W: Witness**

Final Documents to be submitted along with supply of SS studs:
(1) Relevant material test certificates
(2) Visual & Dimensional inspection report
(3) Thread verification report

10. Pressure Gauges

Specification of Pressure gauges is given below

Sl.No	Description
1.	Type: Bourdan tube with blow out disc, bottom entry, laminated safety glass window
2.	End connection: ½" NPT(M)
3.	Sensing Element : AISI 316 S.S Bourdon
4.	Pressure scale: KSC
5.	Dial size :4" approx
6.	Range :0-14 KSC
7.	Quantity :04 nos.
8.	Resolution:0.5 KSC
9.	Over range protection : 130% of FSD
10.	Accuracy : +/- 1 % of FSD
11.	Window material : Shatterproof glass
12.	Dial :Aluminum, white background with black numeral
13.	Make :M/s Baumer/ Wika / Wary/ Stauff/ Fiebig/ Manometer

Note:
(1) Along with pressure gauges, 06 Nos. of ½" isolation valve (NPT) and suitable adopters for fixing pressure/ level/ vacuum transmitters/flow switch shall be provided.
(2) All gauges shall be calibrated and calibration reports shall be submitted along with supply.
(3) QAP to be followed for pressure gauges is as per QAP table no.09

Table no.09
QAP for Pressure gauges

S. No.	Description	Type of check	Sample	Ref. Std./ acceptance norms	Format of record	Inspection		Remarks
						Party	M/s SHAR	
1	Visual inspection	Visual	100 %	Cleanliness check for absence of oil, Moisture. etc.,	Inspection report	P	R	
2	Material test reports	Lab analysis	100%	As per standard	Material test certificates	P	R	
3	Calibration of Gauges	Lab analysis	100 %	As per standard	test report	P	R	

Legend:
P: Perform **R: Review** **W: Witness**

Final Documents to be submitted along with supply of pressure gauges:
(1) Relevant material test certificates
(2) Visual inspection report
(3) Calibration report

11. Thermal Insulation for water tank and pipe lines

Sl.No.	Specification	
1	Material	Phenolic foam slabs.
2	Thickness	50 mm.
3	Density	45 ±3 kg/m³.

Note:

(1) Phenolic foam with above specification shall be used as insulation material for hot water tank and associated pipelines.
(2) After fixing Phenolic foam on the pipelines, finally it shall be covered with Aluminium sheet.
(3) Gaps in between Phenotherm slabs shall be sealed with 3-inch aluminium adhesive tape.
(4) Water tank, water pipe line in the water circulation system shall be insulated with Phenotherm insulation.
(For all flow components, rock wool insulation shall be provided).
(5) QAP to be followed is as per QAP table no.10

Table no.10
QAP for thermal insulation

S. No.	Description	Type of check	Sample	Ref. Std./ acceptance norms	Format of record	Inspection		Remarks
						Party	M/s SHAR	
1	Material test reports	Lab analysis	100%	As per standard	Material test certificates	P	R	

Legend:
P: Perform **R: Review** **W: Witness**

Final Documents to be submitted along with supply of thermal insulation:
(1) Relevant material test certificates

12. Anchor fasteners:

MOC : Carbon steel
Make : HILTI / reputed make
Schedule of quantity : As per BOM

Table No.11
Quality Assurance Plan for Anchor fasteners

S. No.	Description	Type of check	Sample	Ref. Std./ acceptance norms	Format of record	Inspection		Remarks
						Party	M/s SHAR	
1	Visual inspection	Visual	100 %	No scratch, cracks	Inspection report	P	R	
2	Dimensional check	Dimensional	100%	As per standard	Inspection report	P	R	
3	Material test reports	Lab analysis	100%	As per standard	Material test certificates	P	R	

Legend:
P: Perform **R: Review** **W: Witness**

Final Documents to be submitted along with supply:

1. Relevant material test certificates
2. Visual inspection report

13. Structural steel for pipe supports:

(1) Party has to supply required quantity of structural steel for pipe supports and equipment support as per the site condition.
(2) Party shall submit the following test certificates
(3) Material test certificates
(4) Visual inspection report

14. Painting

14.1 Painting for Hot water tank:

Surface preparation: Cleaning by wire brush or power tools to remove any dirt or mill scales from the surface.

Primer: One coat of zinc rich epoxy primer of 120±10-micron Dry Film Thickness (DFT)

Final coat: One coat of aliphatic / acrylic/ polyurethane of total 40-micron DFT.

Finally, the total DFT shall be 160±10 microns.

Cleaning required between successive coats of paint shall also be carried out as per paint manufacturer's standard.

