INDIAN INSTITUTE OF TECHNOLOGY MADRAS
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The Senior Manager (Project Purchase) Date: 17.04.2024

Open Tender Reference No: GEICSR/RAGH/004/2024/ACWALL

GEM NAR ID: GEM/GARPTS/16042024/Z9OXH1DQATCJ Due Date/Time: 30.04.2024@ 3:00 PM

Dear Sir/Madam,

On behalf of the Indian Institute of Technology Madras, digitally signed online bids are invited in two bid system from Class-I Local Suppliers and Class II Local Suppliers, for the supply of: "**PROVISION OF AC FACILITY TO WALMART SPACE"** Conforming to the specifications given in **Annexure -A.**

Tender Documents may be downloaded from Central Public Procurement Portal https://etenders.gov.in/eprocure/app. Aspiring Bidders who have not enrolled / registered in e-procurement should enroll / register before participating through the website https://etenders.gov.in/eprocure/app. The portal enrolment is free of cost. Bidders are advised to go through instructions provided at **"Help for Vendors".** [Special Instructions to the Vendors / Bidders for the e-submission of the bids online through this eProcurement Portal"]

Bidders can access tender documents on the website (For searching in the NIC site, kindly go to Tender Search option and type 'IIT Madras'. Thereafter, click on "GO" button to view all IIT Madras tenders). Select the appropriate tender and fill them with all relevant information and submit the completed tender document online on the website https://etenders.gov.in/eprocure/app as per the schedule attached.

No manual bids will be accepted. All tender documents including Technical and Financial bids should be submitted in the E-procurement portal.

1)	**Pre-bid Meeting Details**	**:**	If required will be intimated
2)	**ICSR Vendor Registration**	**:**	**Vendor registration:** Vendor registration with IC&SR (IITM) is mandatory for bidders to participate in tenders. ** **For Vendor Registration & Guidelines, Please follow the website :** https://icandsr.iitm.ac.in/vendorportal; Helpdesk: vendorhelpdesk@icsrpis.iitm.ac.in

Last date for receipt of tender	**:**	**30.04.2024@ 3:00 PM**
Date & time of opening of tender	**:**	**01.05.2024@ 3:00 PM**

3. Instructions to the Bidder:

A)	**Searching for tender documents**	**:**	• There are various search options built in the CPP Portal, to facilitate bidders to search active tenders by several parameters. These parameters could include Tender ID, organization name, location, date, value, etc. There is also an option of advanced search for tenders, wherein the bidders may combine a number of search parameters such as organization name, form of contract, location, date, other keywords etc. to search for a tender published on the CPP Portal. • Once the bidders have selected the tenders they are interested in, they may download the required documents / tender schedules. These tenders can be moved to the respective **"My Tender"** folder. This would enable the CPP Portal to intimate the bidders through SMS / email in case there is any corrigendum issued to the tender document. • The bidder should make a note of the **unique Tender ID** assigned to each tender, in case they want to obtain any clarification / help from the Helpdesk.
B)	**Assistance to bidders**	**:**	• Any queries relating to the tender document and the terms and conditions contained therein should be addressed to the Tender Inviting Authority for a tender or the relevant contact person indicated in the tender. • Any queries relating to the process of online bid submission or queries relating to CPP Portal in general may be directed to the 24x7 CPP Portal Helpdesk. The contact number for the helpdesk is [0120-4200462, 0120-4001002, 0120-4001005]
C)	**Enrollment Process to Bidders**	**:**	**REGISTRATION** • Bidders are required to enroll on the e-Procurement module of the Central Public Procurement Portal URL:https://etenders.gov.in/eprocure/app by clicking on "Online Bidder Enrollment". Enrollment on the CPP Portal is free of charge. • As part of the enrolment process, the bidders will be required to choose a unique username and assign a password for their accounts. • Bidders are advised to register their valid email address and mobile numbers as part of the registration process. These would be used for any communication from the CPP Portal. • Upon enrolment, the bidders will be required to register their valid Digital Signature Certificate (Class II or Class III Certificates with signing key usage) issued by any Certifying Authority recognized by CCA India (e.g. Sify / TCS / nCode / eMudhra etc.) • Only one valid DSC should be registered by a bidder. Please

			note that the bidders are responsible to ensure that they do not lend their DSCs to others which may lead to misuse. • Bidder then may log in to the site through the secured log-in by entering their user ID / password and the password of the DSC / eToken. • Possession of a Valid Class II/III Digital Signature Certificate (DSC) in the form of smart card/e-token in the company's name is a prerequisite for registration and participating in the bid submission activities through https://etenders.gov.in/eprocure/app • Digital Signature Certificates can be obtained from the authorized certifying agencies, details of which are available in the web site https://etenders.gov.in/eprocure/app under the "Information about DSC".
D)	**Preparation of bids**	**:**	• Bidder should take into account any corrigendum published on the tender document before submitting their bids. • Please go through the tender advertisement and the tender document carefully to understand the documents required to be submitted as part of the bid. Please note the number of covers in which the bid documents have to be submitted, the number of documents including the names and content of each of the document that need to be submitted. Any deviations from these may lead to rejection of the bid. • Bidder, in advance, should prepare the bid documents to be submitted as indicated in the tender document / schedule and generally shall be in PDF / XLS formats as the case may be. Bid documents may be scanned with 100 dpi with black and white option. • To avoid the time and effort required in uploading the same set of standard documents which are required to be submitted as a part of every bid, a provision of uploading such standard documents (e.g. PAN card copy, GSTIN Details, annual reports, auditor certificates etc.) has been provided to the bidders. Bidders can use **"My Documents"** area available to them to upload such documents. These documents may be directly submitted from the **"My Documents"** area while submitting a bid, and need not be uploaded again and again. This will lead to a reduction in the time required for bid submission process.
E)	**Submission of bids**	**:**	• Bidder should log into the site well in advance for bid submission so that he/she can upload the bid in time i.e. on or before the bid submission date and time. Bidder will be responsible for any delay due to other issues. • The bidder has to digitally sign and upload the required bid documents one by one as indicated in the tender document. • Bidder has to select the bid security declaration. Otherwise, the tender will be summarily rejected. • A standard BOQ format has been provided with the tender document to be filled by all the bidders. Bidders are requested to note that they should necessarily submit their financial bids in the

			format provided and no other format is acceptable. Bidders are required to download the BOQ file, open it and complete the detail with their respective financial quotes and other details (such as name of the bidder). If the BOQ file is found to be modified by the bidder, the bid will be rejected. • The server time (which is displayed on the bidders' dashboard) will be considered as the standard time for referencing the deadlines for submission of the bids by the bidders, opening of bids etc. The bidders should follow this time during bid submission. • The Tender Inviting Authority (TIA) will not be held responsible for any sort of delay or the difficulties faced during the submission of bids online by the bidders due to local issues. • The uploaded tender documents become readable only after the tender opening by the authorized bid openers. • Upon the successful and timely submission of bids, the portal will give a successful bid submission message & a bid summary will be displayed with the bid no. and the date & time of submission of the bid with all other relevant details. • Kindly add scanned PDF of all relevant documents in a single PDF file of compliance sheet. • More information useful for submitting online bids on the CPP Portal may be obtained at: https://etenders.gov.in/eprocure/app. • All tender documents including pre-qualification bid, Technical Bid &Financial Bid should be submitted separately in online CPP portal as per the specified format only. Right is reserved to ignore any tender which fails to comply with the above instructions. **No manual bid submission will be entertained.**
F)	**Marking on Technical Bid**		• The bidder eligibility criteria, technical specification and supply of item for this tender is given in Annexure A. • The Bidders shall go through the specification and submit the technical bid. • The Technical bid should be submitted in the proforma as per Annexure-B in pdf format only through online (e-tender). No manual submission of bid will be entertained. • The technical bid should have a page-wise heading as "Technical Bid" and page no. in all pages with seal and signature of authorized signatory. The total no. of pages should be mentioned at the last page of the documents. • The technical bid should consist of bidder eligibility criteria details and all technical details along with catalogue/ pamphlet which will give a detailed description of product with technical data sheet so that technical compliance can be verified.
G)	**Marking on Price Bid**		• Financial bid (BoQ) should be submitted in the prescribed proforma format as per Annexure-C in xls format through e-tender only. No manual or other form of submission of Financial Bid will be entertained

4)	**Preparation of Tender**: The bidders should submit the bids in two bid system as detailed below. **Bid I _Technical Bid** The technical bid should consist of bidder eligibility criteria and technical specification compliance sheet as per the **Technical Bid Proforma** (**Annexure-B).** **Bid II _Price Bid** The price bid should be submitted in the Tabular format (BoQ) as per the **Financial Bid Proforma** (**Annexure -C**) uploaded in the e-Tender web site. The Quoted price should be for supply and installation of the item and inclusive of all cost and statutory levies at IIT Madras.
5)	**Price:** a) The price should be quoted only in INR net per unit (after breakup) and must include all packing, transit insurance and delivery charges to the **Walmart Center for Tech Excellence, IIT Madras.** b) The rate quoted shall be all inclusive of all taxes and no extra payment will be made other than statutory revisions as per the terms and conditions stipulated in this contract document. c) The percentage of tax & duties should be clearly indicated separately. IIT Madras is eligible for custom duty at a concessional rate, i.e., 5.5%. Relevant certificates will be issued by IIT Madras wherever necessary. d) The offer/bids should be submitted through online only in two bid system i.e. Technical Bid and Financial Bid separately.
6)	**Tenderer shall submit along with this tender:** **(**i) Proof of having ISO or other equivalent certification given by appropriate authorities. (ii) Name and full address of the Banker and their swift code and PAN No. and GSTIN number. (iii) GST registration proof showing registration number, area of registration etc. (iv) All of your future correspondences including Invoices should bear the GST No. and Area Code.
7)	**Terms of Delivery:** Supplier will be fully responsible for the safe carriage, Installation/Commissioning of goods up to **The Walmart Center for Tech Excellence, IIT Madras**, or named place as per PO, Insurance coverage will be in the scope of the supplier. The tenderer should indicate clearly the time required for delivery of the item (subject to the approval of the Exclusive Purchase Committee-IIT-Madras). In case there is any deviation in the delivery schedule, liquidated damages clause will be enforced or penalty for the delayed supply period will be levied. In the event of delay or non-supply of materials/execution of Contract beyond the date of delivery/completion of job. The penalty will be levied @1% per week of delay subject to a max of 10% of the value of purchase order and if the delay is more than accepted time frame by IIT M, the PO would be partially or fully cancelled and liquidated damages will be enforced accordingly.
8)	**Period for which the offer will remain open:** The offer shall remain valid for 120 days from the date of opening of the tender. However, the day up to which the offer is to remain valid being declared closed holiday for the Indian Institute of Technology Madras, the offer shall remain valid for acceptance till the next working day.

9)	**EMD:** The EMD of **Rs.12,500** to be transferred to the account details mentioned in Annexure I and proof should be enclosed in the Technical Bid. Any offer not accompanied with the EMD shall be rejected summarily as non-responsive. As per rule no. 5.1.4 (vi) of the Manual of Procurement of Goods, no bid may be withdrawn in the interval between the deadline for submission of bids and the expiration of the period of bid validity. Withdrawal of a bid during this period will result in forfeiture of the bidder's bid security (EMD) and other sanctions. The Institute shall not be liable for payment of any interest on EMD. As per the Public Procurement Policy for MSEs, Order 2012 dated 25.03.2022, EMD is exempted for Micro and Small Enterprises (MSE) as defined in MSE Procurement Policy issued by the Department of Micro, Small and Medium Enterprises (MSME) and Startups as recognized by the Department of Industrial Policy & Promotion (DIPP). (MSE/MSME/DIPP PROOF should be enclosed in the cover containing the technical bid)
10)	**Performance Security: -** The successful bidder should submit Performance Security for an amount of 5% of the basic invoice value of the contract/supply. The Performance Security may be furnished in the form of an Insurance Surety Bond, Account Payee DD, FD Receipt in the name of "The Registrar, IIT Madras" from any scheduled commercial bank or Bank Guarantee from any scheduled commercial bank in India or online payment in an acceptable form. The performance security should be furnished within 14 days from the date of the purchase order. Performance Security in the form of Bank Guarantee: - In case the successful bidder wishes to submit Performance Security in the form of Bank Guarantee, the Bank Guarantee should be routed directly to IIT Madras from the Bank. The Performance Security Deposit should remain valid for a period of sixty days beyond the date of completion of all contractual obligations.
11)	For the same tender, either the OEM or the authorized dealer/service provider can only quote. But both of them cannot quote separately for the same tender.
12)	The offers/bids should be submitted only for an item/Equipment of the exact standard that is acceptable to IIT Madras without Prejudice. The details of a list of customers in India for whom the item is already supplied with must accompany the quotations. Quotations for a prototype machine will not be accepted
13)	Original catalogue (not any photocopy) of the quoted model duly signed by the principals must accompany the quotation in the technical bid.
14)	Compliance or Confirmation report with reference to the specifications and other terms & conditions should also be obtained from the principal/OEM.
15)	**Risk Purchase Clause** In the event of failure of contractual obligation during the schedule, the Office of Industrial Consultancy and Sponsored Research, Indian Institute of Technology Madras has all the right to engage other sources on the total risk of the sanctioned vendor under risk purchase clause.

