INDIAN INSTITUTE OF TECHNOLOGY MADRAS
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The Senior Manager (Project Purchase) Date: 13.09.2023

Open Tender Reference No: PY/MSRO/017/2023/GASCHILLSY

GEM NAR ID: GEM/GARPTS/07092023/8DOZ7Y7JP5CM Due Date/Time: 27.09.2023 @ 3PM

Dear Sir/Madam,

On behalf of the Indian Institute of Technology Madras, Tenders are invited in two bid system from Class-I local suppliers and Class II local suppliers, for the supply of: "**Design and Installation of Gas Distribution System and Chilled Water Distribution System**" 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 contractors".** [Special Instructions to the Contractors/Bidders for the esubmission 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". 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.

1)	**Pre-bid Meeting Details**	**:**	20.09.2023 @9 AM, Before joining this meeting, bidders should send email with details of person who will attend this meeting and their company details along with your queries to **vidyaraman78@incentlgdiitm.org** and **nikhilc@incentlgdiitm.org** on or before 19.09.2023 @ 05:00 PM. Bidders will be intimated on the time schedule and venue details through email.
2)	**Bid Submission**		21.09.2023 @ 9AM
3)	**ICSR Vendor Registration**	**:**	**Vendor registration code.** 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

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

Last date for receipt of tender	**:**	27.09.2023 @ 3PM
Date & time of opening of tender	**:**	29.09.2023 @ 3PM

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 not 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 Annexure-B. **Bid II _Price Bid** The price bid should be submitted in excel format (BoQ) as per the 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 **D1, IITM Research Park** 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 (5.5%). Relevant certificates will be issued 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 **D1, IITM Research Park** 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 Executive 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 Tender shall remain open for acceptance/validity till: 120 days from the date of opening of the tender. However, the day up to which the offer is to remain open being declared closed holiday for the Indian Institute of Technology Madras, the offer shall remain open for acceptance till the next working day.
9)	**EMD:** The EMD of **Rs. 2,00,000** to be transferred to the account details mentioned in Annexure F and proof should be enclosed in the Technical Bid. Any offer not accompanied with the EMD shall be rejected summarily as non-responsive. The EMD of the unsuccessful bidders shall be returned within 30 days of the end of the bid validity period. The same shall be forfeited, if the tenderers withdraw their offer after the opening during the bid validity period. The Institute shall not be liable for payment of any interest on EMD. 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)
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 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. 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 Bank Guarantee should remain valid for a period of sixty days beyond the date of completion of all contractual obligations of the supplier including the warranty 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 sent only for a item/Equipments of latest version that is available in the market and supplied to a number of customers. A list of customers in India with details 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 supply of the item/equipment within the stipulated delivery schedule, the purchaser has all the right to purchase the item/equipment from other sources on the total risk of the supplier under risk purchase clause.
16)	**Payment:** (i) No Advance payment will be made. However, 90% Payment against Delivery 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 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/Guarantee:** The offer should clearly specify the warranty or guarantee 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/guarantee 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 of Tender.
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:** ➢ **As per the Government of India Order, only "Class - I Local Suppliers" and "Class - II Local Suppliers" <u>can participate in this tender.</u>** ➢ **<u>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 as mentioned.</u>**
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 bidders who have fully complied with bidder eligibility criteria I, II and technical evaluation (Annexure A) will only be considered for opening of price bid. **Stage II: Price Bid Evaluation** The price bid evaluation will be based on price quoted by the bidder. The rate quoted for **Design and Installation of Gas Distribution System and Chilled Water Distribution System** unit will alone be taken up for arrival of Lowest Bid (L1) value.
26)	**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.
27)	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.
28)	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.
29)	Clarification to the queries and doubts raised by the bidders will be issued as a corrigendum/addendum in the e-tenders portal.
30)	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 Design and Installation of Gas Distribution System and Chilled Water Distribution System

Tender No. PY/MSRO/017/2023/GASCHILLSY

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

1. 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.

2.0 Bidder Eligibility Criteria – II

1. The bidder/OEM should have supplied at least 2 similar system or more to IITs, NITs, IISERs, CSIR Labs or other Indian Government organizations in the last 5 years, PO copies or installation certificates along with model number and contact details of end user need to be submitted as the proof of supply. IIT Madras reserves its right to verify the claims submitted by the bidder and the feedback from the previous customers will be part of technical evaluation.

3.0 Technical Specifications for Design and Installation of Gas Distribution System and Chilled Water Distribution System

It is proposed to Design and Installs an ultra-high pure gas distribution system for the delivery of Toxic, Inflammable, and Inert gases (CH_4, H_2, Trimethyl Borane (TMB)/Diborane, N_2(High pure), N_2(Industrial pure), Ar, O_2 and compressed air) for deposition equipment such as Micro-wave Plasma CVD (MP-CVD). Work involves Gas Cabinets with Coaxial SS tubing for TMB/Di-Borane gas line, Gas Panels for H_2 and CH_4 gas lines, Valve manifold panel, Electro-polished (EP) and Bright annealing (BA) SS316L tubing, and Exhaust Ducting with scrubber are required for the same. **Following installation, the gas line connections need to be tested and validated for pressure hold test, for 24 hours, Helium leak, up to 1 X 10^{-9} He mBar lit sec^{-1}, trace moisture, tested for less than 5 PPM impurities, trace Oxygen tested for less than 5 PPM and particles, up to 0.1-micron level.** Gas distribution system needs to be designed to Install 7 different MP-CVD system (M-1 to M-7) and for the analytical lab as shown in figure 1 & 2. Also, provision for gas lines (Only CH_4, H_2, N_2(Industrial Pure), TMB/Bi-Borane & Compressed air) expansion to D-102 room must be provided. The floor plan with intended gas line connections is illustrated *(Figure 1 & 2)*. The proposed work also involves design and installation of chilled water distribution piping system for the delivery of chilled water from a 50 TR water cooled chiller for process chamber cooling of each MPCVD system.

Note: Quantities of the items given in the Bill of Material table are approximate, it can be less or more according to the design **requirement. Bidder can come up with their own design for the gas distribution system. Actual billing would be based on actual consumed quantities.** Thus, the bidder should quote a total price based on the quantity given in the table along with per unit price of these items.