14.2. Painting for pipe lines:

Subsequent to hydro test, application of primer and finish coat paint shall be carried out. A high build epoxy primer suitable for pipe surface of 120±10-micron Dry Film Thickness (DFT) followed by a finish coat of aliphatic / acrylic, polyurethane finish paint of 40 microns DFT shall be applied so that the total DFT achieved will be 160±10 microns. The tag numbering & flow direction arrows of pipelines and flow components shall be written as per P & I diagram. Department will provide the colour scheme for finish paint for various pipeline systems.

Note:

(1) Insulation shall be applied only after painting of pipe lines and water tank

(2) Paints shall be one among the reputed makes like Berger / CDC Carboline / Asian Paints /Goodlass Nerolac.

PART-E

Erection and commissioning

1. Erection and commissioning:

1.1. Party shall integrate hot water tank, heaters, pump, and valves etc., as per approved P & ID.

1.2. Erection of Water Circulation System shall be carried out by the bidder as per the approved P&I diagram and isometric drawings. Erection works at purchaser's site shall be commenced by the party only after obtaining site clearance.

1.3. Receipt, transportation, position, grouting and painting of all equipments required for completing the piping related works. Details for the equipment are given in BOM. Specific care shall be taken while handling and erecting equipments.

1.4. Proper piping layout with all the necessary ports and anchors shall be done as per P & ID.

1.5. Slopes and elevations of equipments are as per piping layouts provided by the purchaser.

1.6. Tools and tackles, wire ropes, D-shackles and any other handling accessories are under the scope of the party and have to arrange for transporting the equipment.

1.7. Party shall bring the consumables such as electrodes, filler rods, grinding wheels, industrial gases (oxygen/acetylene), Argon for TIG, DP test kit, face shields, gloves, wire brush, paints, U-clamps, emery paper, cotton waste and any other hand / power tools required for completion of the work.

1.8. Party shall bring all consumables, machinery and manpower required to carry out fabrication works including cutting, welding, grinding and drilling of holes

1.9. Proper alignment of equipment is under party scope.

1.10. Tentative piping layout has shown in the drawing. Minor modification, if any suggested during erection and commissioning shall be carried out at free of cost.

1.11. Party shall use GTAW (TIG welding) for all socket and fillet welds. Welding consumables (filler wire) shall be used as per AWS classification or ER 308L / ER 316L. Argon purging shall be carried out during TIG welding.

1.12. All welds shall be ground smooth and all the sharp edges shall be rounded off for the ease of cleaning.

1.13. Qualified welders shall be deployed for welding the pipelines/fittings.

1.14. Party shall cut the pipes to required lengths and carry out the welding of fittings and flanges etc.

1.15. Necessary consumables required for carrying out the DP like cleaner, developer, cotton waste, gloves, mask etc. shall be provided by the party.

1.16. All Pipe joints shall be DP tested for root and final weld. Party shall provide DP report from qualified DP inspector.100% radiography is to be done for all butt weld joints (If any).

1.17. Fabrication and erection of required quantity of MS brackets for mounting the pipelines shall be carried out by the party. SS U clamps shall be used for pipe line clamping. Pipe support shall have suitable holes.

1.18. Pumps shall be supported on a common frame made of ISMC 100. Frame shall be supplied/ fabricated by Party.

1.19. The party has to fix the field devices (instruments) like sensors, transmitters, etc. in the pipeline with suitable adaptors/ hoses.

1.20. Party shall carry out alignment of pump at site.

1.21. Interconnecting piping between pump & tank, pump & mixer shall be carried out as per site condition. Party shall arrange for welding, grinding, buffing and other tools required for carrying out piping works at site.

1.22. After erection, final layup drawings shall be provided. After satisfactory completion of fabrication and erection, Hydrostatic test shall be carried out with potable water at 5ksc.

1.23. Sequence of Testing (for SS piping):

- Flushing of piping segments with potable water.
- Hydro test.
- Replacement of test gaskets with actual gaskets.
- Leak check of the total system with DM water as an integrated system ready for process functional checks at operating conditions.
- Performance of Water pumps

Note:

1. Hydro test set up: Valves, flanges, spool pieces etc., including Pump, calibrated gauges, Hose, measuring instruments etc., required for conducting Hydro Tests shall be mobilized by contractor.

The following certificates shall be provided by supplier before hydro test:

1. Welder qualification certificate
2. DP test report
4. Weld joint fitup and history.
5. Submission of material test certificates.

1.24. After Hydro-test, all pipe lines shall be painted and stuffed with Phenotherm material (50 mm thick) and covered with outer Aluminium sheet.

1.25. Suitable Pipe supports anchored on floor/wall with anchor fasteners shall be provided wherever required and party shall take up minor civil works like making cut-outs in the brick wall and closing of same after completion of work. Cost for such kind of minor works cannot be claimed separately and it shall be included in lumpsum cost (Sl.No. 01 of price format, Annexure-D)

1.26. As a part of commissioning trials, water heaters & hot water circulation pumps shall be run and current &voltage readings shall be recorded. Also, timely

temperature measurements shall be recorded for tank outer wall and outer surface of insulated pipelines

1.27. Supplier shall demonstrate functioning of water pump through interconnecting piping. Drawing copies and operation & maintenance manual Hard copy: 2 nos. each and soft copy in CD- 2 nos. each shall be provided.