16)	**Payment:** (i) As per GFR 2017 Terms: 90% Payment after supply and 10% after installation are agreed to wherever the installation is involved. (ii) Advance Payment: No advance payment is generally admissible. In case a specific percentage of advance payment (not more than 30%) is required, the Vendor has to submit a Bank Guarantee from a scheduled commercial bank in India equivalent to the amount of advance payment.
17)	**On-site Installation:** The equipment/item or Machinery has to be installed or commissioned by the successful bidder within the number of days (as prescribed by PI) from the date of receipt of the item at the site of IIT Madras.
18)	**Warranty:** The offer should clearly specify the warranty period for the machinery/equipment. Any extended warranty offered for the same has to be mentioned separately (For more details please refer our Technical Specifications). **** Note: PO which involves installation, warranty shall be applicable from date of installation.**
19)	**Acceptance and Rejection:** Failure to comply with any of the instructions stated in this document or offering unsatisfactory explanations for non-compliance will likely to lead to rejection of offers. I.I.T. Madras has the right to accept the whole or any part of the Tender or portion of the quantity offered or reject it in full without assigning any reason.
20)	**Debarment from Bidding:** In case of breach of Terms & Conditions, Bidder may be suspended from being eligible for bidding in any contract with the IIT Madras up to 2 Years [as per Rule 151(iii) of GFR] from the date as fixed by IIT Madras.
21)	**Disputes and Jurisdiction:** **Settlement of Disputes:** Any dispute, controversy or claim arising out of or in connection with this PO including any question regarding its existence, validity, breach or termination, shall in the first instance be attempted to be resolved amicably by both the Parties. If attempts for such amicable resolution fails or no decision is reached within 30 days whichever is earlier, then such disputes shall be settled by arbitration in accordance with the Arbitration and Conciliation Act, 1996. Unless the Parties agree on a sole arbitrator, within 30 days from the receipt of a written request by one Party from the other Party to so agree, the arbitral panel shall comprise of three arbitrators. In that event, the supplier will nominate one arbitrator and the Project Coordinator of IITM shall nominate on arbitrator. The Dean IC&SR will nominate the Presiding Arbitrator of the arbitral tribunal. The arbitration proceeding shall be carried out in English language. The cost of arbitration and fees of the arbitrator(s) shall be shared equally by the Parties. The seat of arbitration shall be at IC&SR IIT Madras, Chennai. a. **The Applicable Law:** The Purchase Order shall be construed, interpreted and governed by the Laws of India. Court at Chennai shall have exclusive jurisdiction subject to the arbitration clause. b. Any legal disputes arising out of any breach of contact pertaining to this tender shall be settled in the court of competent jurisdiction located within the city of Chennai in Tamil Nadu.

22)	**Force Majeure:** The Supplier shall not be liable for forfeiture of its performance security, liquidated damages or termination for default, if and to the extent that, it's delay in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure. For purposes of this Clause, "Force Majeure" means an event beyond the control of the Supplier and not involving the Supplier's fault or negligence and not foreseeable. Such events may include, but are not limited to, acts of the Purchaser either in its sovereign or contractual capacity, wars or revolutions, fires, floods, epidemics, quarantine restrictions and freight embargoes. If a Force Majeure situation arises, the Supplier shall promptly notify the Purchaser in writing of such conditions and the cause thereof. Unless otherwise directed by the Purchaser in writing, the Supplier shall continue to perform its obligations under the Contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.
23)	**Eligibility Criteria:** ➢ **The bidders should have been completed similar works of value not less than Rs.3.00 Lakhs in any Govt. Organization/Institution/Public enterprises. Proof of Completion Certificate shall be attached. Similar works means HVAC works of any unit installation.** ➢ **As per the Government of India Order, only "Class - I Local Suppliers" and "Class - II Local Suppliers" can participate in this tender.** ➢ **Bidder should confirm their acceptance that they comply with the provisions with report to "Guidelines for eligibility of a bidder from a country which shares a land border with India as detailed at Annexure-E. The bidder should submit Certificate for "Bidder from/ Not from Country sharing Land border with India & Registration of Bidder with Competent Authority" as per Order of DoE F.No.6/18/2019-PPD dated 23.07.2020 and No.F.7/10/2021-PPD(1) dated 23.02.2023 and No.F.7/10/2021-PPD(1) dated 23.02.2023.**
24)	**Preference to "class I Local Suppliers"**: preference will be given to "**class 1 local suppliers**" (subject to class -I local supplier's quoted price falling within the margin of purchase preference) as per public procurement (preference to make in India) order 2017 .O.M No P- 45021/2/2017 – pp(BE - 11) dt 04/06/2020 subject to the conditions that the "class 1 Local Supplier" should agree to supply goods / provide service at L1 rate and furnish a certificate with the technical bid document that the goods/service provided by them consists local content equal to or more than 50%.(certificate from Chartered Accountant in case value of contract exceeds Rs 10 crore). ➢ **'Class - I local supplier'** means a supplier or service provider whose goods, services or works offered for procurement consists of local content equal to or more than 50% as defined under the above said order. **Declaration to be provided as per Annexure-D per item/service/work.** ➢ **'Class - II local supplier'** means a supplier or service provider whose goods, services or works offered for procurement consists of local content equal to 20% but less than 50% as defined under the above said order. **Declaration to be provided as per Annexure-D per item/service/work.** ➢ **'Margin of purchase preference'**: - The margin of purchase preference shall be 20%. The Definition of the margin of purchase preference is defined in the Govt. of India Order No: **P-45021/12/2017-PP (BE-II) Dt.4th June, 2020) Order 2017. As per the Government of India Order – "Margin of Purchase Preference" means the maximum extent to which the price quoted by a "Class-I local supplier" may be above the L1 for the purpose of purchase preference.**

	****Note: Local content percentage to be calculated in accordance with the definition provided at clause 2 of revised public procurement preference to Make in India Policy vide GoI Order no. P-45021/2/2017-PP (B.E.-II) dated 15.06.2017 (subsequently revised vide orders dated 28.05.2018, 29.05.2019and 04.06.2020) MOCI order No. 45021/2/2017-PP (BE II) Dt.16th September 2020 & P-45021/102/2019-BE-II-Part(1) (E-50310) Dt.4th March 2021**
25)	**Evaluation of Bids** Bid evaluation will take place in two stages. **Stage I Technical Bid evaluation** All bids received within due date and time will be opened for technical evaluation as per scheduled time. All bidders who have fully complied with bidder eligibility criteria I, II and technical Specification (Annexure B) will only be considered for opening of financial bid. **Stage II: Financial Bid Evaluation** The Financial bid evaluation will be based on price quoted by the bidder. The rate quoted for **PROVISION OF AC FACILITY TO WALMART SPACE** unit will alone be taken up for arrival of Lowest Bid (L1) value.
26)	In accordance to the Rule 173 of GFR,2017 and relevant provisions thereof in Procurement Manuals, 2022, IC&SR, IITM reserves the right to carry out the negotiation process through its purchase/technical committee with L1/H1 (as applicable) vendor to ensure price reasonability before final recommendation to the Competent Authority. The negotiation details, if any, on case-to-case basis shall be recorded in minutes of meetings suitably for records.
27)	**Selection of successful bidder and Award of Order** The order will be directly awarded to the technically qualified bidder as per the condition in para 3A of DIPP, MoCI Order No. 45021/2/2017-PP (BE II) dated 16th September 2020.
28)	All information including selection and rejection of technical or financial bids of the prospective bidders will be communicated through e-Tender portal. In terms of Rule 173(iv) of General Financial Rule 2017, the bidder shall be at liberty to question the bidding conditions, bidding process and/or rejection of bids.
29)	The tenderer shall certify that the tender document submitted by him / her are of the same replica of the tender document as published by IIT Madras and no corrections, additions and alterations made to the same. If any deviation found in the same at any stage and date, the bid / contract will be rejected / terminated and actions will be initiated as per the terms and conditions of the contract.
30)	Clarification to the queries and doubts raised by the bidders will be issued as a corrigendum/addendum in the e-tenders portal.
31)	In the e-tender process, participation of bidders after the due date is not possible. The eligible bidders can login to the e-Procurement portal to ascertain the tender status.

ACKNOWLEDGEMENT

It is hereby acknowledged that I/We have gone through all the points listed under "Specification, Guidelines, Terms and Conditions" of tender document. I/We totally understand the terms and conditions and agree to abide by the same.

SIGNATURE OF TENDERER ALONG WITH SEAL OF THE COMPANY WITH DATE

ANNEXURE – A

Bidder Eligibility Criteria and Technical Specification for PROVISION OF AC FACILITY TO WALMART SPACE

Tender No. GEICSR/RAGH/004/2024/ACWALL

Bidder Eligibility Criteria – I (Public Procurement – Preference to Make in India)

Only 'Class-I local suppliers' and 'Class-II local suppliers', as defined under DIPP, MoCI Order No. P-45021/2/2017-PP (BE-II) dated 16th September 2020 and other subsequent orders issued therein (**ANNEXURE – D**)

Bidder Eligibility Criteria – II

1. Vendor Registration ID/Proof.
2. Land Border Certificate (**ANNEXURE – E**).
3. **OEM Certificate Form**-The Participating Bidder's firm shall be the Original Equipment Manufacturer (OEM) or OEM Certified authorized firm (**ANNEXURE – F**).
4. Non- Debarment Declaration **(ANNEXURE – H**).
5. Mandate Form **(ANNEXURE – J)**
6. EMD as per Tender, to be remitted in the account number as given in the **(Annexure – I)** or EMD is exempted for Micro and Small Enterprises (MSE) as defined in MSE Procurement Policy issued by Department of Micro, Small and Medium Enterprises (MSME) and Startups as recognized by Department of Industrial Policy & Promotion (DIPP). (MSE/MSME/DIPP PROOF should be enclosed in the cover containing technical bid).
7. The bidders should have been completed similar works of value not less than Rs.3.00 Lakhs in any Govt. Organization/Institution/Public enterprises. Proof of Completion Certificate shall be attached. Similar works means HVAC works of any unit installation.

III. Technical Specification for PROVISION OF AC FACILITY TO WALMART SPACE

DOUBLE SKIN FAN COIL UNITS - DECORATIVE TYPE - INSIDE CONDITIONED SPACE

EQUIPMENT

These units would be mounted in the conditioned area and would be exposed without false ceiling. The units shall be visually pleasing. Unit shall be of cuboid shape with SA grille in the front and RA grille at the rear. Valve packages shall be housed within the unit itself. Unit shall be as per the drawing provided along with this tender.

General:

Indoor chilled water ceiling suspended / floor mounted decorative fan coil unit shall be complete with cooling coil, fan, fan motor, factory fitted valve package consisting of Ball valve with strainer at inlet and without strainer at outlet, 2 Way Motorised Valve (On/Off type with spring return) & piping connectors, electrical controls, and hanging brackets. The unit shall be provided with aluminium powder coated grille for both supply air and return air. Filters shall be accessible after removal of the RA grille.