GAS DISTRIBUTION SYSTEM SPECIFICATION

Details of required gases:

Sl. No	Gas	Required Flow Rate per machine (in SCCM)	Required Gas Purity (%)	Required Gas Line Pressure (Bar)	Gas Supply Source *(Cylinder / On-site Generation)*	Supply line required for
1	TMB (2% Boron in 98% Hydrogen) **or** Di-Borane (5% in 95% Hydrogen)	≤ 50	>99.999	3	Cylinder	M1 & D-102 Room
2	Methane (CH_4)	≤ 200	>99.999	4	Cylinder	M1,M2,M3,M4,M5,M6, M7 & D-102 Room

3	Argon (Ar)	≤ 100	>99.999	4	Cylinder	M1,M2,M3,M4,M5,M6 & M7
4	Oxygen (O_2)	≤ 50	>99.999	4	Cylinder	M1,M2,M3,M4,M5,M6 & M7
5	Nitrogen (N_2 - High Pure)	≤ 20	>99.999	4	Cylinder	M1,M2,M3,M4,M5,M6, & M7
6	Nitrogen (N_2 - Industrial Pure)	≤ 10000	≥ 99.5	6	Cylinder	M1,M2,M3,M4,M5,M6, M7 & D-102 Room
7	Hydrogen (H_2)	≤ 1000	>99.999	4	Cylinder & H_2 Generators	M1,M2,M3,M4,M5,M6, M7 & D-102 Room
8	Compressed Air	0.5 to 0.7 CFM	Oil & Moisture free	6	Air Compressor	M1,M2,M3,M4,M5,M6, M7, Analytical Lab & D-102 Room

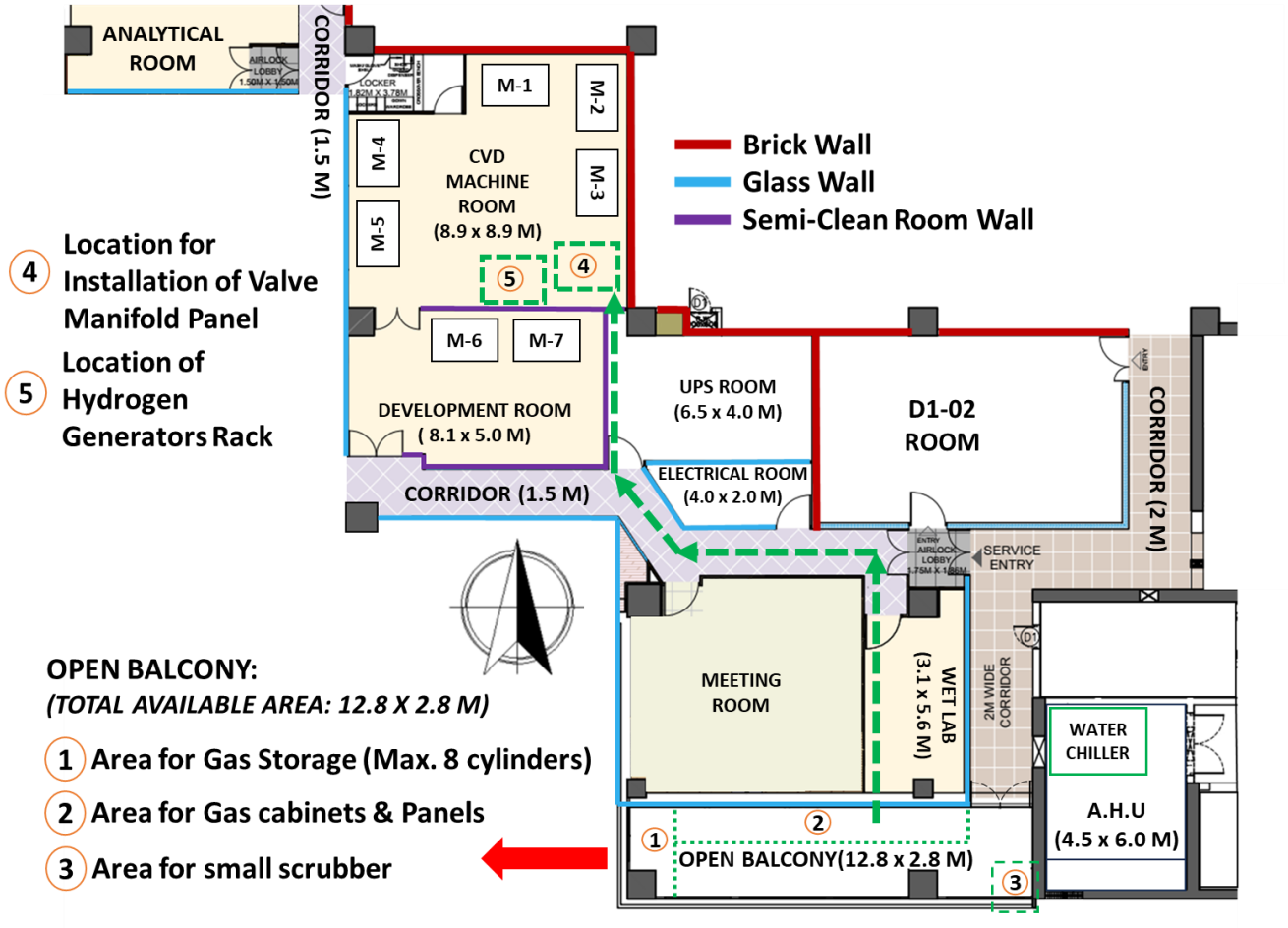

Figure 1: Floor plan details with preferable pathway (green arrow) for gas line construction

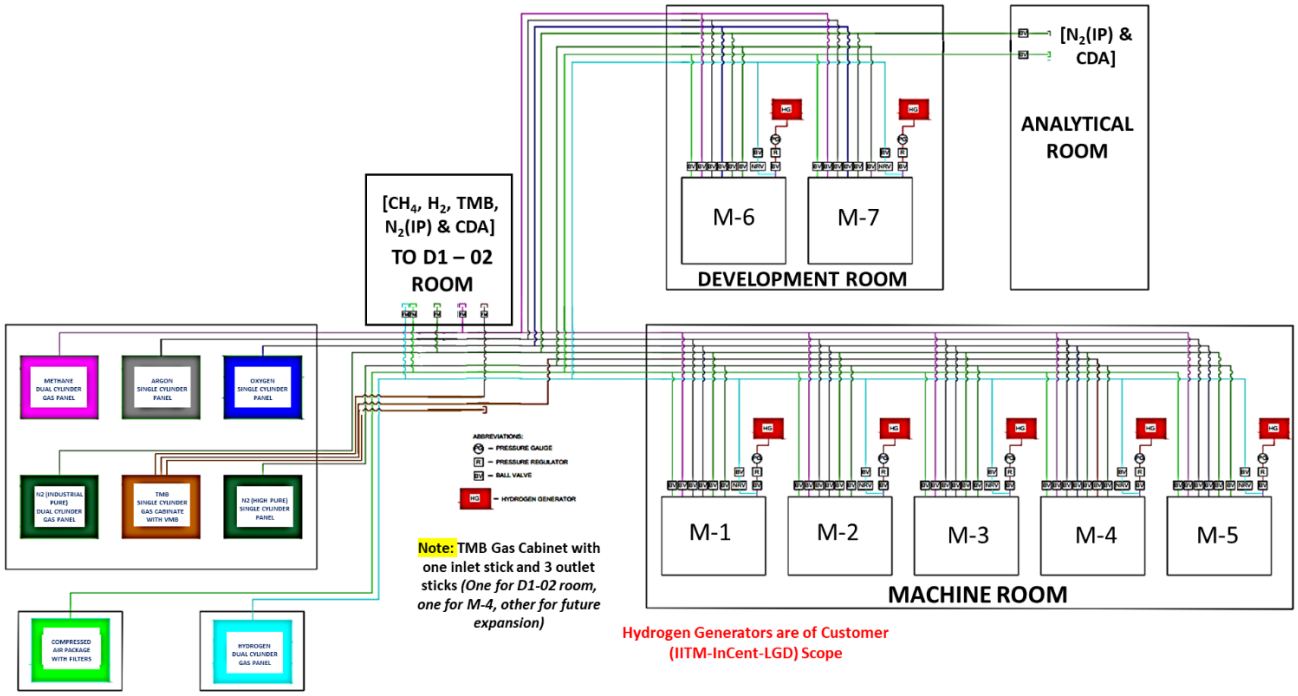

Figure 2: Line Diagram of Complete Gas Distribution System

Scope Of Work:

The Scope of work is primarily the Design, Fabrication, Supply, Installation, Testing, Commissioning of Gas Distribution System for the MPCVD and Analytical lab & it's broadly summarized as:

- Design of the Gas Cabinets, Gas Panels & Manifolds valve arrangements as per the standard and the given P&ID.
- Submission of GA for approval.
- Procurement of Gas Cabinets, Gas Panels, Manifolds, Tubes, Supports, Pigtails, Cables, Tubes, Fittings, components as per the P&ID.
- Shipping and Unloading of Gas Cabinets, Manifolds, Tubes, Fittings, components as per the P&ID at the site premises.
- Hook-up of gas lines to CVD system from the Hydrogen generators located inside the machine room *(Hydrogen generators are in IITM (InCent-LGD) scope)*. Hydrogen generator outlet port type and size: 1/4" VCR fitting.
- Erection of Tubes and supports as per the site routing to equipment from source.
- Erection of Cable and Cable Trays as per the requirement
- Installation of Point of use valves nearby equipment with having access to operate.
- Pressure, Trace Moisture, Particle, Trace Oxygen, Helium Testing of the tube installed at the site.
- Conducting Pre-Startup Safety Review for ensuring system safety before commissioning.
- Commissioning of manifolds, PLC Automation with the process parameters checked.
- Submission of Handing Over Document with the As-Built, O&M, Catalogues etc.,

Specifications of Major Items/works:

1. Gas Distribution System

a. Gas Lines and Piping:

On-site gas line piping for all required gases shall preferably be the responsibility of the supplier. The piping costs must be quoted. The utility area (where the gas cylinders must be kept) will be within 15 meters of the equipment. However, the vendor may quote for the required attachments (on per unit basis) and piping (on per meter basis).

The supplier must ensure a completely safe and fool-proof mechanism for storage and supply of inert as well as process gases that may be highly flammable and hazardous in nature. Hence, the gas distribution system must be handled by experienced vendor. The vendor should have at least 10 years establishment in India.

The Bidder should submit contact details of minimum 5 no's of Govt. customers where they have executed similar work for TMB, CH4, H2 and other required gases during the past 5 years.

Entire gas distribution system should be SEMI- S2 compliant.

Following is a summary of requirement on gas cabinet, supply panel and piping. Any other requirement for ensuring safe operation may be brought out in the technical bid and the same may be quoted in the price bid.

b. Single cylinder Gas Cabinet: For TMB

The gas cabinet and supply panel should be equipped with the following features:

- Suitable primary pressure regulator with inlet and outlet pressure gauges as well as isolation valves.
- Venturi operated purge-vacuum system to remove entrapped moisture before charging corrosive gases and suitable provision to ensure impurity free delivery of high purity gases to the process without any contamination.
- Necessary diaphragm type isolation valves for Pneumatic, Venturi, Purge and process gases.
- Manifold must be of 7-Valve manifold with 1 No of emergency shut off valve.
- Sample / He leak check port to be provided.
- 0.4-micron filter at pigtail and 0.003-micron filter at the outlet.
- The outlet of the gas cabinet shall have **3 outlets,** so that we can provide individual connection to the three machine tools/rooms that require supply of the gas.
- High pressure vent for quick efficient purging of pigtail & high-pressure side of panel.
- A rupture disc or Safety relief valve must be provided.
- Emergency shut off valve at the inlet can be activated during any life safety warnings coming from process and facility conditions. The emergency shut off valves shall be pneumatically operated with external solenoid.
- The supply panel should be monitored for life safety situations. It should, in the event of gas leak, exhaust failure, rate of rise and fire etc. take necessary actions to prevent damage and auto shut off shutdown during any exigency with alarm hooter.
- The gas cabinet must have a sprinkler.
- Self-extraction type Gas leak detection system should be used inside gas cabinet.
- The gas cabinet should have an ROR sensor.
- The gas cabinet should have an independent HMI panel with controller.
- All the internals of components should be electro polished with surface roughness of 10 µinch or better.
- The enclosure should be made of Cold Rolled Steel (min 11 SWG) for strength and seams must be welded to increase the structural integrity.
- The gas cabinet must be full length hinged door for improved life of cabinet, must be Key operated to disable unauthorized access.
- Metallic cylinder support brackets and holders.
- Inlet air filter must be provided for rear plenum, rear louvers, and door louvers.
- Adjustable shelves should be provided for installation of small cylinders.
- The enclosure should come with an exhaust port to meet the recommended exhaust flow rate.
- Must have self-latching window and self – latching door compulsory for improved safety of the operator.
- Safety glass viewing windows with ¼" wire reinforcement.
- All joints in panel shall be either orbital welded or face seal (VCR) connections.
- All panels shall be tested for particle content (less than 10 particles for size above 0.1 micron).
- The panel shall be tested and certified for Trace moisture & Trace oxygen content for less than 5 ppb.

- All panels must be Helium leak test at leak rate of 10^{-9} mbar l/s.
- All panels must be pressure tested as per SEMI standard.
- All panels shall be assembled in class 1000 or higher standard clean room.

c. Dual cylinder, Semi-automatic change over gas supply panel for process gas: For CH_4 and H_2

- Semi-Auto changeover Panels must have pressure changeover regulator, line regulator to provide constant pressure of gas, high pressure pneumatic isolation valve, high pressure vent valve, process isolation valve, Safety relief valve, 0.4-micron filter at both inlet side and 0.003-micron filter at outlet side of supply panel, SS316L.
- The panel must be of 5-Valve manifold.
- All fittings should be micro fittings. No block assembly will be allowed from the maintenance point. Each and every component should have VCR end connection only.
- All panels shall be tested for particle content (less than 10 particles for size above 0.1 micron).
- The panel shall be tested and certified for Trace moisture & Trace oxygen content for less than 1 ppb as per SEMI standard.
- All panels must be Helium leak test at leak rate of 10^{-9} mbar l/s.
- All panels must be pressure tested as per SEMI standard.
- All panels shall be assembled in class 1000 or higher standard clean room.
- The panel for CH_4 and H_2 shall have an emergency shutoff valve to take immediate action in case of leak detection by the GLDs.

d. Single cylinder gas supply panel for process gas: For Argon, Oxygen, Nitrogen (High Pure)