1.28. Party shall comply all points mentioned in the QAP of mechanical and instrumentation systems. Deviation, if any, shall be communicated for acceptance by SDSC-SHAR

1.29. In addition to the bill of materials shown in P&ID, party shall supply the spare quantity of all items as mentioned in document.

1.30. Any item which may not have been specifically mentioned herein but are needed to complete the system shall also be treated as included and the same shall also be supplied at no extra cost, unless otherwise specifically excluded as indicated.

1.31. Suitable adapters shall be provided for ½" isolation valve for pressure/ vacuum/ level indicators. Pressure indicator shall be in the pipeline connecting motor and tank. Level indicator will be in the tank.

1.32. Dummy flanges/plugs required for Hot water tank and pipe lines during installation & testing at SDSC SHAR shall be provided by the party. Also, party shall arrange all necessary tools, consumables and accessories required for the successful installation & commissioning of hot water system at the purchaser site.

1.33. Party has to deploy the required teams to complete the work within the delivery schedule.

1.34. Commissioning report shall comprise:

(a) As built fabrication drawing for hot water tank
(b) All relevant test certificates for hot water tank, Heaters, water Pumps, pipes & pipe fittings etc. as per QAP
(c) Pipe line hydro test report
(d) DP test reports for weld joints of pipelines
(e) Water heater functioning report for trials conducted at Purchaser's site

2. General points:

(1) For Items to be supplied, in case Bidder suggests any changes in the Make, same shall be supported with complete technical details including need for such changes proposed.

Alternate make suggested by the Party shall be better than the make suggested in this tender document. Department has the right to accept or reject the changes in the suggested make/vendors list

(2) Supplier shall take necessary care for proper packing of all items/equipment to avoid damages during transit.
(3) Damaged Items are not accepted by purchaser and they shall be replaced at no extra cost.
(4) It is the complete responsibility of supplier to ensure the safety of working personnel at purchaser site.
(5) Bidder shall submit the compliance(Annexure-B) along with the quotation without that bid will be treated as Invalid

(6) Payment will be made at actual for supply of items. Quantity variation of +10% is allowed.
(7) Price quoted by supplier shall be inclusive of all testing charges (ie chemical, mechanical, hydro, pneumatic, DP test., etc.)
Separate charges quoted will not be considered and No cost will be paid for the same.

3. Factory Acceptance Test (FAT)

- Factory Acceptance Tests (FAT) will be carried out by purchaser personnel at supplier's site before dispatch of material to SDSC SHAR. It is supplier responsibility to carry out FAT to purchaser satisfaction and obtain clearance for dispatch.
- Dimensional checks of hot water and its subsystem
- Verification of following documents
    - Material test certificates
    - DP test reports
    - Electric Motor test reports
    - Pressure gauges Calibration reports
    - Pump performance certificate
- Functional and interlock checks of electrical systems if applicable
- Visual check of all instruments etc. to be carried out.

4. Site Acceptance Tests (SAT)

After successful completion of FAT, material shall be dispatched to SDSC SHAR, unloaded, stored and installed. After successful installation of all systems at site, the site acceptance tests include the following:

- Physical verification of hot water system and its sub systems for any damages and their interfacing. All equipment shall be properly grounded using suitable Aluminum strips of appropriate size wherever applicable.
- Measurement of current and IR value for all motors.
- Functional and interlock checks of electrical systems if applicable
- Outer skin temperature of tank and pipelines shall be measured and logged during commissioning trails.
- No load/load trials of system shall be carried out and all parameters of operation shall be recorded as per purchaser defined format. Any abnormalities found shall be reported and rectified.
- The supplier has to ensure proper interfacing of all sensors / transmitters / Drives with Data Acquisition and Control System if applicable.
- Submission of installation report.

PART-F

SCOPE OF WORK

(INSTRUMENTATION SYSTEM)

Scope of work (Instrumentation system):

1. Introduction:

1.1. Supply, installation, testing & commissioning of all the field instruments as per the datasheet given in Table No: 1 to 5 with its associated accessories & fittings are in the scope of Bidder.

1.2. The field instruments shall have the following interface to connect with PLC for remote monitoring and operation,

S.No	Type of Sensor signal	Interface type
1	Digital input instruments (Ex: Proximity sensors, Limit switches etc.,)	Potential free contacts/NAMUR switching elements
2	Digital output instruments (Ex: Solenoid valves, E/P valves etc.,)	Operating voltage: 24V DC
3	Analog Input instruments (Ex: Transmitters)	4-20mA.
4	Analog output (Ex: Thyristor, VVVFD etc.,)	Profinet.