S. No.	Item	Technical Specifications
1.	**Unit Cabinet**	Casing shall be of Double skin construction. Double Skin wall panels shall be 43±2 mm thick made of GSS, pressure injected with polyurethane foam insulation of density 38 – 40 kg/cum and K factor not exceeding 0.02 W / M ° C. Double skin wall panels shall be fixed to 2.5 mm thick thermal break profile type aluminium alloy twin box section structural framework with stainless steel screws. Outer sheet of the panels shall be made of 0.80mm thick GSS pre-plasticized or powder coated. Inner sheet shall be 0.63mm thick plain GSS. The casing shall also accommodate the valve package. Fan/s shall be a centrifugal, forward curved, direct-drive, blow thru type. Easy access to be available for the fan & motor from the bottom of the unit. Unit shall come along with an insulated drain pan.
2.	**Coil**	Standard base unit shall be equipped with a 3 or 4 row cooling coil for installation in a 2-pipe system. Coils shall have ½-in. copper tubes, aluminium fins bonded to the tubes by mechanical expansion, and shall be factory tested for leakage at working pressure of 10bar. Each coil shall have a manual air vent on upper connection, a drain port on the lower connection.
3.	**Motors**	Motor shall be single phase induction motor, enclosed and with thermal overload protection, sealed for life lubricated bearings, and external rotor allowing good heat dissipation. Fan motor shall be 3-speed. Motors may have double ended shaft to cater for two fans wherever necessary.
4.	**Water Leak Alarm Interlock Relay**	The unit shall be provided with a water leak tape in the drain pan. The tape shall be fixed at a height of about 3mm from the top of drain tray using suitable spacers. In case of any choke in the drain line, when the water in the tray rises and touches the tape, the tape shall trigger a relay to a) raise a water leak alarm b) provide a potential free contact for BMS and c) force close the two-way valve of the unit.
5.	**Filters**	Unit shall have a filter track with factory-supplied cleanable nylon mesh filters in aluminium frame.
6.	**Electrical Requirements**	Unit shall operate on a 230V/50 Hz/1 Phase power supply
7.	**Thermostat**	Thermostat shall have provisions to switch On / Off the Unit, select the fan speed and set the desired temperature and It shall have a large LCD display of at least 50mm x 50mm size. Thermostat shall be suitable for 230V operation.
8	**2 Way Valve**	Two way valve shall be motorised On/Off type, with spring return (valve to return to close position when power is withdrawn) type actuator. Actuator shall be easily removable from the assembly. It shall also be possible to manually set the valve in open condition by operating a lever. Valve actuator shall be suitable for 230V operation.

9.	**PIPING AND VALVES**	
	1.0 Scope	This section lays down the general requirements for Supply, Installation and testing of Chilled Water Piping, related valves and accessories.
	1.1 Codes and Standards	The material construction, manufacture, inspection, testing and commissioning of water piping shall comply with all currently applicable statutes, regulations and safety codes in the locality where the Equipment will be installed. Nothing in this specification shall construe to relieve the Contractor of his responsibility. The equipment supplied shall comply with the latest applicable Indian and / or British Standards. Other National Standards are acceptable, if they are established to be equal or superior. The latest versions of standards would apply wherever they have been referred to.
	1.2 Scope of Supply And Erection	The Contractor shall supply all piping material like pipes, fittings, flanges, gaskets, bolts & nuts, pipe supports, consumables such as welding electrodes etc., all equipment's, tools and tackles required for carrying out piping work. The Contractor shall install valves, strainers, flow measuring instruments, pressure gauges, thermometers, thermowells etc., as required. The entire piping system including valves shall be hydrostatically pressure tested to check for any leaks. All piping shall be internally cleaned and flushed by the Contractor before and after re-rection in a manner suited to the service as directed by the Clients/Consultants. The contractor shall furnish factory test certificates for pipes, valves before commencing installation. Necessary temporary pumps, piping, drain hoses shall be arranged by the Contractor to carry out flushing work.
	1.3 Pipes	Pipes shall be MS (black) or GI as specified in the Bill of quantities. Pipes up to and including 150 mm NB shall be ERW pipes of Heavy Class ('C' Class) conforming to IS-1239. 200 mm NB and above shall be confirming to IS-3589 wall thickness as specified in the BOQ. Effective precautions such as capping, and sealing shall be taken to protect all pipe ends against ingress of dirt and damage during transit or storage. The outside of the carbon steel pipe (black) shall receive two coats of red oxide paint immediately after completion of welding to prevent corrosion

1.4 Pipe Installation

The Contractor should prepare and submit for approval detailed shop drawings indicating the pipe routing, levels, tapping points, riser points, drain points etc., Pipes shall be installed in a workmanship manner in accordance with the approved shop drawings. Pipes shall be aligned parallel to walls and ceiling and all drops shall be plumb.

Wherever specified all pipe connections to equipment's shall be provided with flexible connections.

All pipes shall be properly supported from roofs, walls, etc., Vertical risers shall be supported at all floor casting with Rigid MS Channels Where light weight roofing are provided, the pipe supports should be provided from the floors and as directed by the Consultants. All pipework inside the plantroom and terrace shall be supported from the floor only.

All pipes shall necessarily be clamped to the pipe supports with specially made pipe clamps. The clamps shall be made out of mild steel and painted with a coat of primer and final coat of black enamel paint. The clamps should take into account any lateral moment of the pipes owing to temperature variations and in no case the clamps should induce stresses on the pipe and supports. Pipe supports inside trenches shall restrain the vertical movement of pipes while at the same time permitting horizontal movement due to thermal expansion/contraction.

HDPE / Metal jacketed insulated pipes shall be provided with clamps over the encasement. In case of other insulation such as nitrile rubber insulation, rigid PUF supports shall be provided between the bare pipe and the support.

The pipe support spacing shall be as under:

Pipe Size	Horizontal pipe	Vertical pipe
Upto 25mm	2.0 m	2.5 m
32mm to 125mm	2.5 m	3.0 m
150mm to 250mm	3.0 m	4.0 m
300mm and above	4.0m	4.0m

Additional supports shall be provided at Bends, Valves, Equipment connections etc., Supports structures shall be grouted to walls and could be fixed on to concrete ceilings, beams, columns using Anchor Fasteners.

Wherever the pipes pass through wall or ceilings, pipe sleeves shall be provided at the crossings. These sleeves shall be fixed to the civil structure. After carrying out the piping, gaps between the sleeve and pipe shall be sealed with fire rated sealant.

		Prior to fixing of pipework, all pipes shall be wire brushed and purged with air blast to remove all rust and mill scale from inner surface. The method of cleaning shall be such that no material is left on the inner or outer surfaces, which will affect the serviceability of the pipe. All pipe joints shall be welded construction, unless otherwise specified. However, flange joints shall be provided as mentioned below. i) Equipment isolation ie adjacent to units. ii) Mating flange for valves, strainers etc., iii) At wall / ceiling crossings as required by the Consultant Flangesshall be slip-on carbon steel with plain face conforming to IS 6392.All bolts & nuts shall be carbon steel and gaskets shall be 3 to 6 mm reinforced rubber Gaskets. All pipes below 40 mm NB shall have socket welding using fillet welding. Pipes 50 mm NB and above shall have butt welding using butt weldable fittings. Wherever welding is carried out on pre-insulated piping, the insulation shall be protected from welding sparks as well as heat of welding using metal sheets and wet cloth. The ends of pipe lengths to be welded shall be cut square by a machine saw and the edges levelled to form a 'V' groove before welding. Under no circumstances, pipe cutting or forming the edges using gas cutting or welding will be allowed. For bends, wherever space permits, the Contractor may use pipe bends (3D) formed using pipe bending machine for pipe sizes 50 mm nominal size and under. The Contractor shall ensure that undue thinning of pipe wall does not occur due to bending. Readymade bends of the same wall thickness as the pipe can be used up to pipe diameters of 250mm. These bends shall preferably be of long radius type. In case of space constraints short radius bends may be used. All welding work shall be carried out by professional welders. The Contractor before employing any welder at site shall invite the Client and Consultant to witness a sample welding which would be carried out by that particular welder. The Client and Consultant would witness and inspect the quality of the welding joint and provide consent for the particular person to carryout welding works at site. It is to be noted that the consent of Client and Consultant does not absolve the Contractor of their contractual obligation to provide a defect free installation. The Contractor shall not use any other persons for welding other than those welders whose samples have been inspected and accepted by Client and Consultant. In case the Contractor uses

		unapproved welders, the entire welding work carried out by such welder/s will be summarily rejected. All pipes shall be laid, and tack welded in position with all flanges, valves, etc., After inspection and approval of the layout by the Consultants / Clients Site Engineer, only then full welding could be carried out. Automatic air vents shall be installed at all highest sections of piping. Drain with drain valves shall be provided at low point of piping and all dirty legs. The size of the valves shall be 25 mm size for pipes up to 100 mm and 40 mm for sizes larger than 100 mm. Drain shall be closed with dummy caps to prevent accidental opening. Drain shall be piped to the nearest floor drain. Piping shall be pitched towards the drain points. Wherever specified in BOQ, drainpipes shall be provided with water grade HDPE/PVC pipe 10kg/sq.cm rating with screwed/solvent joints. These drainpipes shall be tested for leaks to a minimum pressure of 1 kg/sq.cm.
	1.5 Testing	Pipes after completion of welding shall be hydraulically tested. All equipment's shall be isolated from the piping by providing inserting suitable dummy plates in the flanges so as to prevent entry of water into the equipment. In case of Chilled water pipes (except for pre-insulated pipes), no insulation shall be carried out until the completion of pressure test. Pipes shall be tested in sections if necessary to suit the project schedule. Piping shall be tested to hydrostatic test pressure of at least 1.5 times the maximum operating pressure or 2 times the shut off head of the pumps whichever is higher, but not less than 10Kg/Sq.Cm for a period of not less than 24 hours. All leaks and defects in joints and piping during the test shall be rectified and got approved. No pipe shall be welded with water inside the pipes. Piping repaired subsequent to the above pressure shall be retested in the same manner. Systems may be tested in sections and such sections shall be capped securely. Entire system shall then be retested. Noiseless circulation of water in the circuit should be achieved. If improper circulation due to air lock is found, it is the responsibility of the Contractor to carry out all necessary rectification. The Consultants / Client shall be informed well in advance by the Contractor of his intention to test a section or sections of piping and all such tests shall be witnessed by the consultants or their authorized representatives. Test certificates duly signed by the contractor and the consultant shall be submitted by the contractor after completing the tests.

	1.6 Flushing	After completion of the installation, the pipelines are to be flushed thoroughly to blow out the entire dirt and muck. All equipment's would be isolated from the piping with dummies and the pipework provided with temporary loop lines near equipment's to facilitate flushing. Flushing will be carried out in multiple stages as under till the water drained from the pipework at all points is clear of any sediments or suspended particles. A. Fill up water in the pipework and drain the water from the pipework from the lowest point in each section of the pipework. This filling-flushing activity has to be carried out at least 2 times. For the purpose of draining, the contractor, if necessary, has to create temporary drain points at the lowest point of each section of piping. B. Fill up water in the pipework and circulate the water at high velocity using temporary pumps. After circulating the water for about 1 hour, the water hast to be drained fully. This process has to be repeated till the water is clear. Subsequent to flushing, commissioning strainers (strainers with permanent magnet on flange and SS fine mesh wrapped over the normal strainer basket) along with temporary pumps shall be used for circulating water for at least 48 hours and thereafter the commissioning strainers can be removed and the equipment's can be brought into loop. The system then shall be balanced to deliver the water quantities as specified. Balancing report after certification shall be submitted with completion drawings and documents
10.	**VALVES**	
	1. Butterfly Valves	The butterfly valves shall be wafer type and supplied along with flow control lever. The valves shall be compact in size and shall conform to BS 5155, MSS SP 67, and API 609. The valves shall be light in weight and easy to install between a pair of flanges conforming to BS10 Table D & E. The body shall of close grain cast iron conforming to BS EN: 1561/IS210Gr FG260 and the seating shall be of Resilient black, Nitrile rubber / EPDM moulded on to the body. The disk shall be of cast iron as per BS EN: 1561 with nylon coating or SG iron as per BS EN: 1563 nylon coated or ductile iron as per IS1865 Gr450/10, whereas the shaft shall be of stainless steel AISI 431 / 410treated permanently for lubrication. The shaft seals shall be of Nitrile 'O' rings and rubber seals. Valves shall be suitable for a working pressure as specified in the Bill of Quantities. Care should be taken during installation to see that the disk is not damaged during installation due to the flanges being incorrectly spaced. The valve shall be removed from pipework after initial setting for carrying out full welding work. For valves including and above 200mm diameter, geared arrangement with hand wheel shall be provided for operation of the valve. Wherever called for, the valves shall be provided with extended stem to ensure easy operation in insulated pipework.