- Panels have high pressure isolation valve, high pressure purge facility, high pressure vent valve, process isolation valve, Safety Relief Valve, 0.4-micron filter at inlet side, SS316L.
- Single stage regulator, SS316L.
- The panel must be of 3-Valve configuration.
- All fittings should be micro fittings. No block assembly will be allowed from maintenance point of view. Each and every component should be of VCR end connection only.
- All panels shall be tested for particle content (less than 10 particles for size above 0.1 micron).
- The panel shall be tested and certified for Trace moisture & Trace oxygen content for less than 1 ppb as per SEMI standard.
- All panels must be Helium leak test at leak rate of 10^{-9} mbar l/s.
- All panels must be pressure tested as per SEMI standard.
- All panels shall be assembled in class 1000 or higher standard clean room.

e. Dual cylinder gas supply panel with semi-automatic change over for Nitrogen (Industrial Pure):

- Panels have high pressure isolation valve, high pressure vent valve, process isolation valve, Safety Relief Valve, 0.4-micron filter at inlet side, SS316L.
- Dual stage regulator, SS316L.
- The panel must be of 5-Valve configuration.
- All panels must be pressure/leak tested as per industrial standards.
- Fittings for N_2 (Industrial Pure) and CDA: SS 316 BA. End connection: Compression end.

2. Isolation valve at point of use: For all process gas, Nitrogen (Industrial Pure) & CDA.

- Isolation valve shall be of diaphragm type for all the process gases mentioned above and Ball valve for N_2 (Industrial pure) and CDA.
- The ball valve must be of compression end for N_2 (Industrial pure) and CDA Gas stick.

3. **Tubing Material / Type:**
    - 1/2" X 1/4" SS316L, electro-polished, coaxial Tube, 10µIN Ra max. Tubing for TMB. Coaxial pressure switch should be considered for each branch of the tubing system.
    - 1/4" OD X 0.035" WT Seamless EP tube, SS316L, 10µin Ra max tubing for CH_4, H_2, N_2 (High Pure), Ar, and O_2.
    - 1/4" OD X 0.035" WT Seamless BA tube, SS316L, 10µin Ra Max. Tubing for N_2 (Industrial pure) and compressed dry air (CDA).
    - All Valves fitting (except N2 (Industrial Pure) and CDA): SS 316 L EP – electropolished. End connection: VCR
    - Fittings for N_2 (Industrial Pure) and CDA: SS 316 BA. End connection: Compression end.
4. **Air Compressor: For Compressed Dry Air**
    - Technology: Rotary Screw Compressor
    - Drive: Fixed Speed Drive with IE3 Motor
    - Motor Rating: 3 KW // 4 HP
    - Flow Capacity: 12 CFM @10 Bar
    - Maximum Operating Pressure: 10 bar
    - Dryer: with Inbuilt Refrigerated Air Dryer
    - Tank Capacity: Inbuilt 200L Receiver Tank
    - The system should have pre- and post-filtration filters to remove particles, moisture, and oil contamination.
    - Noise Level: < 65 DB
5. **Exhaust distribution System:**
    - Complete Exhaust ducting interconnecting gas cabinets' outlets, Valve manifold panel outlet, MP-CVD vacuum pumps outlet (Max. 10 CFM flowrate) with appropriate dampers to dry/wet scrubber.
    - Dry/Wet Scrubber with blower of required flowrate (CFM) with its chemical media and the accessories needs to be installed. ***Available space for scrubber installation is 1 M x 1 M (L x B) will be kept in the balcony as shown in the figure 1.***
    - MOC of DUCT, nuts and bolts must be SS304, minimum 0.8 mm thickness or higher.
6. **Instrumentation:**
    - Gas detection system for TMB, H_2 and CH_4 must indicate the area of leakage and integrated with Gas Cabinet /Gas panel/ H_2 generator to auto shut off the gas flow in the event of leakage.
    - Pneumatically actuated solenoid valve to be provided in H_2 and CH_4 process line for shut down the system in the event of respective gas detection.
    - Self-Extraction type Gas detection system for H_2 and CH_4 must indicate the area of leakage and integrated with pneumatic actuated solenoid valve to auto shut off the gas flow in the event of leakage.
    - Gas detector to be provided (**3 Nos**.) for CH_4 and H_2. A single detector should be capable of detecting both CH_4 and H_2 (*Hydrogen detector can also be used to identify leaks in the TMB gas line, since it is a mixed gas with more than 90% hydrogen*). Gas detector installation: One in gas cabinet / Gas panel, one is machine room and other development room.
    - Gas detection Control panel suitable for above along with control card and other accessories
7. **Cylinder Holding Structure:**
    - Ground mounted cylinder & manifold holding structure with cylinder bracket capable of handling dual cylinders for CH_4, H_2 and N_2 (Industrial Pure). Material: MS with powder coated. Individual cylinder capacity is 47 to 50 Liters.

- Ground mounted cylinder & manifold holding structure with cylinder bracket capable of handling single cylinders for Ar, O_2 and N_2 (High Pure). Material: MS with powder coated. Individual cylinder capacity is 47 to 50 Liters.
- **The structure should have a top canopy to safeguard it from rain as it will be kept in an open balcony area.**

Bill of Materials with Approved Makes:

S.No.	Description	UOM	Qty.	Approved Makes
1	**Dual cylinder, Semi-automatic change over panel for Methane gas**	Set	1	• Norcimbus • Spectron • KAS Tech • CCD TPL • Ceres • Applied Energy • Air Products • Air Liquide
2	**Single cylinder TMB/Diborane gas cabinet with inbuilt Valve Manifold Box of one stick inlet and 3 stick outlets**	Set	1	
3	**Single cylinder Oxygen (O_2) gas panel**	Set	1	
4	**Single cylinder Argon (Ar) gas panel**	Set	1	
5	**Single cylinder Nitrogen [high purity] gas panel**	Set	1	
6	**Dual cylinder gas supply panel with semi-automatic change over for Nitrogen (industrial pure) gas**	Set	1	
7	**Dual cylinder, Semi-automatic change over panel for Hydrogen gas**	Set	1	
8	**Air compressor with it's components for oil free compressed dry air (CDA)**	Nos.	1	• Atlas Copco • ELgi • IR
9	**¼" Diaphragm valve** The valves shall be manually operated and made of SS316L according to ASTM A276 specifications. The maximum working pressure of the valve shall be 10 bar. The valves shall bear leak integrity of 10^-9 mbar lit/sec. The end connections shall be VCR end.	Nos.	35	• Parker USA • Spectron • Daja • Swagelok USA • Carten • AP Tech • Rotarex • Hamlet
10	**¼" Ball Valve** The ball valves shall be manually operated and made of SS316L and of single piece construction. The maximum working pressure shall be at least 10 bar or above. The end connections shall be double compression end.	Nos.	22	• Parker USA • Spectron • Daja • Swagelok USA • Carten • Gas Arc
11	**¼" tube for process gases:** ¼" tube stainless steel electropolished with necessary fittings and supports	Mtrs.	250	• Valex USA • Dockweiler Germany • Sandvik Sweden
12	**½" x ¼" co-axial tube for TMB/Diborane process gas:** ½" (bright annealed), ¼" tube stainless steel electropolished with necessary fittings and supports	Mtrs.	55	