1.3. The essential & minimum required list of instruments is provided in table 1 to 5. Bidder may propose additional instruments other than those listed for better & effective monitoring of remote operations of hot water circulation system. List of additional instruments proposed shall be provided. Cost of these additional instruments shall be included in the total cost.

1.4. Cables, cable trays & Junction boxes shall be supplied by the bidder as per actual requirements. Fixing of cable trays, junction boxes, laying and termination of cables are in bidder scope. Supply of suitable MS angle for supports, anchor fasteners, bolt/ nuts, double compression cable glands, insulated boot type Cu lugs, double cross ferrules & cable dressing material and other required accessories are in the scope of bidder. All supports shall be painted with red oxide primer and suitable color with final coating shall be done by Bidder. All paints & accessories are in bidder scope.

1.5. Bidder shall provide the suitable communication interface for their instruments with Siemens make (CPU 414-3 PN/DP) PLC & SCADA (WinCC V7.4) which is available with purchaser. If any of the item supplied as part of

this contract is not meeting the system requirement or any compatibility/ interface issues with other systems are found at any stage of the project, same shall be replaced with suitable items without any additional cost.

1.6. PLC programming and SCADA development will be done by purchaser. However, the inputs for above programming like sequence of operations, initial interlocks, running interlocks and emergency stop procedure etc., shall be provided by Bidder.

1.7. Much care has been taken in arriving the list of equipment and quantities, however if any equipment or components which is not mentioned explicitly but essentially required for the completion of system is in the scope of the Bidder.

1.8. During the warrantee period, the bidder shall replace the failed/ malfunctioning components without any additional cost.

1.9. List of documents to be submitted (3 sets of soft & 2 set of printed copy);

- Final BOM with make & model number.
- Technical catalogues and datasheets of all items.
- Installation, Operation & Maintenance (IOM) manual.
- Test certificates.
- Warranty certificates.
- Passwords/ Licenses/ Operating keys etc.,
- Any other relevant document not listed above.

2. The following equipment/ services are not in the scope of the contract:

- 230V AC UPS & 24V DC power supply.
- PLC, SCADA, MMI, Control consoles.
- Instrumentation & power earth pits.
- Fire detection and alarm system (FDAS), firefighting system (FFS), telephones and wireless sets.
- CCTV system.

3. Essential and minimum list of instruments are given below,

S.No	Instrument Description	Quantity (Nos.)
1.	Temperature transmitter • Tank (DM) water temperature • Jacket water outlet temperature transmitter. • Spare	03 Nos.
2.	Pressure transmitter • Hot water line discharge pressure	01 No.
3.	Level transmitter • Water Level in Tank – Level	01 No.

	transmitter	
4.	Water flow transmitter • Water flow switch in return line	02 Nos.
5.	Proximity Sensors	10 Nos.

Table 2. *Specification of RTD Sensors& Temperature transmitter*

Description	Essential Specification
Make	Rosemount / Omega/ Wika/ Honeywell/ Siemens/ Yokogawa/ Red lion/ Tempsens or equivalent with the approval of Purchaser.
Type of sensor	Pt100 4 – wire Spring loaded.
Accuracy	IEC 751 Class A / DIN 60751
Temperature Coefficient:	0.00385 Ohms/ ^{0}C
Temperature Range:	0 to 100 ^{0}C
Sensor Immersion length	Refer below table.
Sheath	Sensor shall be housed in ¼" SS 316 sheath.
Thermowell	Required (SS) suitable to RTD & mounting location.
Transmitter	Head mounted with local indication
Transmitter accuracy	0.1% of span or better.
Transmitter output	4-20mA.
Span/ Zero adjustment	Required
Ambient temperature range	Min. 15 to 45^{0}C
Electro Magnetic Compatibility (EMC)	Required.
Cable Entry	To be specified by bidder.
Protection	IP 65 or better.
Calibration certificate	Required.
Application	DM water temperature measurement.

S.No	**Location**	**Quantity (Nos.)**	**Immersion length (mm)**	**Thermowell**
1	Tank (DM) water temperature.	1	As required	Required
2	Jacket water outlet temperature transmitter(Intrinsically safe/ Flame proof suitable to use in Zone	1	As required	Required

	1, Gas group IIA, IIB &T4).			
3	Spare	1	Similar to tank	Not required

Table 3. *Specification of Pressure Transmitter*

Description	Essential Specification
Make	Rosemount/ Yokogawa/ Honeywell/ Siemens/ Red lion or equivalent with the approval of Purchaser.
Operating Principle	Capacitance / Piezo-resistive type/ silicone resonant
Integral display	LCD display
Mounting location, Range & Quantity.	Refer below table.
Output	Linearized
Accuracy	0.1% of span or better.
Long term stability	0.2% full scale over a period of 5 years.
Electro Magnetic Compatibility (EMC)	Required
Calibration certificate	Required.
Power supply	Loop powered
Output signal	4 to 20 mA
Span / Zero adjustment	Required.
Protection	IP 65 or better.
Over range protection	Required.
Application of measurement	1. Water (DM) pump discharge pressure.
Process connection	½" NPT (F) OR to be specified by bidder.
Cable Entry	To be specified by bidder.
2-valve manifold	SS and shall be suitable to pressure ratings.