		Integral ISO 5211 platform shall be provided to facilitate direct mounting of actuators and Gear units on to the valves. In case of motorised butterfly valves, the actuator motor shall be mounted on the platform provided in the butterfly valves. The actuator shall operate on single phase 230V power supply and have potential free contacts for status monitoring. The actuator shall have Push Button for ON/OFF arrangement. If the push button arrangement in the valve is not a standard, then the contractor shall provide necessary wiring and push button externally. It shall be possible to dismount the motor assembly easily and operate the valve stem manually if required.
	2. Ball Valves	Ball Valves shall have body of carbon steel. The ball and the shaft shall be of stainless steel. The seat shall be of PTFE. The valve shall be complete with socket weld ends.
	3. Ball Valves with And Without Strainer	Ball Valves with strainer up to 50mm size shall have brass body. The ball and the shaft shall be of stainless steel. The seat shall be of PTFE. The valve shall be complete with socket weld ends and confirming to relevant codes. Valves 50 mm dia shall have brass body and stainless-steel spindle valve seat. The valves shall be suitable for pressure rating as specified in the Bill of Quantities
	4. Balancing Valves	Balancing valves shall be provided in the piping as indicated in drawings to measure and balance the flow in the piping. These valves shall have built-in pressure-drop measuring facility to compute flow rate across the valve. The test cocks shall be long enough to protrude out of pipe insulation. The valve handle or stem shall have markings which would display the number of turns the valve is open. It shall also be possible to lock the valve at the balanced position such that it would not be possible to open the valve any further at the same time permitting full closure of the valve if required. Valves up to and including 50mm dia shall be in Gun metal construction with threaded connections. Contractor shall provide flanges on either end of such threaded valve to enable easy removal of valve. For valves including and above 65mm dia, the construction shall be as under: Body: Cast Iron to IS 210 Gr. FG 260 Bonnet: Cast Iron to IS 210 Gr. FG 260 Hand Wheel: Mild Steel Fabricated Stem: SS-410 Disc: EN-3 Sealing Disc: E P D M Temp Range:-40 Deg. C to 120 Deg. C) Pressure Test Cocks: Steel Chrome Plated

		End Connection: Flanged as per IS: 6392 Table 17 To enable accurate and practical operation, measurement of flow and differential pressure shall be made with a computerized balancing instrument which shall enable the operator to read the flow directly without the use of diagrams or tables. In addition to measuring flow rate, differential pressure and temperature, computerized balancing instrument shall have a computer programme to provide the following functions: To balance the HVAC installation and calculate the necessary valve settings based on system measurements. • To store the results of balancing. • To log measured values from a valve (differential pressure, flow rate or temperature). • To printout saved data in computerized measurement protocol (CMP) consisting of : a. Name and size of Balancing Valve (BV) b. Pre-setting position of BV c. P at BV d. Flow at BV e. Design Flow
	5. Strainers (Y type Strainers)	Strainers up to 50 mm shall be of gun metal type. Strainers 65mm and above shall be flanged type with Cast Iron / MS body fabricated from pipes. The strainer screen shall be long and removable type with 3 mm perforations. It shall be possible to remove the strainer element without disconnecting the strainer from the pipework by removing a flange at one end of the strainer element. The removable flange shall have donut shaped permanent magnet of at least ½" ht fixed to the centre of the removable flange with bolt nut and washer on the inside to trap any ferrous/magnetic particles. Strainers 100mm dia and larger shall be provided with pipe nipple of 20mm dia and ball valve so that the water in the strainer can be drained with a flexible hose to the nearest drain point. In case the requirement of magnet and pipe nipple provision is not a standard offering of the manufacturer, they shall be provided on field by the Contractor. During commissioning of system, the strainer screen shall be provided with a further SS mesh with 1mm sieve size. The same shall be removed after a few days of running the system with the mesh in place.

	6. Two Way Motorised Valve On/Off Type	Two way motorised ON/OFF type valve complete with electrical actuator, heavy duty PN 10 rating brass/bronze body valve, Room thermostat with LCD display, On/Off buttons, Temperature adjustment dial/button, Fan speed control with necessary transformers wiring etc., This shall be provided as 2 position diverting valves in chilled water lines at each fan coil unit and shall be actuated by space thermostat. Space conditions shall be maintained by modulating the volume of water flow through the coil. The valves shall revert to fully bypass position when fan is shut off. Pressure drop across the valve shall not exceed 0.14 kg/ sq.cm. Valve shall have the facility to replace motor actuator without removing the valve body.
	7. Two-Way Control Valve Modulating Type	Two way modulating Control valves in a single Unit of Valve. The 2 way valve for the AHU / CSU shall be suitable for 24V AC power supply. All control Valves with size lesser than or equal to DN 40 mm shall have Brass / Bronze body with stainless steel seat and brass plug, Control Valves with size above DN 50mm shall have a Cast iron body and stainless steel with brass plug and sealing gland. The actuator versions should be with spring-return function and should be directly mounting on valves without any adjustments. All the actuator shall be operated through 24 VAC and should be modulated through control signals 0…10 VDC, 4….20 mA, or 0…1000 ohms.
	8. BTU Meter	BTU meter shall consist of flow sensor, temperature sensors, microprocessor unit with display. The flow sensor shall be of ultrasonic type working on time transit method. The sensor shall consist of two ultrasonic transducers producing sound waves travelling both in the direction of water flow and against it and use the time taken to reach the receiver to measure the flow quantum. The flow sensor shall be in the form of a pipe and offer minimum resistance to the water flow. Flow sensor shall have integral flanges at both ends for connecting to pipework. Immersion type temperature sensors shall be provided to measure the temperature at two locations in the pipework. Cable length with these sensors shall be minimum 6m each. One of the sensor could also be inbuilt along with the flow sensor. The microprocessor unit shall be similar to Kamstrup Multical 603. The unit shall compute the flow, temperature difference, instantaneous

		cooling capacity, totalized values of cooling capacity etc. The unit shall have a backlit display unit which shall display all these values. Scrolling or programming the unit shall be possible through tactile keypad or soft buttons which would provide an easy menu driven experience. The unit shall have in built battery backup. The unit shall release all the operational parameters to a BMS through Modbus / BACNET over IP. Unit shall be minimum IP 55 rated.
	9. Pressure Gauges	Pressure gauges shall be of bourdon type, glycerine/liquid filled with AISI 304 Stainless Steel casing of appropriate range as specified in the BOQ. Pressure gauge shall be fixed onto a coupling welded to the main pipework with a small stub nipple pipe. Isolation valve shall be provided to isolate the pressure gauge as necessary. The stub nipple pipe shall be Class C as per IS1239. Accuracy of pressure gauge shall be 1% as per UNI EN – 837 -1. Pressure gauges installed on the inlet and outlet of chillers and pumps shall be of 150mm dia dial and the ones installed across AHU pipework shall be of 100mm dia dial.
	10. Thermometers	Thermometers shall be Dial type with remote sensing bulb and interconnecting capillary. Design shall be as per EN13190. Case, capillary, and stem shall be of stainless steel. Dial shall be minimum 100mm dia. Accuracy shall be Class 2 as per EN13190. Thermometer shall be with bottom capillary entry and back mounting support. Thermometer shall be suitable for use on a liquid filled thermowell.
	11. Thermowell	Thermowell shall be provided in pipework as called for. The pipework shall be welded with an 1" threaded coupling and closed with a 1" threaded dummy will be screwed into the coupling. The dummy will have an ½" hole drilled along the centreline of the dummy. Copper pipe stub of 5/8" will be brazed on the coupling end of the dummy. The other end of the copper tube would be pinched. Glycol or other conducting fluid would be filled in the copper tube.
	12. Test Points	Test points shall be fixed to couplings provided in the pipework as required/shown in the drawings. These test points would allow measurement of pressure and temperature at the point of installation with the help of portable pressure gauges and thermometers custom made for this purpose. Body of test point shall be of brass with nitrile sealing bushes. The test point shall be capable of withstanding pressures upto 16 bar and be leakproof even after multiple uses. Pressure gauges and Digital thermometers as suitable for these test points shall be supplied as called for in the BOQ. These gauges shall have at least Class 2 accuracy as per relevant EN standards.

	13. Air Vents	The automatic air vent comprises as follows a. Lid b. Red bronze housing c. Float d. Valve seat seals **Materials** a. Brass housing b. Brass lid c. High grade, heat-resistant synthetic material float d. Heat resistant elastomer seal components
11.	**CHILLED WATER PIPING INSULATION**	
	Pre-Insulated Pipework with HDPE Jacketing – For Buried Pipework	This specification covers the technical aspects related to insulation of pipework. (For specification related to pipes, methods of jointing, installation etc., please refer to the relevant section in this document.) Insulation material shall be PUF of density minimum 40Kg/cu.m sandwiched between the pipe and an outer HDPE jacket. Entire insulation shall be done at the factory and brought to site. Field work shall be limited to insulation of welded joints only. HDPE pipes shall be of minimum PN 2.5 rating and as per outer diameter as mentioned in the BOQ for the relevant pipe sizes and conform to IS4984, material grade PE80. Before insulation, the outer surface of the chilled water pipe shall be cleaned thoroughly to remove any dust, dirt, oil and grease. Thereafter the chilled water pipe shall be positioned inside the HDPE pipe such that the annular space is even all around. Thereafter, PUF injection shall be carried out to achieve the desired density. Insulation shall not be done for a small distance at either end to facilitate joining of pipes. After insulation, the pipes shall be handled carefully and transported to site and unloaded with utmost care to ensure that there is no damage to the HDPE casing or insulation. After completion of welded joints and pressure testing, all the joints would be insulated at site with PUF and finished with HDPE. Sections of HDPE pipe or HDPE sheets would be welded with HDPE welding to form a leakproof joint which would prevent ingress of water into the insulation.