13	**½" tube for N_2(Industrial Pure) and CDA:** ½" (bright annealed) stainless steel with necessary fittings and supports	Mtrs.	100	
14	**¼" tube for N_2(Industrial Pure) and CDA:** ¼" (bright annealed) stainless steel with necessary fittings and supports	Mtrs.	25	
15	**Gas detector (SIL 2 certified) for CH_4 and H_2:** Lel gas detector (single sensor for both H_2, CH_4) with its accessories.	Nos.	3	• Honeywell • Draeger • Bionics • Cosmos • Riken Keiki
16	**Gas leak detection system with centralized controller for gas handling system with related cables, wiring, PLC, HMI panel (7" Display or higher) with controller card and other accessories.**	Set	1	• Honeywell • Bionics • Draeger • Cosmos • Allenbradley • Siemens • ABB • Moviecon • Wonderware
17	**Gas distribution system installation** by means of orbital welding followed by testing (Pressure hold test & Helium leak check (TMB/Diborane, CH_4, H_2, Ar, O_2, N_2 (High pure) followed by validation (Trace oxygen, Trace Moisture & Trace particle)). The gas line connections need to be tested and validated for pressure hold test, for 24 hours, Helium leak, up to 1 X 10^{-9} He mBar lit sec^{-1}, trace moisture, tested for less than 5 PPM impurities, trace Oxygen tested for less than 5 PPM and particles, up to 0.1-micron level.	Set	1	Any Reputed Indian Company
18	**Support structure for gas tube lines:** Unistruts for the support structure (GI), cable tray/conduits for single cables	Mtr	150	• RSSIPL • Divine • DKNV • Hilti • AKI • Stauff • Any Reputed Indian Company
19	**Tube clamps (MOC SS with PVC/PP Inserts)**	Nos	450	• Hilti • AKI • Any Reputed Indian Company
20	**Anchor bolts & Nuts and fittings** (required for above mentioned gas lines)	Set	1	• Hilti • AKI • Any Reputed Indian Company
21	**Dual Cylinder holding structure: For CH_4, H_2 & N_2 (Industrial pure)** **Structure should have a canopy to safeguard it from rain as it will be kept in open balcony. Individual cylinder capacity is 47 to 50 Liters.*	Nos	03	Reputed Indian Make

22	**Single Cylinder holding structure: For Ar, O_2 & N_2 (High pure)** **Structure should have a canopy to safeguard it from rain as it will be kept in open balcony. Individual cylinder capacity is 47 to 50 Liters.*	Nos	03	
23	**Exhaust duct (from gas cabinet):** 4" exhaust duct, 2mm thickness with fittings and accessories.	Mtrs.	30	• AKI • SE Products • Any Reputed Indian Make
24	**Exhaust duct (for MPCVD vacuum pump outlet):** 1.5" exhaust duct, 2mm thickness with fittings and accessories.	Mtrs.	20	
25	**Dry/Wet scrubber:** **Available space for scrubber installation is 1 M x 1 M (Lx B) will be kept in the balcony as shown in the figure 1.*	Nos.	1	• Edwards Systems • CS Clean, Germany • KAS Tech • Centrotherm • ATMI Inc • CCD TSPL • DAS • Any Reputed Indian Make
26	**Blowers for Exhaust:** ** Designed for Flowrate as per the requirement of gas cabinet/panel and CVD vacuum pump outlet exhaust.*	Nos.	1	• Any Reputed Indian Make
27	**Instrumentation Cables and Necessary Cable Trays:** CAT6 cable with necessary cable lugs and cable tray	Mtr	150	• Polycab • LAPP • ManCab • Varsha • Finolex • Reputed Indian Make

Note: Quantities of the items given in above table are approximate, it can be less or more according to the design **requirement. Bidder can come up with their own design for the gas distribution system. Actual billing would be based on actual consumed quantities.** Thus, the bidder should quote a total price based on the quantity given in the table along with per unit price of these items.

CHILLED WATER DISTRIBUTION SYSTEM

Chilled water supply distribution system needs to be designed to Install 7 different MP-CVD system (M-1 to M-7) shown in figure 3. Also, provision for chilled water line (Inlet & Outlet) expansion to D-102 room must be provided with gate valve for each line.

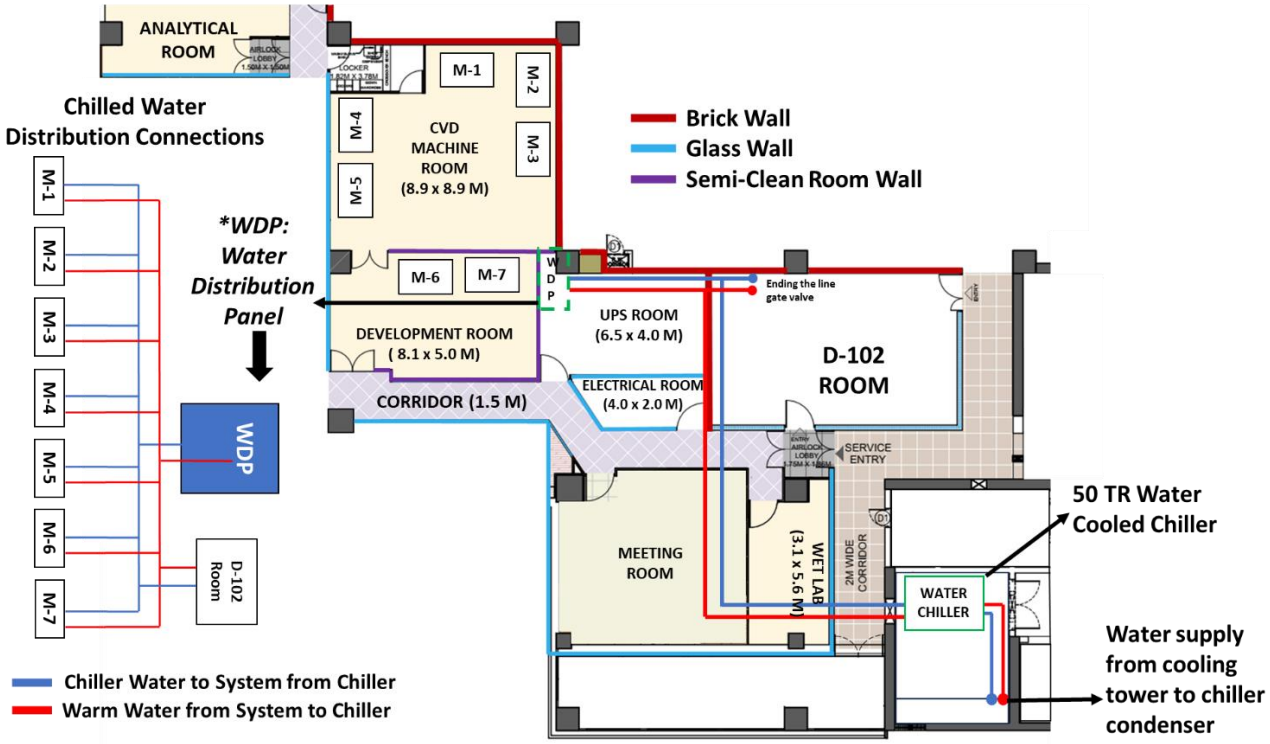

Figure 3: Floor plan with the directions of chilled water line connections

Scope Of Work:

The Scope of work is primarily the Design, Fabrication, Supply, Installation, Testing, Commissioning of process cooling water pipeline distribution system. Piping (with insulation) from end connection of pipe coming from centralised cooling tower to water cooled chiller condenser also needs to be taken care (as shown in figure 3). *The customer (IITM – IncentLGD) will be responsible for providing 50 TR water cooled chiller system.*

Approximate Bill of Materials:

S.No.	DESCRIPTION	UOM	Qty.	Approved Makes
1	**3" PIPE FOR CHILLED WATER:** 3" Sch 10 Stainless Steel 304 pipe with Insulation (Nitrile Rubber and Aluminium Cladding) with necessary Gate Valves, Fittings and Supports	Mtr	40	For Pipes – *Ratnamani/ Sumitomo*; For Pipe Fittings – *KB Forging / Sagar Forging*; For Pipe Insulation – *Armaflex/ Cflex/an equivalent*
2	**1" PIPE FOR CHILLED WATER:** 1" Sch 10 Stainless Steel 304 pipe with Insulation (Nitrile Rubber and Aluminium Cladding) with necessary Gate Valves, Fittings & Supports	Mtr	60	
3	**Chilled water distribution system installation** followed by Pressure hold test. Pressure hold test for chilled water lines at the site. Certified up to 1.5 times of the working pressure by keeping the	Set	1	Any reputed Indian Company

	system under pressure using RO Water/Nitrogen Gas for 24 hours without a drop in pressure.			

BID EVALUATION CRITERIA

The bidder must include their statement and proof of compliance for the below in the Technical Bid.

S.No	Details
1.	Should have installed gas distribution system involving Toxic and Hazardous gases like Methane, TMB, Diborane and Hydrogen using co-axial SS 316L EP tubing for IITs/similar institutes/universities or reputed Government R&D centres or reputed Private Industries who deals with CVD process.
2.	Must have own or rented analysers to measure trace oxygen, nitrogen (min 10 ppb), trace moisture (min 10 ppb) and sub-micron particles (minimum 0.1 micron) before commissioning the pipelines.
3.	Must have stainless steel clean room compatible tools for handling components in the project.
4.	Vendor must have high radius benders approved for semiconductor gas piping.
5.	Must have used Ultra High Purity Argon purifier with impurities of oxygen less than 100 ppb, moisture less than 100 ppb, total hydrocarbons less than 100 ppb. During installation vendor must use purifiers to achieve the purity level of welding gas.
6.	People must be trained to do the validation.
7.	Should have experience and demonstrated design capability for safe Gas Distribution System.
8.	**Entire gas distribution system should be SEMI- S2 compliant**.
9.	Should be well versed to use instruments like pressure switch, gas leak detectors, pressure transducers and vacuum venturis.
10.	The vendor should have understanding of JSA (Job Safety Analysis), MAPP (Major Accident Prevention Plan) and PSR (Pre-Start up safety review) for effective project implementation.
11.	The vendor must have done 2 similar projects in nature for customers in CVD process involving gases like CH_4, H_2, TMB and Diborane.
12.	Bidder to submit the cause effect matrix for the proposed equipment's in line with Gas Hazard.
13.	Vendor must have trained team to service trouble shoot Gas Cabinet, VMB and associated gas line and safety equipment. Necessary evidence from existing customers in India for having supported Gas Cabinets Maintenance and Troubleshooting should be enclosed. Vendor must submit letter from customers confirming that similar gas cabinets (similar makes of gas cabinets) are installed by vendor and the system is running successfully since last 3 years minimum and satisfactory service support has been provided by vendor.
14.	Vendor should demonstrate capability and experience of installation of Gas cabinet, VMB, Safe gas distribution system for Ultra High Purity gases with references from at-least 3 customers.
15.	Must provide training to operate gas cabinets and other equipment to run the facility safely. Training must be provided by OEM only.
16.	Vendor must provide authorization certificate from the principal.
17.	Customer feedback letters indicating the quality of work and satisfactorily working of gas cabinets from at least 3 customers in India.
18.	List of customers, projects done with contact address, phone number, and email etc., Necessary site visit to any of the projects mentioned in your reference may be conducted at our discretion and accordingly technical capability rating will be given to bidders.

19.	**The vendor/manufacturer/Supplier must visit the installation site before submission of the tender bid to evaluate the site location, available floor space and other safety conditions.**

SIGNATURE OF TENDERER
ALONG WITH SEAL OF THE
COMPANY WITH DATE

ANNEXURE - B

TECHNICAL BID PROFORMA

Tender No. PY/MSRO/017/2023/GASCHILLSY

Item Name: Design and Installation of Gas Distribution System and Chilled Water Distribution System

1.0 Bidder Eligibility Criteria:

I	**Bidder Eligibility Criteria-I (Public Procurement – Preference to Make in India)**	**Class I / Class II**	**Local Content value**	**Reference, 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.			

2.0 Bidder Eligibility Criteria II :

S.NO	**Bidder Eligibility Criteria-II**	**COMPLIED/NOT COMPLIED**	**Ref. Page. No**	**Remarks if any**
I	The bidder/OEM should have supplied at least 2 similar system or more to IITs, NITs, IISERs, CSIR Labs or other Indian Government organizations in the last 5 years, PO copies or installation certificates along with model number and contact details of end user need to be submitted as the proof of supply. IIT Madras reserves its right to verify the claims submitted by the bidder and the feedback from the previous customers will be part of technical evaluation.			

TECHNICAL SPECIFICATIONS FOR Design and Installation of Gas Distribution System and Chilled Water Distribution System

It is proposed to Design and Installs an ultra-high pure gas distribution system for the delivery of Toxic, Inflammable, and Inert gases (CH_4, H_2, Trimethyl Borane (TMB)/Diborane, N_2(High pure), N_2(Industrial pure), Ar, O_2 and compressed air) for deposition equipment such as Micro-wave Plasma CVD (MP-CVD). Work involves Gas Cabinets with Coaxial SS tubing for TMB/Di-Borane gas line, Gas Panels for H_2 and CH_4 gas lines, Valve manifold panel, Electro-polished (EP) and Bright annealing (BA) SS316L tubing, and Exhaust Ducting with scrubber are required for the same. **Following installation, the gas line connections need to be tested and validated for pressure hold test, for 24 hours, Helium leak, up to 1 X 10^{-9} He mBar lit sec^{-1}, trace moisture, tested for less than 5 PPM impurities, trace Oxygen tested for less than 5 PPM and particles, up to 0.1-micron level.** Gas distribution system needs to be designed to Install 7 different MP-CVD system (M-1 to M-7) and for the analytical lab as shown in figure 1 & 2. Also, provision for gas lines (Only CH_4, H_2, N_2(Industrial Pure), TMB/Bi-Borane & Compressed air) expansion to D-102 room must be provided. The floor plan with intended gas line connections is illustrated *(Figure 1 & 2)*. The proposed work also involves design and installation of chilled water distribution piping system for the delivery of chilled water from a 50 TR water cooled chiller for process chamber cooling of each MPCVD system.