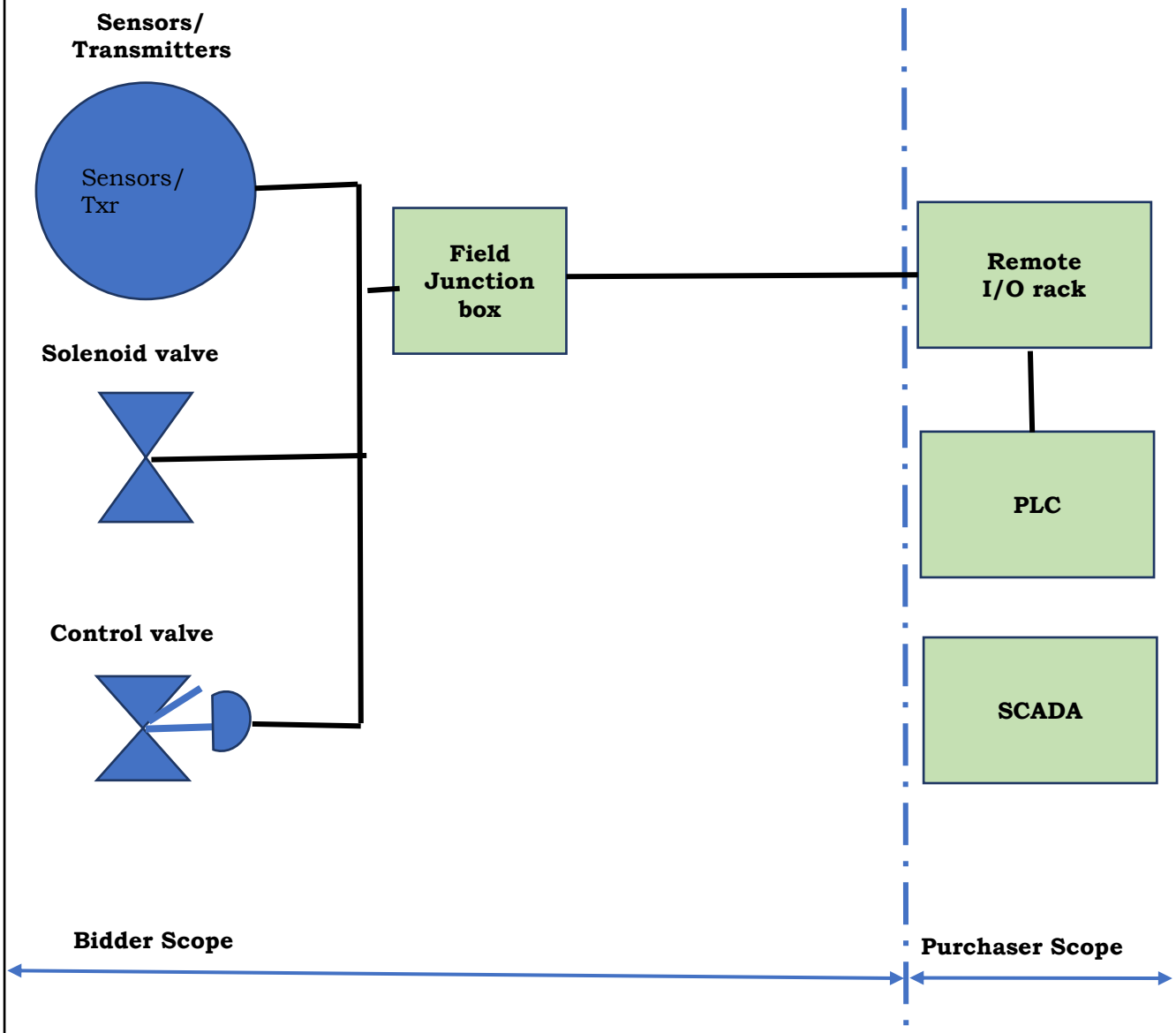
S.No	Location	Quantity (Nos.)	Range	Unit
1	Hot water pipe line (40 ^{0}C)	1	0 - 5	bar