	Pre-Insulated Pipework With GI Spiral Pipe Jacketing – For Pipework Inside Buildings	This specification covers the technical aspects related to insulation of pipework. (For specification related to pipes, methods of jointing, installation etc., please refer to the relevant section in this document.) Insulation material shall be PUF of density minimum 40Kg/cu.m sandwiched between the pipe and an outer GI spiral pipe jacket. Entire insulation shall be done at the factory and brought to site. Field work shall be limited to insulation of welded joints only. GI spiral pipes shall be of minimum 26G thickness having GI coating of atleast 120 gms/sqm. Outer diameter of GI spiral pipe shall be as mentioned in the BOQ for the relevant pipe sizes. Before insulation, the outer surface of the chilled water pipe shall be cleaned thoroughly to remove any dust, dirt, oil and grease. Thereafter the chilled water pipe shall be positioned inside the GI spiral pipe such that the annular space is even all around. Thereafter, PUF injection shall be carried out to achieve the desired density. Insulation shall not be done for a small distance at either end to facilitate joining of pipes. **All tap offs and elbows shall be welded at factory, insulated and brought to site. Vendor shall carryout proper site measurements to ensure that insulation for butt welded or flanged joints alone is carried out at site and all other joint types are done in the factory itself.** After insulation, the pipes shall be handled carefully and transported to site and unloaded with utmost care to ensure that there is no damage to the GI spiral casing or insulation. After completion of welded joints and pressure testing, all the joints would be insulated at site with PUF and finished with GI sheet. Sections of GI sheets shall be screwed or riveted and sealant applied at all joints to form a leakproof joint which would prevent ingress of water into the insulation. ***Insulation work at site for these joints will have to be carried out by the same manufacturer who has supplied the Pre-insulated pipe.***

12.	**Pipe Insulation For Field Joints**	Material of insulation for chilled water pipework in Plantrooms shall be rigid PUF of density minimum 40kg/cum. Before insulation, the outer surface of the chilled water pipe shall be cleaned thoroughly to remove any dust, dirt, oil and grease. Thereafter one coat of bituminous primer shall be applied all over the pipe and allowed to dry. Insulation shall be in the form of semi-circular annular pipe sections. Wherever the insulation thickness specified does not meet standard products, the first layer shall be with pipe sections and the balance be made up with rectangular slabs cut into strips and fixed over the pipe section. Insulation shall be fixed using a flood coat of hot bitumen grade 100/85 @ 1.5kg/sqm. All joints shall be staggered while fixing the insulation. All joints shall be sealed thoroughly with hot bitumen. Thereafter the insulation shall be wrapped with 300G polyethylene sheet. All joints of the sheet shall be finished with PVC tapes to form good vapour barrier. Aluminium cladding with 26G aluminium sheets shall be carried out as finish. Items which would require future maintenance such as pumps, strainers etc., and other such items shall be insulated with a removable piece so that the insulation can be removed, maintenance work carried out and the insulation piece fixed back in original position without any damage to the insulation.
13.	**PIPE INSULATION FOR UNIT CONNECTIONS**	
	1.0 Material	
	Material for piping insulation shall be Closed Cell Nitrile Rubber insulation of thickness as specified in the Bill of Quantities. • Density of Material shall be between 40 to 55 Kg/m3. • Thermal conductivity of elastomeric nitrile rubber shall not exceed 0.037 W/m°K at an average temperature of 0°C. • The insulation shall have fire performance such that it passes Class 0 as per BS476 Part 7 for surface spread of flame as per BS 476 and also pass Fire Propagation requirement as per BS476 Part 6 to meet the Class 'O' Fire category as per 1991 Building Regulations (England & Wales) and the Building Standards (Scotland) Regulations 1990. • Water vapor permeability shall not exceed 0.017 Perm inch (2.48×10^{-14} Kg/m.s.Pa), i.e. Moisture Diffusion Resistance Factor or 'μ' value should be minimum 7000.	

	• Thickness of the insulation shall be as specified for the individual application. • Wherever specified the insulation shall be supplied with factory faced GC Cloth. The insulation material, to the extent feasible shall be in tubular form only. In cases where the diameters of pipe or large or the thickness required is higher and not in the standard supply range of the OEM, to the extent feasible, the initial layer shall be with tubular insulation and further thickness achieved by applying insulation in sheet form to wrap around the pipes.
	2.0 Insulation Application
	The insulation shall be applied as under: a. For Tubular Insulation: Clean the Pipe surface with wire brush and render the surface dry and clean. Slide the insulation into the pipe. Seal all transverse joints using tape. Tubular insulation shall be suitably protected from any damage during installation works. b. For Sheet Insulation: Clean the Pipe surface with wire brush and render the surface dry and clean. Cut the sheets appropriately to match the diameter of the pipe. Apply a coat of adhesive to the pipe and the inner surface of insulation and wait for the insulation to be tacky. Fix the insulation to the pipe without any wrinkle or bubbles. Wrap the insulated surface with minimum 300-micron polythene sheet with at least 50mm overlap and hold in position with self-adhesive PVC tapes. Finish the insulation with 26G Aluminium cladding held in place with self-tapping screws.
14.	**Warranty**: One Year Standard Warranty Period.

ANNEXURE - B

TECHNICAL BID PROFORMA

Tender No. GEICSR/RAGH/004/2024/ACWALL

Item Name: PROVISION OF AC FACILITY TO WALMART SPACE

1.0 Bidder Eligibility Criteria:

I	**Bidder Eligibility Criteria-I (Public Procurement – Preference to Make in India)**	**Class I / Class II**	**Local Content Percentage**	**Ref. Page No.**
I	Only 'Class-I local suppliers' and 'Class-II local suppliers', as defined under DIPP, MoCI Order No. P-45021/2/2017-PP (BE II) dated 16th September 2020 and other subsequent orders issued therein **(ANNEXURE – D)**			

2.0 Bidder Eligibility Criteria:

II	**Bidder Eligibility Criteria-II**	**Complied/Not Complied**	**Ref Page No.**
1	Vendor Registration ID/Proof		
2	Land Border Certificate (**ANNEXURE – E**)		
3	**OEM Certificate Form**-The Participating Bidder's firm shall be the Original Equipment Manufacturer (OEM) or OEM Certified authorized firm (**ANNEXURE – F**)		
4	Non- Debarment Declaration **(ANNEXURE – H**).		
5	Mandate Form **(ANNEXURE – J)**		
6	EMD as per Tender, to be remitted in the account number as given in the **(Annexure – I)** or EMD is exempted for Micro and Small Enterprises (MSE) as defined in MSE Procurement Policy issued by Department of Micro, Small and Medium Enterprises (MSME) and Startups as recognized by Department of Industrial Policy & Promotion (DIPP). (MSE/MSME/DIPP PROOF should be enclosed in the cover containing technical bid).		
7.	The bidders should have been completed similar works of value not less than Rs.3.00 Lakhs in any Govt. Organization/Institution/Public enterprises. Proof of Completion Certificate shall be attached. Similar works means HVAC works of any unit installation.		

3.0 Technical Compliance:

DOUBLE SKIN FAN COIL UNITS - DECORATIVE TYPE - INSIDE CONDITIONED SPACE

EQUIPMENT

These units would be mounted in the conditioned area and would be exposed without false ceiling. The units shall be visually pleasing. Unit shall be of cuboid shape with SA grille in the front and RA grille at the rear. Valve packages shall be housed within the unit itself. Unit shall be as per the drawing provided along with this tender.

General:

Indoor chilled water ceiling suspended / floor mounted decorative fan coil unit shall be complete with cooling coil, fan, fan motor, factory fitted valve package consisting of Ball valve with strainer at inlet and without strainer at outlet, 2 Way Motorised Valve (On/Off type with spring return) & piping connectors, electrical controls, and hanging brackets. The unit shall be provided with aluminium powder coated grille for both supply air and return air. Filters shall be accessible after removal of the RA grille.

S. No.	Item	Technical Specifications	Complied/Not Complied	Ref Page No.
1.	**Unit Cabinet**	Casing shall be of Double skin construction. Double Skin wall panels shall be 43±2 mm thick made of GSS, pressure injected with polyurethane foam insulation of density 38 – 40 kg/cum and K factor not exceeding 0.02 W / M ° C. Double skin wall panels shall be fixed to 2.5 mm thick thermal break profile type aluminium alloy twin box section structural framework with stainless steel screws. Outer sheet of the panels shall be made of 0.80mm thick GSS pre-plasticized or powder coated. Inner sheet shall be 0.63mm thick plain GSS. The casing shall also accommodate the valve package. Fan/s shall be a centrifugal, forward curved, direct-drive, blow thru type. Easy access to be available for the fan & motor from the bottom of the unit. Unit shall come along with an insulated drain pan.		
2.	**Coil**	Standard base unit shall be equipped with a 3 or 4 row cooling coil for installation in a 2-pipe system. Coils shall have ½-in. copper tubes, aluminium fins bonded to the tubes by mechanical expansion, and shall be factory tested for leakage at working pressure of 10bar. Each coil shall have a manual air vent on upper connection, a drain port on the lower connection.		

3.	**Motors**	Motor shall be single phase induction motor, enclosed and with thermal overload protection, sealed for life lubricated bearings, and external rotor allowing good heat dissipation. Fan motor shall be 3-speed. Motors may have double ended shaft to cater for two fans wherever necessary.		
4.	**Water Leak Alarm Interlock Relay**	The unit shall be provided with a water leak tape in the drain pan. The tape shall be fixed at a height of about 3mm from the top of drain tray using suitable spacers. In case of any choke in the drain line, when the water in the tray rises and touches the tape, the tape shall trigger a relay to a) raise a water leak alarm b) provide a potential free contact for BMS and c) force close the two-way valve of the unit.		
5.	**Filters**	Unit shall have a filter track with factory-supplied cleanable nylon mesh filters in aluminium frame.		
6.	**Electrical Requirements**	Unit shall operate on a 230V/50 Hz/1 Phase power supply		
7.	**Thermostat**	Thermostat shall have provisions to switch On / Off the Unit, select the fan speed and set the desired temperature and It shall have a large LCD display of at least 50mm x 50mm size. Thermostat shall be suitable for 230V operation.		
8	**2 Way Valve**	Two way valve shall be motorised On/Off type, with spring return (valve to return to close position when power is withdrawn) type actuator. Actuator shall be easily removable from the assembly. It shall also be possible to manually set the valve in open condition by operating a lever. Valve actuator shall be suitable for 230V operation.		
9.	**PIPING AND VALVES**			
	1.0 Scope	This section lays down the general requirements for Supply, Installation and testing of Chilled Water Piping, related valves and accessories.		
	1.1 Codes and Standards	The material construction, manufacture, inspection, testing and commissioning of water piping shall comply with all currently applicable statutes, regulations and safety codes in the locality where the Equipment will be installed. Nothing in this specification shall construe to relieve the Contractor of his responsibility. The equipment supplied shall comply with the latest applicable Indian and / or British Standards. Other National Standards are acceptable, if they are established to be equal or superior. The latest versions of standards would apply wherever they have been referred to.		

	1.2 Scope of Supply And Erection	The Contractor shall supply all piping material like pipes, fittings, flanges, gaskets, bolts & nuts, pipe supports, consumables such as welding electrodes etc., all equipments, tools and tackles required for carrying out piping work. The Contractor shall install valves, strainers, flow measuring instruments, pressure gauges, thermometers, thermowells etc., as required. The entire piping system including valves shall be hydrostatically pressure tested to check for any leaks. All piping shall be internally cleaned and flushed by the Contractor before and after re-rection in a manner suited to the service as directed by the Clients/Consultants. The contractor shall furnish factory test certificates for pipes, valves before commencing installation. Necessary temporary pumps, piping, drain hoses shall be arranged by the Contractor to carry out flushing work.		
	1.3 Pipes	Pipes shall be MS (black) or GI as specified in the Bill of quantities. Pipes up to and including 150 mm NB shall be ERW pipes of Heavy Class ('C' Class) conforming to IS-1239. 200 mm NB and above shall be confirming to IS-3589 wall thickness as specified in the BOQ. Effective precautions such as capping, and sealing shall be taken to protect all pipe ends against ingress of dirt and damage during transit or storage. The outside of the carbon steel pipe (black) shall receive two coats of red oxide paint immediately after completion of welding to prevent corrosion		
	1.4 Pipe Installation	The Contractor should prepare and submit for approval detailed shop drawings indicating the pipe routing, levels, tapping points, riser points, drain points etc., Pipes shall be installed in a workmanship manner in accordance with the approved shop drawings. Pipes shall be aligned parallel to walls and ceiling and all drops shall be plumb. Wherever specified all pipe connections to equipment's shall be provided with flexible connections. All pipes shall be properly supported from roofs, walls, etc., Vertical risers shall be supported at all floor casting with Rigid MS Channels Where light weight roofing are provided, the pipe supports should be provided from the floors and as directed		

by the Consultants. All pipework inside the plantroom and terrace shall be supported from the floor only.

All pipes shall necessarily be clamped to the pipe supports with specially made pipe clamps. The clamps shall be made out of mild steel and painted with a coat of primer and final coat of black enamel paint. The clamps should take into account any lateral moment of the pipes owing to temperature variations and in no case the clamps should induce stresses on the pipe and supports. Pipe supports inside trenches shall restrain the vertical movement of pipes while at the same time permitting horizontal movement due to thermal expansion/contraction.

HDPE / Metal jacketed insulated pipes shall be provided with clamps over the encasement. In case of other insulation such as nitrile rubber insulation, rigid PUF supports shall be provided between the bare pipe and the support.