Note: Quantities of the items given in the Bill of Material table are approximate, it can be less or more according to the design **requirement. Bidder can come up with their own design for the gas distribution system. Actual billing would be based on actual consumed quantities.** Thus, the bidder should quote a total price based on the quantity given in the table along with per unit price of these items.

GAS DISTRIBUTION SYSTEM SPECIFICATION

Details of required gases:

Sl. No	Gas	Required Flow Rate per machine (in SCCM)	Required Gas Purity (%)	Required Gas Line Pressure (Bar)	Gas Supply Source *(Cylinder / On-site Generation)*	Supply line required for
1	TMB (2% Boron in 98% Hydrogen) **or** Di-Borane (5% in 95% Hydrogen)	≤ 50	>99.999	3	Cylinder	M1 & D-102 Room
2	Methane (CH_4)	≤ 200	>99.999	4	Cylinder	M1,M2,M3,M4,M5,M6, M7 & D-102 Room
3	Argon (Ar)	≤ 100	>99.999	4	Cylinder	M1,M2,M3,M4,M5,M6 & M7
4	Oxygen (O_2)	≤ 50	>99.999	4	Cylinder	M1,M2,M3,M4,M5,M6 & M7
5	Nitrogen (N_2 - High Pure)	≤ 20	>99.999	4	Cylinder	M1,M2,M3,M4,M5,M6, & M7
6	Nitrogen (N_2 - Industrial Pure)	≤ 10000	≥ 99.5	6	Cylinder	M1,M2,M3,M4,M5,M6, M7 & D-102 Room
7	Hydrogen (H_2)	≤ 1000	>99.999	4	Cylinder & H_2 Generators	M1,M2,M3,M4,M5,M6, M7 & D-102 Room
8	Compressed Air	0.5 to 0.7 CFM	Oil & Moisture free	6	Air Compressor	M1,M2,M3,M4,M5,M6, M7, Analytical Lab & D-102 Room

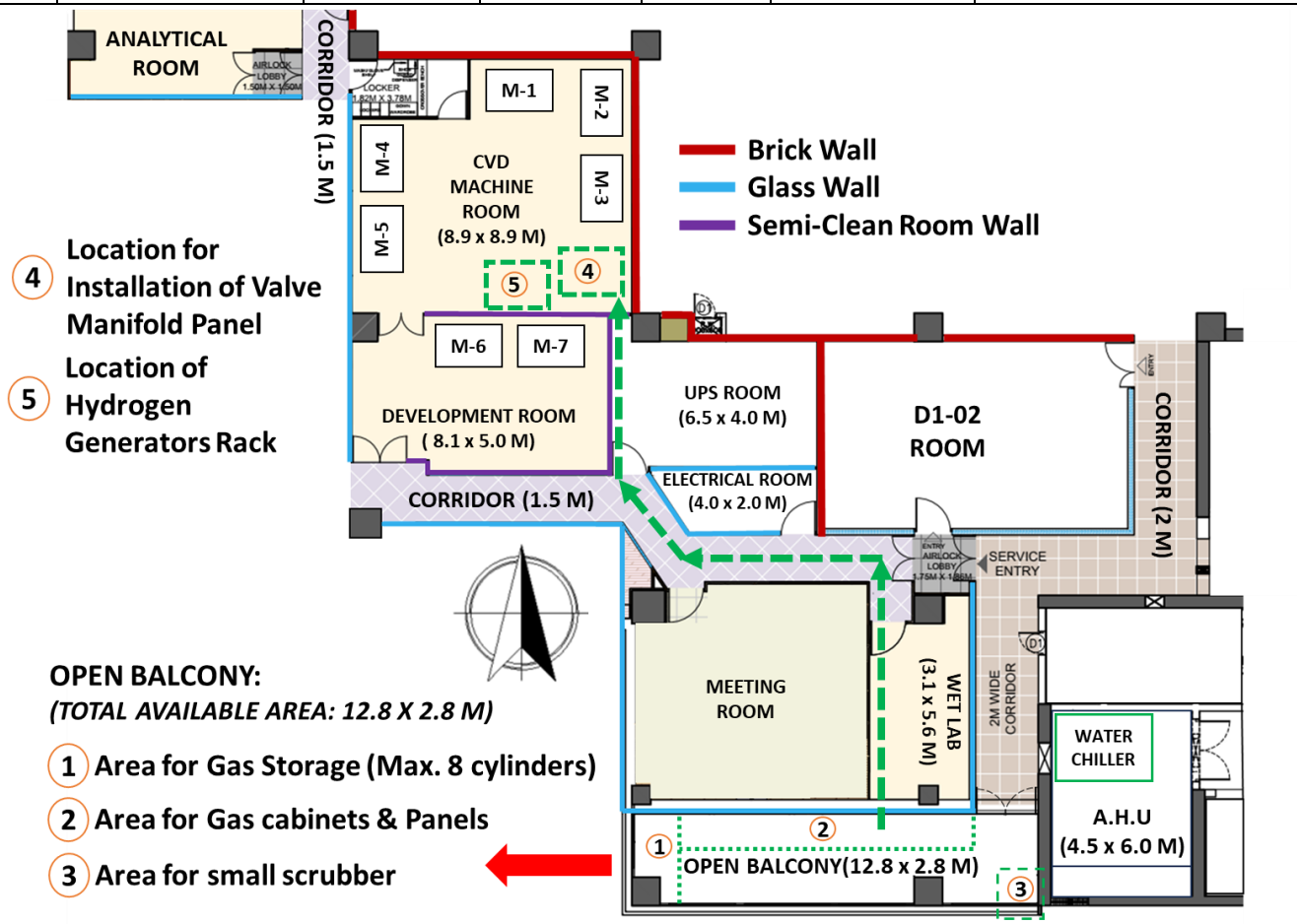

Figure 1: Floor plan details with preferable pathway (green arrow) for gas line construction