Table 4. Specification of Level Transmitter	
Description	Essential Specification
Make	Rosemount/ Yokogawa/ Honeywell/ Siemens/ Pepperl& Fuchs/ Krohne/ IFM/ Red lion or equivalent with the approval of Purchaser.
Type	Differential pressure type/ Non-contact
Operating Principle	Capacitance / Piezo-resistive type/ silicone resonant/ Ultrasonic/ Radar
Integral display	LCD display
Mounting location	Water tank bottom/ top
Output	Linearized
Accuracy	0.1% of span or better.
Long term stability	0.2% full scale over a period of 5 years.
Electro Magnetic Compatibility (EMC)	Required.
Calibration certificate	Required.
Output signal	4 to 20 mA.
Span / Zero adjustment	Required
Protection	IP 65 or better.
Pressure Range:	0-2000 mmwc
Process connection	½" NPT (F) OR to be specified by Bidder.
Cable Entry	To be specified by bidder.
5-valve manifold	Required. SS
Quantity(Nos.)	1

Table 5. *Specification of Water flow switch*	
Description	Essential Specification
Make	IFM
Model	SI5006
Connector cable	Model: E11249 Suitable for above flow switch model
Fittings & Accessories	Required
Switch setting	Tamper proof and external adjustment
Temperature of water	10 to 45°C
Certificate	Calibration test certificates are required.
Quantity (Nos.)	2 nos.

Table 6. *Specification of Proximity sensor*	
Description	Essential Specification
Make	P&F/ IFM/ STAHL/ OMRAN/Red lion or equivalent with the approval of Purchaser.
Type	Inductive
Switching element function	NAMUR
Operating distance & Quantity	5 mm – 10 Nos.
Nominal voltage	8 V DC
Switching frequency	0 to 400 Hz
Reverse polarity & short circuit protection	Required.
Diagnostics	Required.
Indication of switching state	Required (LED).
Mounting type	Cylindrical, threaded type with check nuts.
Protection	IP 65 or better. Intrinsically safe to Zone 1, Gas group IIA, IIB & T4.
Connection type	Multi pin circular connector and suitable cable with min. 30 meter length shall be supplied with each proximity sensors.
Sensing face	PBT
Housing material	SS
Standards	IEC/EN 60947 DIN EN 60947 (NAMUR)
Certificate	Test certificates are required.

Typical Instrumentation & Control system Configuration



Note:

- Supply & installation of Field instruments are in Bidder scope.
- Supply of PLC, SCADA, Remote I/O racks are in Purchaser scope.

QAP for Instrumentation systems

Sl No	Characteristics/ type of checks	Quantum of check	Reference document	Acceptance norms	Formats of record	Party	SHAR	Remarks
1	2	3	4	5	6	7	8	9
RTD &Transmitters								
1.	Visual	100%	Datasheet	Datasheet	Inspection report		Review	
2.	Calibration data	100%	Datasheet and OEM Test certificate	Datasheet and OEM Test certificate	Inspection report		Review	
3.	Functional check at site.	100%	Datasheet and OEM Test certificate	Datasheet and OEM Test certificate	Inspection report		Review	
Proximity sensors								
4.	Visual	100%	Datasheet	Datasheet	Inspection report		Review	
5.	Functional check at site.	100%	Datasheet	Datasheet	Inspection report		Review	
Solenoid valves								
6.	Visual	100%	Datasheet	Datasheet	Inspection report		Review	
7.	Coil resistance	100%	Datasheet	Datasheet	Inspection report		Review	
8.	Pickup &Cutoff voltage	100%	Datasheet	Datasheet	Inspection report		Review	
9.	Function check	100%	Datasheet	Datasheet	Inspection report		Review	

Annexure-B

1. COMPLIANCE SHEET

Party shall comply all the points and same shall be uploaded along with price bid.

Sl. No.	Description	Party's compliance
1	The detailed scope of work and technical specifications are under stood and price was quoted accordingly	
2	Delivery period shall be as per schedule mentioned under scope of work(PART-A of tender document)	
3	PBG at 03% of the value of the Purchase Order shall be submitted through bank guarantee from any of the Scheduled Banks executed on non-judicial stamp paper of appropriate value, and shall be valid for a period of sixty days beyond the date for completion of warranty period.	
4	Time is the essence of this order. If the supplier's defined scope of work is not made by the end of delivery period, liquidated damage will be levied @ 0.5 % per week or part thereof subject to a maximum of 10% of value of undelivered stores.	
5	The validity of quotation offered by the party shall be at least for 6(six) months	
6	Party shall supply all items listed in Tender document	
7	Party shall comply all points mentioned in the QAP. Deviation, if any, shall be communicated to SDSC-SHAR for acceptance	
8	One Hot Water Tank shall be supplied as per details given in PART- C of this tender document(MOC: SS 304L / 316L)	
9	09 nos. of heaters/heater flanges (each 6 kW) + 02 nos. of Thyristors (each 9kW) shall be supplied as per details given in PART- D of this tender document	
10	02 nos. of Water Pumps with spare mechanical seal shall be supplied as per details given in tender as per PART- D of this tender document	
11	04 Nos. of 1" Non-Return Valve shall be supplied as per specifications given in PART- D of this tender document. MOC:SS304/316	
12	04 Nos. of SS 304L/316L Strainer shall be supplied as per specifications given in PART- D of this tender document	
13	SS304/316 Ball valve shall be supplied as per specifications given in PART- D of this tender document	
14	SS304L/316L Pipe lines shall be supplied as per specifications given in PART- D of this tender document	
15	SS304/316 Fittings, SS304 L/316 L Flanges and U-clamps	