The pipe support spacing shall be as under:

Pipe Size	**Horizontal pipe**	**Vertical pipe**
Upto 25mm	2.0 m	2.5 m
32mm to 125mm	2.5 m	3.0 m
150mm to 250mm	3.0 m	4.0 m
300mm and above	4.0m	4.0m

Additional supports shall be provided at Bends, Valves, Equipment connections etc., Supports structures shall be grouted to walls and could be fixed on to concrete ceilings, beams, columns using Anchor Fasteners.

Wherever the pipes pass through wall or ceilings, pipe sleeves shall be provided at the crossings. These sleeves shall be fixed to the civil structure. After carrying out the piping, gaps between the sleeve and pipe shall be sealed with fire rated sealant.

Prior to fixing of pipework, all pipes shall be wire brushed and purged with air blast to remove all rust

		and mill scale from inner surface. The method of cleaning shall be such that no material is left on the inner or outer surfaces, which will affect the serviceability of the pipe. All pipe joints shall be welded construction, unless otherwise specified. However, flange joints shall be provided as mentioned below. iv) Equipment isolation ie adjacent to units. v) Mating flange for valves, strainers etc., vi) At wall / ceiling crossings as required by the Consultant Flangesshall be slip-on carbon steel with plain face conforming to IS 6392.All bolts & nuts shall be carbon steel and gaskets shall be 3 to 6 mm reinforced rubber Gaskets. All pipes below 40 mm NB shall have socket welding using fillet welding. Pipes 50 mm NB and above shall have butt welding using butt weldable fittings. Wherever welding is carried out on pre-insulated piping, the insulation shall be protected from welding sparks as well as heat of welding using metal sheets and wet cloth. The ends of pipe lengths to be welded shall be cut square by a machine saw and the edges levelled to form a 'V' groove before welding. Under no circumstances, pipe cutting or forming the edges using gas cutting or welding will be allowed. For bends, wherever space permits, the Contractor may use pipe bends (3D) formed using pipe bending machine for pipe sizes 50 mm nominal size and under. The Contractor shall ensure that undue thinning of pipe wall does not occur due to bending. Readymade bends of the same wall thickness as the pipe can be used up to pipe diameters of 250mm. These bends shall preferably be of long radius type. In case of space constraints short radius bends may be used.		

		All welding work shall be carried out by professional welders. The Contractor before employing any welder at site shall invite the Client and Consultant to witness a sample welding which would be carried out by that particular welder. The Client and Consultant would witness and inspect the quality of the welding joint and provide consent for the particular person to carryout welding works at site. It is to be noted that the consent of Client and Consultant does not absolve the Contractor of their contractual obligation to provide a defect free installation. The Contractor shall not use any other persons for welding other than those welders whose samples have been inspected and accepted by Client and Consultant. In case the Contractor uses unapproved welders, the entire welding work carried out by such welder/s will be summarily rejected. All pipes shall be laid, and tack welded in position with all flanges, valves, etc., After inspection and approval of the layout by the Consultants / Clients Site Engineer, only then full welding could be carried out. Automatic air vents shall be installed at all highest sections of piping. Drain with drain valves shall be provided at low point of piping and all dirty legs. The size of the valves shall be 25 mm size for pipes up to 100 mm and 40 mm for sizes larger than 100 mm. Drain shall be closed with dummy caps to prevent accidental opening. Drain shall be piped to the nearest floor drain. Piping shall be pitched towards the drain points. Wherever specified in BOQ, drainpipes shall be provided with water grade HDPE/PVC pipe 10kg/sq.cm rating with screwed/solvent joints. These drainpipes shall be tested for leaks to a minimum pressure of 1 kg/sq.cm.		
	1.5 Testing	Pipes after completion of welding shall be hydraulically tested. All equipment's shall be isolated from the piping by providing inserting suitable dummy plates in the flanges so as to prevent entry of water into the equipment. In case of Chilled water pipes (except for pre-insulated pipes), no insulation shall be carried out until the		

		completion of pressure test. Pipes shall be tested in sections if necessary to suit the project schedule. Piping shall be tested to hydrostatic test pressure of at least 1.5 times the maximum operating pressure or 2 times the shut off head of the pumps whichever is higher, but not less than 10Kg/Sq.Cm for a period of not less than 24 hours. All leaks and defects in joints and piping during the test shall be rectified and got approved. No pipe shall be welded with water inside the pipes. Piping repaired subsequent to the above pressure shall be retested in the same manner. Systems may be tested in sections and such sections shall be capped securely. Entire system shall then be retested. Noiseless circulation of water in the circuit should be achieved. If improper circulation due to air lock is found, it is the responsibility of the Contractor to carry out all necessary rectification. The Consultants / Client shall be informed well in advance by the Contractor of his intention to test a section or sections of piping and all such tests shall be witnessed by the consultants or their authorized representatives. Test certificates duly signed by the contractor and the consultant shall be submitted by the contractor after completing the tests.		
	1.6 Flushing	After completion of the installation, the pipelines are to be flushed thoroughly to blow out the entire dirt and muck. All equipment's would be isolated from the piping with dummies and the pipework provided with temporary loop lines near equipment's to facilitate flushing. Flushing will be carried out in multiple stages as under till the water drained from the pipework at all points is clear of any sediments or suspended particles. C. Fill up water in the pipework and drain the water from the pipework from the lowest point in each section of the pipework. This filling-flushing activity has to be carried out at least 2 times. For the purpose of draining, the contractor, if necessary, has to create temporary drain points at the lowest point of each section of piping. D. Fill up water in the pipework and circulate the water at high velocity using temporary		

		pumps. After circulating the water for about 1 hour, the water hast to be drained fully. This process has to be repeated till the water is clear. Subsequent to flushing, commissioning strainers (strainers with permanent magnet on flange and SS fine mesh wrapped over the normal strainer basket) along with temporary pumps shall be used for circulating water for at least 48 hours and thereafter the commissioning strainers can be removed and the equipment's can be brought into loop. The system then shall be balanced to deliver the water quantities as specified. Balancing report after certification shall be submitted with completion drawings and documents		
10.	**VALVES**			
	1. Butterfly Valves	The butterfly valves shall be wafer type and supplied along with flow control lever. The valves shall be compact in size and shall conform to BS 5155, MSS SP 67, and API 609. The valves shall be light in weight and easy to install between a pair of flanges conforming to BS10 Table D & E. The body shall of close grain cast iron conforming to BS EN: 1561/IS210Gr FG260 and the seating shall be of Resilient black, Nitrile rubber / EPDM moulded on to the body. The disk shall be of cast iron as per BS EN: 1561 with nylon coating or SG iron as per BS EN: 1563 nylon coated or ductile iron as per IS1865 Gr450/10, whereas the shaft shall be of stainless steel AISI 431 / 410treated permanently for lubrication. The shaft seals shall be of Nitrile 'O' rings and rubber seals. Valves shall be suitable for a working pressure as specified in the Bill of Quantities. Care should be taken during installation to see that the disk is not damaged during installation due to the flanges being incorrectly spaced. The valve shall be removed from pipework after initial setting for carrying out full welding work. For valves including and above 200mm diameter, geared arrangement with hand wheel shall be provided for operation of the valve. Wherever called for, the valves shall be provided with extended stem to ensure easy operation in insulated pipework. Integral ISO 5211 platform shall be provided to facilitate direct mounting of actuators and		

		Gear units on to the valves. In case of motorised butterfly valves, the actuator motor shall be mounted on the platform provided in the butterfly valves. The actuator shall operate on single phase 230V power supply and have potential free contacts for status monitoring. The actuator shall have Push Button for ON/OFF arrangement. If the push button arrangement in the valve is not a standard, then the contractor shall provide necessary wiring and push button externally. It shall be possible to dismount the motor assembly easily and operate the valve stem manually if required.		
	2. Ball Valves	Ball Valves shall have body of carbon steel. The ball and the shaft shall be of stainless steel. The seat shall be of PTFE. The valve shall be complete with socket weld ends.		
	3. Ball Valves with And Without Strainer	Ball Valves with strainer up to 50mm size shall have brass body. The ball and the shaft shall be of stainless steel. The seat shall be of PTFE. The valve shall be complete with socket weld ends and confirming to relevant codes. Valves 50 mm dia shall have brass body and stainless-steel spindle valve seat. The valves shall be suitable for pressure rating as specified in the Bill of Quantities		
	4. Balancing Valves	Balancing valves shall be provided in the piping as indicated in drawings to measure and balance the flow in the piping. These valves shall have built-in pressure-drop measuring facility to compute flow rate across the valve. The test cocks shall be long enough to protrude out of pipe insulation. The valve handle or stem shall have markings which would display the number of turns the valve is open. It shall also be possible to lock the valve at the balanced position such that it would not be possible to open the valve any further at the same time permitting full closure of the valve if required. Valves up to and including 50mm dia shall be in Gun metal construction with threaded connections. Contractor shall provide flanges on either end of such threaded valve to enable easy removal of valve. For valves including and above 65mm dia, the construction shall be as under: Body: Cast Iron to IS 210 Gr. FG 260 Bonnet: Cast Iron to IS 210 Gr. FG 260 Hand Wheel: Mild Steel Fabricated		

		Stem: SS-410 Disc: EN-3 Sealing Disc: E P D M Temp Range:-40 Deg. C to 120 Deg. C) Pressure Test Cocks: Steel Chrome Plated End Connection: Flanged as per IS: 6392 Table 17 To enable accurate and practical operation, measurement of flow and differential pressure shall be made with a computerized balancing instrument which shall enable the operator to read the flow directly without the use of diagrams or tables. In addition to measuring flow rate, differential pressure and temperature, computerized balancing instrument shall have a computer programme to provide the following functions: To balance the HVAC installation and calculate the necessary valve settings based on system measurements. • To store the results of balancing. • To log measured values from a valve (differential pressure, flow rate or temperature). • To printout saved data in computerized measurement protocol (CMP) consisting of : f. Name and size of Balancing Valve (BV) g. Pre-setting position of BV h. P at BV i. Flow at BV j. Design Flow		
	5. Strainers **(Y type Strainers)**	Strainers up to 50 mm shall be of gun metal type. Strainers 65mm and above shall be flanged type with Cast Iron / MS body fabricated from pipes. The strainer screen shall be long and removable type with 3 mm perforations. It shall be possible to remove the strainer element without disconnecting the strainer from the pipework by removing a flange at one end of the strainer element. The removable flange shall have donut shaped permanent magnet of at least ½" ht fixed to the centre of the removable flange with bolt nut and washer on the inside to trap any ferrous/magnetic particles. Strainers 100mm dia and larger shall be provided with pipe nipple of 20mm dia and ball valve so that the water in the strainer can be drained with a		

		flexible hose to the nearest drain point. In case the requirement of magnet and pipe nipple provision is not a standard offering of the manufacturer, they shall be provided on field by the Contractor. During commissioning of system, the strainer screen shall be provided with a further SS mesh with 1mm sieve size. The same shall be removed after a few days of running the system with the mesh in place.		
	6. Two Way Motorised Valve On/Off Type	Two way motorised ON/OFF type valve complete with electrical actuator, heavy duty PN 10 rating brass/bronze body valve, Room thermostat with LCD display, On/Off buttons, Temperature adjustment dial/button, Fan speed control with necessary transformers wiring etc., This shall be provided as 2 position diverting valves in chilled water lines at each fan coil unit and shall be actuated by space thermostat. Space conditions shall be maintained by modulating the volume of water flow through the coil. The valves shall revert to fully bypass position when fan is shut off. Pressure drop across the valve shall not exceed 0.14 kg/ sq.cm. Valve shall have the facility to replace motor actuator without removing the valve body.		
	7. Two-Way Control Valve Modulating Type	Two way modulating Control valves in a single Unit of Valve. The 2 way valve for the AHU / CSU shall be suitable for 24V AC power supply. All control Valves with size lesser than or equal to DN 40 mm shall have Brass / Bronze body with stainless steel seat and brass plug, Control Valves with size above DN 50mm shall have a Cast iron body and stainless steel with brass plug and sealing gland. The actuator versions should be with spring-return function and should be directly mounting on valves without any adjustments. All the actuator shall be operated through 24 VAC and should be modulated through control signals 0…10 VDC, 4….20 mA, or 0…1000 ohms.		