Sl. No.	Description	Party's compliance
	shall be supplied as per specifications given in PART- D of this tender document	
16	CAF Gaskets shall be supplied as per specifications and quantity given in PART- D of this tender document	
17	Studs, Nuts & washers shall be supplied as per the specification and quantity given PART- D of this tender document	
18	Bourdon tube type Pressure gauges with suitable adopters shall be supplied as per the specification and quantity given PART- D of this tender document	
19	Phenolic foam Insulation shall be fixed in hot water tank as per specification given. Pipe lines shall be insulated with the Phenolic foam Insulation and it shall be finally covered with aluminum sheet.	
20	Party shall supply anchor fasteners and structural steel material as per quantity given in BOM	
21	Party shall integrate hot water tank, heaters, pump, valves etc., as per drawing.	
22	Party shall supply all items listed in Tender document	
23	Supply of Instrumentation items shall be as per PART-F of this tender document	
24	Interface the department supplied electrical and instrumentation items as per PART-F of this tender document	
25	Party shall comply all points mentioned in the QAP of mechanical and instrumentation systems. Deviation, if any, shall be communicated to SDSC-SHAR for acceptance	
26	All the general conditions of the tender document as per the Section-E are acceptable.	
27	Submission of Bill of material(as per table no.02 of annexure-D of tender document) WITH OUT individual cost for Unpriced technical bid (Part-1)	
28	Submission of Bill of material with individual cost for price bid (Part-2) as per Annexure-D of tender document	
29	Taxes are quoted in the price bid	
30	All the terms and conditions(Delivery schedule, Terms of payment, Security deposit, Liquidate damages., etc.) of the tender document are understood completely and acceptable	
31	Tender document consisting of Annexures (Annexure-A for Tender specification, Annexure-B for compliance, Annexure-C for Deviation list and Annexure-D for price format are understood completely and submitted according to instructions given in tender document	

Signature of Supplier with Seal

Annexure - C

DEVIATION LIST

THE PARTY SHALL SUBMIT ALONG WITH THEIR QUOTE

Sl. No.	Tender Specification	Deviations	Reason for Deviations
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
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Annexure-D

PRICE FORMAT – For Price bid
(Table No.1)

Sl. No.	DESCRIPTION	Price (Rupees)
	PART- I TOTAL SYSTEM COST	
1.0	**Lump sum price** for Fabrication, supply, erection and commissioning of Hot water system at site, erection, interfacing of department supplied panels, testing, commissioning and carrying out test and operation trials at site including risk coverage during transit, erection, testing & commissioning *(Total cost(Cost-A + Cost-B)- as per table no.02 of Annexure-D)*	
2.0	Packing & forwarding cost	
3.0	GST (Included in 1.0)	
4.0	Any other taxes and duties	
5.0	Erection and commissioning cost *(Sub-total (Cost-B)- as per table no.02 of Annexure-D)* (Included in 1.0)	
6.0	**Grand total (1+2+4)**	

Note: Department deserves the right to cancel any of the item or increase the quantity.

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PRICE FORMAT – For Price bid (Table-2)
Bill of Material for Hot Water Circulation System for ISPF, SMPC-2

S.No.	Item Name	Specification	Description	MOC	Quantity Nos. / mts	Make	Unit cost (Rs.)	GST (%)	Total cost (Rs.)
1	Hot Water tank	1000 ltr (approx.)	0.9 x 0.9 x 1.2 m	SS 304L/ 316L	01				
2	Water pump	03 m^3/hr& 23 m discharge head	Centrifugal pump	SS	02				
3	Immersion type Heaters	45 kW	Heater banks of 18 kW & thyristers of 9 kW	SS	(03 nos. of heater banks 18 kW each and 02 nos. of thyristers each 9 kW including spare)				
4	Insulation	Thermal conductivity - 0.02 W/mK (max)& Bulk density -45 ± 3 Kg/m^3	Phenotherm insulation, 50 mm thick	Phenolic foam material	05sq.m for tank and 80 meters for pipe lines (approx.)				
5	Pipe	15 NB	Sch. 40	SS 304L/ 316L	10				
6	Pipe	25 NB			50				
7	Pipe	40 NB			20				
8	Flanged Two piece manual ball valve	15 NB	Reduced bore/full bore	SS304 /316	05				
9	Flanged Two piece manual ball valve	25 NB	Full bore		17				
10	Flanged Two piece manual ball valve	40 NB	Full bore		05				
11	NRV	25 NB	Wafer type with swing check suitable for 25 NB, 150# flanges		04				
12	Flange	15 NB	SORF, #150	SS 304L/ 316L	10				
13		25 NB			40				
14		40 NB			16				