	8. BTU Meter	BTU meter shall consist of flow sensor, temperature sensors, microprocessor unit with display. The flow sensor shall be of ultrasonic type working on time transit method. The sensor shall consist of two ultrasonic transducers producing sound waves travelling both in the direction of water flow and against it and use the time taken to reach the receiver to measure the flow quantum. The flow sensor shall be in the form of a pipe and offer minimum resistance to the water flow. Flow sensor shall have integral flanges at both ends for connecting to pipework. Immersion type temperature sensors shall be provided to measure the temperature at two locations in the pipework. Cable length with these sensors shall be minimum 6m each. One of the sensor could also be inbuilt along with the flow sensor. The microprocessor unit shall be similar to Kamstrup Multical 603. The unit shall compute the flow, temperature difference, instantaneous cooling capacity, totalized values of cooling capacity etc. The unit shall have a backlit display unit which shall display all these values. Scrolling or programming the unit shall be possible through tactile keypad or soft buttons which would provide an easy menu driven experience. The unit shall have in built battery backup. The unit shall release all the operational parameters to a BMS through Modbus / BACNET over IP. Unit shall be minimum IP 55 rated.		
	9. Pressure Gauges	Pressure gauges shall be of bourdon type, glycerine/liquid filled with AISI 304 Stainless Steel casing of appropriate range as specified in the BOQ. Pressure gauge shall be fixed onto a coupling welded to the main pipework with a small stub nipple pipe. Isolation valve shall be provided to isolate the pressure gauge as necessary. The stub nipple pipe shall be Class C as per IS1239. Accuracy of pressure gauge shall be 1% as per UNI EN – 837 -1. Pressure gauges installed on the inlet and outlet of chillers and pumps shall be of 150mm dia dial and the ones installed across AHU pipework shall be of 100mm dia dial.		

	10. Thermometers	Thermometers shall be Dial type with remote sensing bulb and interconnecting capillary. Design shall be as per EN13190. Case, capillary, and stem shall be of stainless steel. Dial shall be minimum 100mm dia. Accuracy shall be Class 2 as per EN13190. Thermometer shall be with bottom capillary entry and back mounting support. Thermometer shall be suitable for use on a liquid filled thermowell.		
	11. Thermowell	Thermowell shall be provided in pipework as called for. The pipework shall be welded with an 1" threaded coupling and closed with a 1" threaded dummy will be screwed into the coupling. The dummy will have an ½" hole drilled along the centreline of the dummy. Copper pipe stub of 5/8" will be brazed on the coupling end of the dummy. The other end of the copper tube would be pinched. Glycol or other conducting fluid would be filled in the copper tube.		
	12. Test Points	Test points shall be fixed to couplings provided in the pipework as required/shown in the drawings. These test points would allow measurement of pressure and temperature at the point of installation with the help of portable pressure gauges and thermometers custom made for this purpose. Body of test point shall be of brass with nitrile sealing bushes. The test point shall be capable of withstanding pressures upto 16 bar and be leakproof even after multiple uses. Pressure gauges and Digital thermometers as suitable for these test points shall be supplied as called for in the BOQ. These gauges shall have at least Class 2 accuracy as per relevant EN standards.		
	13. Air Vents	The automatic air vent comprises as follows e. Lid f. Red bronze housing g. Float h. Valve seat seals **Materials** e. Brass housing f. Brass lid g. High grade, heat-resistant synthetic material float h. Heat resistant elastomer seal components		

11.	**CHILLED WATER PIPING INSULATION**			
	Pre-Insulated Pipework with HDPE Jacketing – For Buried Pipework	This specification covers the technical aspects related to insulation of pipework. (For specification related to pipes, methods of jointing, installation etc., please refer to the relevant section in this document.) Insulation material shall be PUF of density minimum 40Kg/cu.m sandwiched between the pipe and an outer HDPE jacket. Entire insulation shall be done at the factory and brought to site. Field work shall be limited to insulation of welded joints only. HDPE pipes shall be of minimum PN 2.5 rating and as per outer diameter as mentioned in the BOQ for the relevant pipe sizes and conform to IS4984, material grade PE80. Before insulation, the outer surface of the chilled water pipe shall be cleaned thoroughly to remove any dust, dirt, oil and grease. Thereafter the chilled water pipe shall be positioned inside the HDPE pipe such that the annular space is even all around. Thereafter, PUF injection shall be carried out to achieve the desired density. Insulation shall not be done for a small distance at either end to facilitate joining of pipes. After insulation, the pipes shall be handled carefully and transported to site and unloaded with utmost care to ensure that there is no damage to the HDPE casing or insulation. After completion of welded joints and pressure testing, all the joints would be insulated at site with PUF and finished with HDPE. Sections of HDPE pipe or HDPE sheets would be welded with HDPE welding to form a leakproof joint which would prevent ingress of water into the insulation.		
	Pre-Insulated Pipework with GI Spiral Pipe Jacketing – For Pipework Inside Buildings	This specification covers the technical aspects related to insulation of pipework. (For specification related to pipes, methods of jointing, installation etc., please refer to the relevant section in this document.) Insulation material shall be PUF of density minimum 40Kg/cu.m sandwiched between the pipe and an outer GI spiral pipe jacket. Entire insulation shall be done at the factory and brought to site. Field work shall be limited to insulation of welded joints only. GI spiral pipes shall be of minimum 26G thickness		

		having GI coating of atleast 120 gms/sqm. Outer diameter of GI spiral pipe shall be as mentioned in the BOQ for the relevant pipe sizes. Before insulation, the outer surface of the chilled water pipe shall be cleaned thoroughly to remove any dust, dirt, oil and grease. Thereafter the chilled water pipe shall be positioned inside the GI spiral pipe such that the annular space is even all around. Thereafter, PUF injection shall be carried out to achieve the desired density. Insulation shall not be done for a small distance at either end to facilitate joining of pipes. **All tap offs and elbows shall be welded at factory, insulated and brought to site. Vendor shall carryout proper site measurements to ensure that insulation for butt welded or flanged joints alone is carried out at site and all other joint types are done in the factory itself.** After insulation, the pipes shall be handled carefully and transported to site and unloaded with utmost care to ensure that there is no damage to the GI spiral casing or insulation. After completion of welded joints and pressure testing, all the joints would be insulated at site with PUF and finished with GI sheet. Sections of GI sheets shall be screwed or riveted and sealant applied at all joints to form a leakproof joint which would prevent ingress of water into the insulation. ***Insulation work at site for these joints will have to be carried out by the same manufacturer who has supplied the Pre-insulated pipe.***		
12.	**Pipe Insulation For Field Joints**	Material of insulation for chilled water pipework in Plantrooms shall be rigid PUF of density minimum 40kg/cum. Before insulation, the outer surface of the chilled water pipe shall be cleaned thoroughly to remove any dust, dirt, oil and grease. Thereafter one coat of bituminous primer shall be applied all over the pipe and allowed to dry. Insulation shall be in the form of semi-circular annular pipe sections. Wherever the insulation		

		thickness specified does not meet standard products, the first layer shall be with pipe sections and the balance be made up with rectangular slabs cut into strips and fixed over the pipe section. Insulation shall be fixed using a flood coat of hot bitumen grade 100/85 @1.5kg/sqm. All joints shall be staggered while fixing the insulation. All joints shall be sealed thoroughly with hot bitumen. Thereafter the insulation shall be wrapped with 300G polyethylene sheet. All joints of the sheet shall be finished with PVC tapes to form good vapour barrier. Aluminium cladding with 26G aluminium sheets shall be carried out as finish. Items which would require future maintenance such as pumps, strainers etc., and other such items shall be insulated with a removable piece so that the insulation can be removed, maintenance work carried out and the insulation piece fixed back in original position without any damage to the insulation.		
13.	**PIPE INSULATION FOR UNIT CONNECTIONS**			
	1.0 Material			
	Material for piping insulation shall be Closed Cell Nitrile Rubber insulation of thickness as specified in the Bill of Quantities. • Density of Material shall be between 40 to 55 Kg/m3. • Thermal conductivity of elastomeric nitrile rubber shall not exceed 0.037 W/m°K at an average temperature of 0°C. • The insulation shall have fire performance such that it passes Class 0 as per BS476 Part 7 for surface spread of flame as per BS 476 and also pass Fire Propagation requirement as per BS476 Part 6 to meet the Class 'O' Fire category as per 1991 Building Regulations (England & Wales) and the Building Standards (Scotland) Regulations 1990. • Water vapor permeability shall not exceed 0.017 Perm inch (2.48×10^{-14} Kg/m.s.Pa), i.e. Moisture Diffusion Resistance Factor or 'μ' value should be minimum 7000. • Thickness of the insulation shall be as specified for the individual application.			

	• Wherever specified the insulation shall be supplied with factory faced GC Cloth. The insulation material, to the extent feasible shall be in tubular form only. In cases where the diameters of pipe or large or the thickness required is higher and not in the standard supply range of the OEM, to the extent feasible, the initial layer shall be with tubular insulation and further thickness achieved by applying insulation in sheet form to wrap around the pipes.		
	2.0 Insulation Application		
	The insulation shall be applied as under: c. For Tubular Insulation: Clean the Pipe surface with wire brush and render the surface dry and clean. Slide the insulation into the pipe. Seal all transverse joints using tape. Tubular insulation shall be suitably protected from any damage during installation works. d. For Sheet Insulation: Clean the Pipe surface with wire brush and render the surface dry and clean. Cut the sheets appropriately to match the diameter of the pipe. Apply a coat of adhesive to the pipe and the inner surface of insulation and wait for the insulation to be tacky. Fix the insulation to the pipe without any wrinkle or bubbles. Wrap the insulated surface with minimum 300-micron polythene sheet with at least 50mm overlap and hold in position with self-adhesive PVC tapes. Finish the insulation with 26G Aluminium cladding held in place with self-tapping screws.		
14.	**Warranty**: One Year Standard Warranty Period.		

(Note: It is mandatory for the bidders to provide the compliance statement (Complied/Not Complied) for the above points with document proof as required). If the compliance statement (Complied/Not Complied) is not furnished for the evaluation Bidders will be disqualified.

SIGNATURE OF BIDDER ALONG WITH SEAL OF THE COMPANY WITH DATE

ANNEXURE – C

FINANCIAL BID (PROFORMA) - BILL OF QUANTITIES (BOQ)

Item Name: PROVISION OF AC FACILITY TO WALMART SPACE
Tender No. GEICSR/RAGH/004/2024/ACWALL

It. No	Description of work	Quantity	Units	Basic Rate in INR	GST in Percentage	Total Amount with taxes in INR
1	**DOUBLE SKIN FAN COIL UNITS - DECORATIVE TYPE CEILING SUSPENDED -INSIDE CONDITIONED SPACE** SITC of double skin chilled water Fan Coil Unit. It is proposed to install these units ceiling suspended inside the conditioned area without false ceiling. Hence, aesthetics of the unit is of parmount importance. The unit shall be constructed out of sandwiched panels minimum 43 mm thick RPUF insulation, with thermal break profile.The outer sheet of the panel shall be 0.8mm thick and the inner sheet shall be 0.63mm thick. The unit shall be provided with a Aluminium powdercoated grille for both supply air and return air. RA Grille on the rear side. SA Grille shall be provided in the front side. (please refer enclosed sketch). The units shall be with blow through design, units complete with pre-filters, fan section with DIDW forward curved fan directly coupled to a single phase motor operable in 3 speeds, 3 row deep cooling coil & extended drain tray. Coil section shall be with suitable air vent and drain points.The coil section and drain tray sections shall be provided with sandwiched insulation.The unit shall be sized to accommodate the isolation valves as well as the control valve. The FCU shall be factory fitted with isolation valves (ball valve with strainer at inlet and without strainer at outlet), 2 Way Motorised Valve(On/Off type) motorised valve with spring return (Valve to close when the power supply is cut off), necessary interconnections etc., Price to include for Room Thermostat compatable for BMS integration (Bacnet over MSTP) with On/Off, Fan Speed and Temperature Control with a digital display & upto 15Rmt of interconnecting wiring between FCU and Thermostat in GI conduits. Price also to include upto 3Rmt of copper flexible multicore cable with plugtop for power.					
1.01	2.0TR, 800 CFM	4	Nos.			
1.02	1.0 TR, 400 CFM	2	Nos.			

2	SITC of Pre Insulated Chilled water piping inside buildings in welded construction with MS ERW pipes with factory made GI spiral pipe jacketed PUF insulation complete with all fittings, flanges, pressure testing as per specification. Pipes 150mm dia and below shall be C class as per IS1239.200 mm and above shall be as per IS3589 with wall thicness as specified. Cost to include necessary supports with PUF saddles.					
2.01	40mm dia NB - jacket dia min 140mm	40	Mtr.			
2.02	32mm dia NB - jacket dia min 125mm	40	Mtr.			
2.03	25mm dia NB - jacket dia min 125mm	10	Mtr.			
3	**COPPER CHILLED WATER PIPING** SITC of Copper Soft / Hard drawn piping for smaller chilled water units (CSU, FCU, Hiwalls) with all fitting and insulated with class "O" tubular closed cell nitrile rubber 25mm thick insulation with factory made glass cloth backing. Thickness of the copper pipe shall be minimum 22G. Price to include necessary flare nuts, adaptors etc., Copper pipe routing shall be as per the attached tender layouts.					
3.01	19.1mm dia	20	Mtr.			
	Grand Total					

Total Amount Rupees in words _____

Note:

1. Price bid as per this format to be uploaded only at the financial document column in CPP Portal. Price disclosure at the technical bid will result in disqualification.

2. Technical Bid Should NOT Contain Price Bid/Financial Bid details (or) Indication. If the price Details are indicated, mentioned inside the technical bid, then bid will be disqualified and neither the Technical Bid nor the Price Bid/Financial Bid will be considered.

I/We the bidder accept all the terms and conditions as per tender including all technical & commercial conditions.

Date:
Place:

Authorized Signatory
(_____)
Seal and signature

ANNEXURE – D

FORMAT FOR AFFIDAVIT OF SELF-CERTIFICATION UNDER PREFERENCE TO MAKE IN INDIA – PER ITEM

Tender Reference Number:

Name of the item / Service:

Date: _____
I/We_____S/o, D/o, W/o, _____
Resident of
_____

Hereby solemnly affirm and declare as under:

That I will agree to abide by the terms and conditions of the Public Procurement (Preference to Make in India) Policy vide GoI Order no. P-45021/2/2017-PP (B.E.-II) dated 15.06.2017 (subsequently revised vide orders dated 28.05.2018, 29.05.2019and 04.06.2020) MOCI order No. 45021/2/2017-PP (BE II) Dt.16th September 2020 & P- 45021/102/2019-BE-II-Part (1) (E-50310) Dt.4th March 2021 and any subsequent modifications/Amendments, if any and

That the local content for all inputs which constitute the said item/service/work has been verified by me and I am responsible for the correctness of the claims made therein.

Tick (✓) and Fill the Appropriate Category	
☐	I/We_____[name of the supplier] hereby confirm in respect of quoted items thatLocal Content is equal to or more than 50% and come under **"Class-I Local Supplier"** category.
☐	I/We_____[name of the supplier] hereby confirm in respect of quoted items that Local Content is equal to 20% but less than 50% and come under **"Class-II Local Supplier"** category.

- The details of the location (s) at which the local value addition is made and the proportionate value of local content in percentage

Address _____ Percentage of Local content: _____%
_____ Country of Origin of Goods: _____

For and on behalf of ..... (Name of firm/entity)

Authorized signatory (To be duly authorized by the Board of Directors)
<Insert Name, Designation and Contact No.>

[Note: In case of procurement for a value in excess of Rs. 10 Crores, the bidders shall provide this certificate from statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of local content.]

This letter should be on the letterhead of the quoting firm and should be signed by a competent authority. Non-submission of this will lead to Disqualification of bids.

ANNEXURE – E

Land Border Sharing Declaration

(To be given on the letter head of the bidder)

In-line with Department of Expenditure's (DoE) Public Procurement Division Order vide ref. F.No.6/18/2019-PPD dated 23.07.2020 & 24.7.2020

Tender No._____ Dated: _____

CERTIFICATE

(Bidders from India)

"I/ we have read the clauses pertaining to Department of Expenditure's (DoE) Public Procurement Division Order (Public procurement no 1, 2 & 3 vide ref. F.No.6/18/2019-PPD dated 23.07.2020 & 24.7.2020) regarding restrictions on procurement from a bidder of a country which shares a land border with India. I/We hereby certify that I/ we _____ (Name of the bidder) is/are

a) Not from such a country and eligible to be considered for this tender.

OR

(Bidders from Country which shares a land border with India)

I/We _____ (Name of the bidder) is/are from _____ (Name of the Country) and has been registered with the Competent Authority. I also certify that I fulfil all the requirements in this regard and is eligible to be considered. *(Copy/ evidence of valid registration by the Competent Authority is to be attached)*

Place: Signature of the Bidder
Date: Name & Address of the Bidder with Office Stamp

ANNEXURE - F

OEM CERTIFICATION FORM
(In Original Letter Head of OEM)

Tender No: ..... Dated: .....

We are Original Equipment Manufacturers (OEM) of..... (Name of the company) Ms..... (Name of the vendor) is one of our Distributors/Dealers/Resellers/Partners (tick one) for the ……. and is participating in the above-mentioned tender by offering our product model.....(Name of the product with model number).

…….. is authorized to bid, sell and provide service support warranty for our product as mentioned above.

Name and Signature of the authorized signatory of OEM along with
seal of the company with Date

TENDER CHECKLIST – Mandatory documents to be filled and attached along with technical bid document.

(1) I have registered as a Vendor with IC&SR. (Proof to be enclosed) ☐
To submit document proof pertaining to point.no: 6 of tender ISO certificate, Active GSTIN certificate, valid PAN details.

(2) Technical Bid details and Financial Bid details have to be provided in a separate folder ☐

(3) Completed and Signed Form of Tender. The Form of Tender document shall be signed by a person legally authorized. (Proof of Authorization to be enclosed) ☐

(4) Completed Technical Compliance Statement ☐

(5) Evidence of similar contracts completed/Product supplied in case if the details are requested in (**Annexure – A)** ☐

(6) Certification of Class I / Class II Local Supplier (Goods, Services, or Works) is submitted as part of the technical bid. **(Annexure – D)** ☐

(7) EMD as per tender norms is deposited and the proof is enclosed (**Annexure – I**) ☐

(8) Land Border sharing declaration document is submitted **(Annexure – E)** ☐

(9) Non- Debarment Declaration (**Annexure – H)** ☐

(10) Authorized agent certificate from OEM is mandatory if Indian agent/Indian office of OEM is participating in this tender on behalf of OEM. (**Annexure F)** ☐

The bid will be valid if all the above documents are provided. Bidders are asked to supply and tick off the required information. Failure to provide any of the stated documents as per tender norms may result in the bid being considered non-compliant and rejected.

Signature of the Bidder

ANNEXURE - H

FORM - A
NON- DEBARMENT DECLARATION

Date: XXXX

To,
The Indian Institute of Technology Madras,
Sardar Patel road,
Guindy, Chennai - 600036

Subject: Non-debarment declaration in connection with tender RFF No: XXXXXX for procurement of "XXXXXXXXXXXXXXXXXXXXXXXXXXX"

Dear Sir,

This is to notify you that our Firm/Company/Organization <*provide Name of the Firm/Company/Organization*> intends to submit a proposal in response to the invitation for procurement of "XXXXXXXXXXXXXXXXXXXXXXXXXXX" In accordance with the above we declare that:

a. We are not involved in any major litigation that may have an impact of affecting or compromising the delivery of services as required under this assignment.

b. We are not debarred by any Central/ State Government/ agency of Central/ State Government of India or any other country in the world/ Public Sector Undertaking/ any Regulatory Authorities in India or any other country in the world for any kind of fraudulent activities in last XX years.

Sincerely,

[BIDDERS NAME]
Name
Title Signature

CENTRE FOR INDUSTRIAL CONSULTANCY & SPONSORED RESEARCH (IC&SR)
INDIAN INSTITUTE OF TECHNOLOGY MADRAS
CHENNAI 600 036

ELECTRONIC CLEARING SERVICE (Credit Clearing)/ REAL TIME GROSS SETTLEMENT (RTGS) FACILITY FOR RECEIVING PAYMENTS

A. Details of Account Holder

Name of the Institution	Indian Institute of Technology - Madras
Complete Contact Address	Industrial Consultancy and Sponsored Research Indian Institute of Technology-Madras, IIT- Madras Campus Post Office, Sardar Patel Road, Guindy, CHENNAI - 600 036
Permanent Account Number (PAN)*	AAAAI3615G
GST REGISTERATION NO.	33AAAAI3615G1Z6
Telephone No./ Fax No.	Tel - 044-2257 8356
E- mail ID of the FO/AO/REG/DIR	dricsr@iitm.ac.in

B. Bank Account Details:

Institution Account Name (As per Bank Record)	The Registrar, Indian Institute of Technology - Madras
Account No.	2722101003872
IFSC CODE	CNRB0002722
SWIFT CODE	CNRBINBBIIT
Bank Name (in full)	Canara Bank
Branch Name	IIT-Madras Branch
Complete Branch Address	Canara Bank, IIT-Madras Branch, IIT- Madras Campus Post Office, Sardar Patel Road, Guindy, CHENNAI - 600 036
MICR No.	600015085
Account Type	Savings Account

Certified that the Institute's account is in an RTGS enabled branch.
I hereby declare that the particulars given above are correct and complete.

Date: 04/08/2023

कृते केनरा बैंक / For CANARA BANK
अधिकारी / Officer
आई आई टी चेन्नई शाखा / IIT Chennai Branch
चेन्नई / Chennai - 600 036

करोलिन लेमिना.म
M. KAROLINE LEMINA
अधिकारी
OFFICER
S.P. No:64356

Signature of the Competent Authority
of the Institution with seal.

उप कुलसचिव (आईसी एवं एसआर)
DEPUTY REGISTRAR (IC & SR)
आईआईटी मद्रास
I.I.T. MADRAS

Phone : +91 (0) 44 2257 8062 / 8061 / 8060 Fax : +91 (0) 44 2257 0545 / 2257 8366 email : deanicsr@iitm.ac.in website : http://www.iitm.ac.in

ANNEXURE – J

MANDATE FORM

ELECTRONICS CLEARING SERVICE (CREDIT CLEARING)/REAL TIME GROSS SETTLEMENT (RTGS) FACILITY FOR RECEIVING PAYMENTS.

*****

A. DETAILS OF ACCOUNT HOLDER: -

NAME OF ACCOUNT HOLDER	
COMPLETE CONTACT ADDRESS	
TELEPHONE NUMBER/E MAIL	

B. BANK ACCOUNT DETAILS: -

BANK NAME	
BRANCH NAME WITH COMPLETE ADDRESS, TELEPHONE NUMBER AND EMAIL	
WHETHER THE BRANCH IS COMPUTERISED?	
WHETHER THE BRANCH IS RTGS ENABLED? IF YES, THEN WHAT IS THE BRANCH **IFSC CODE**	
IS THE BRANCH ALSO NEFT ENABLED?	
TYPE OF BANK ACCOUNT(SB/CURRENT/CASH CREDIT)	
COMPLETE BANK ACCOUNT NUMBER(LATEST)	
MICR CODE OF BANK	

DATE OF EFFECT:

I hereby declare that the particulars given above are correct and complete. If the transaction is delayed or not effected at all for reasons of incomplete or incorrect information I would not hold the user institution responsible. I have read the option invitation letter and agree to discharge the responsibility expected of me as a participant under the Scheme.

(…….……)
Signature of Bidder

Date:
Certified that the particulars furnished above are correct as per our records.
(Bank's Stamp)

(…….……)
Signature of Bidder

Date :

1. **Please attach a photocopy of the cheque along with the verification obtained from the bank.**
2. **In case your Bank Branch is presently not "RTGS enabled", then upon its upgradation to "RTGS Enabled" branch, please submit the information again in the above pro-forma to the Department at the earliest.**