S.No.	Item Name	Specification	Description	MOC	Quantity Nos. / mts	Make	Unit cost (Rs.)	GST (%)	Total cost (Rs.)
15		25 NB	Blind, #150		05				
16	Y-type strainer	40 NB	Pore size of filter element- 500 microns		04				
17	Gaskets	25 NB	3 mm thick	CAF	150				
18		40 NB			50				
19		15 NB			05				
20	Elbow (90 Deg.)	Socket weld	15 NB		10				
21			25 NB		30				
22			40 NB		10				
23		Threaded-F	15 NB		05				
24			25 NB		05				
25	Equal Tee	Socket weld	25 NB		10				
26			40 NB		05				
27		Threaded-F	15 NB		05				
28			25 NB		05				
29	Union	Socket weld	25 NB		40				
30			40 NB		10				
31	Hex. Nipple	Threaded-M	15NB (NPT) x M24		05				
32			20NB (NPT) x M24		05				
33			25NB (NPT) x M24		20				
34			40NB (NPT) x M24		05				
35	Pipe nipple (3" long)	Threaded-M (both sides)	15 NB		05				
36			20 NB		05				
37			25 NB		10				
38			40 NB		05				
39	Suitable adaptor for fixing pressure gauge	Threaded	1/2" X pressure gauge size)		04				
40	Concentric reducer	Socket weld	25 x 15 NB	SS304 /316	10				
41			40 x 25 NB		10				

S.No.	Item Name	Specification	Description	MOC	Quantity Nos. / mts	Make	Unit cost (Rs.)	GST (%)	Total cost (Rs.)
42	Un-Equal Tee	Threaded-F	40 x 25 NB		05				
43			25 x 15 NB		05				
44			20 x 15 NB		05				
45	U-Clamps with suitable nuts and washers			SS	150 sets				
46	SS Studs ,Nuts & washers		M12 X 60 mm	SS	150 sets				
47	Structural steel			MS	0.65 Ton				
48	Anchor fasteners			CS	150 sets				
49	Temperature transmitter		Temperature Range: 0 to 100 ^{0}C Type of sensor: PT100, 4-wire, spring loaded Transmitter output: 4-20mA.	SS	03 Nos.				
50	Pressure transmitter		Operating Principle: Capacitance / Piezo-resistive type/ silicone resonant Accuracy: 0.1% of span or better. Output signal: 4 to 20 mA	SS	01 No.				
51	Level transmitter		Operating Principle: Capacitance / Piezo-resistive type/ silicone resonant/ Ultrasonic/ Radar Accuracy:	SS	01 No.				

S.No.	Item Name	Specification	Description	MOC	Quantity Nos. / mts	Make	Unit cost (Rs.)	GST (%)	Total cost (Rs.)
			0.1% of span or better.						
52	Water flow transmitter		Sensing element: Ultrasonic/ Calorific/ Diaphragm or to be specified by Bidder. Flow range (LPM) & line pressure: 0 - 300 LPM, 2.5 bar Temperature of water: 10-45 °C	SS	02 No.				
53	Proximity Sensors		Type: Inductive Operating distance: 5 mm Switching frequency: 0 to 400 Hz Sensing face: PBT	SS	10 nos.				
54	Cables		Three core, 0.5 mm^2 copper shielded armoured cable For instrumentation systems		300 m (approx.)				
55	Cable trays	Perforated cable trays	150 mm (W) X 2 metre (H) X 2 mm (T)		10 nos.				
56	Junction boxes(Instrumentation)		500 mm X 300 mm X 200 mm		02 Nos.				
						Sub-total **(Cost-A)**			

S.No.	Item Name	Specification	Description	MOC	Quantity Nos. / mts	Make	Unit cost (Rs.)	GST (%)	Total cost (Rs.)
57	Erection and commissioning of hot water system, **(Cost-B) (Includes 57(a), 57(b) & 57(c))**								
57(a)	Interface the department supplied electrical panels and instrumentation system with hot water system								
57(b)	Socket weld		1 ½" Socket weld-25 nos.	SS 304/ 316	38 inch dia.				
57(c)	Socket weld		1" Socket weld-180 nos.		180 inch dia.				
	Total cost (Cost-A + Cost-B)								

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