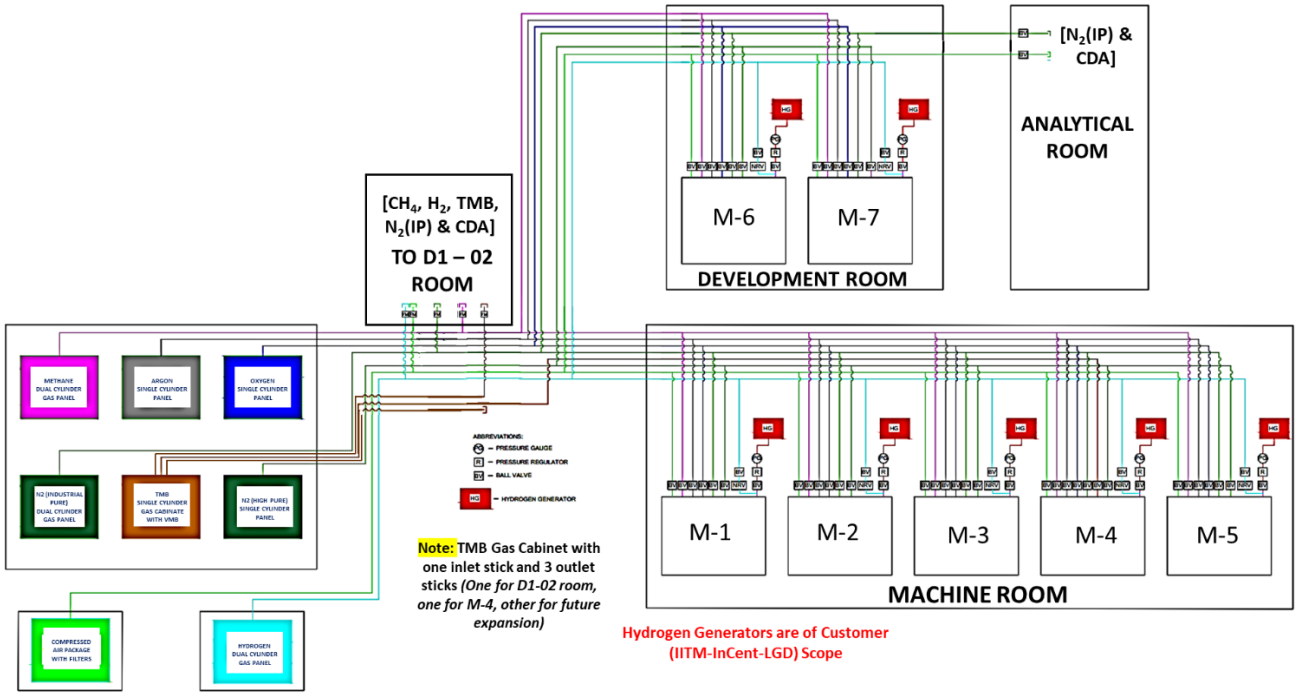

Figure 2: Line Diagram of Complete Gas Distribution System

Scope Of Work:

The Scope of work is primarily the Design, Fabrication, Supply, Installation, Testing, Commissioning of Gas Distribution System for the MPCVD and Analytical lab & it's broadly summarized as:

- Design of the Gas Cabinets, Gas Panels & Manifolds valve arrangements as per the standard and the given P&ID.
- Submission of GA for approval.
- Procurement of Gas Cabinets, Gas Panels, Manifolds, Tubes, Supports, Pigtails, Cables, Tubes, Fittings, components as per the P&ID.
- Shipping and Unloading of Gas Cabinets, Manifolds, Tubes, Fittings, components as per the P&ID at the site premises.
- Hook-up of gas lines to CVD system from the Hydrogen generators located inside the machine room *(Hydrogen generators are in IITM (InCent-LGD) scope)*. Hydrogen generator outlet port type and size: 1/4" VCR fitting.
- Erection of Tubes and supports as per the site routing to equipment from source.
- Erection of Cable and Cable Trays as per the requirement
- Installation of Point of use valves nearby equipment with having access to operate.
- Pressure, Trace Moisture, Particle, Trace Oxygen, Helium Testing of the tube installed at the site.
- Conducting Pre-Startup Safety Review for ensuring system safety before commissioning.
- Commissioning of manifolds, PLC Automation with the process parameters checked.
- Submission of Handing Over Document with the As-Built, O&M, Catalogues etc.,

Specifications of Major Items/works:

8. Gas Distribution System

a. Gas Lines and Piping:

On-site gas line piping for all required gases shall preferably be the responsibility of the supplier. The piping costs must be quoted. The utility area (where the gas cylinders must be kept) will be within 15 meters of the equipment. However, the vendor may quote for the required attachments (on per unit basis) and piping (on per meter basis).

The supplier must ensure a completely safe and fool-proof mechanism for storage and supply of inert as well as process gases that may be highly flammable and hazardous in nature. Hence, the gas distribution system must be handled by experienced vendor. The vendor should have at least 10 years establishment in India.

The Bidder should submit contact details of minimum 5 no's of Govt. customers where they have executed similar work for TMB, CH4, H2 and other required gases during the past 5 years.

Entire gas distribution system should be SEMI- S2 compliant.

Following is a summary of requirement on gas cabinet, supply panel and piping. Any other requirement for ensuring safe operation may be brought out in the technical bid and the same may be quoted in the price bid.

b. Single cylinder Gas Cabinet: For TMB

The gas cabinet and supply panel should be equipped with the following features:

- Suitable primary pressure regulator with inlet and outlet pressure gauges as well as isolation valves.
- Venturi operated purge-vacuum system to remove entrapped moisture before charging corrosive gases and suitable provision to ensure impurity free delivery of high purity gases to the process without any contamination.
- Necessary diaphragm type isolation valves for Pneumatic, Venturi, Purge and process gases.
- Manifold must be of 7-Valve manifold with 1 No of emergency shut off valve.
- Sample / He leak check port to be provided.
- 0.4-micron filter at pigtail and 0.003-micron filter at the outlet.
- The outlet of the gas cabinet shall have **3 outlets,** so that we can provide individual connection to the three machine tools/rooms that require supply of the gas.
- High pressure vent for quick efficient purging of pigtail & high-pressure side of panel.
- A rupture disc or Safety relief valve must be provided.
- Emergency shut off valve at the inlet can be activated during any life safety warnings coming from process and facility conditions. The emergency shut off valves shall be pneumatically operated with external solenoid.
- The supply panel should be monitored for life safety situations. It should, in the event of gas leak, exhaust failure, rate of rise and fire etc. take necessary actions to prevent damage and auto shut off shutdown during any exigency with alarm hooter.
- The gas cabinet must have a sprinkler.
- Self-extraction type Gas leak detection system should be used inside gas cabinet.
- The gas cabinet should have an ROR sensor.
- The gas cabinet should have an independent HMI panel with controller.
- All the internals of components should be electro polished with surface roughness of 10 µinch or better.
- The enclosure should be made of Cold Rolled Steel (min 11 SWG) for strength and seams must be welded to increase the structural integrity.
- The gas cabinet must be full length hinged door for improved life of cabinet, must be Key operated to disable unauthorized access.
- Metallic cylinder support brackets and holders.
- Inlet air filter must be provided for rear plenum, rear louvers, and door louvers.
- Adjustable shelves should be provided for installation of small cylinders.
- The enclosure should come with an exhaust port to meet the recommended exhaust flow rate.
- Must have self-latching window and self – latching door compulsory for improved safety of the operator.
- Safety glass viewing windows with ¼" wire reinforcement.
- All joints in panel shall be either orbital welded or face seal (VCR) connections.
- All panels shall be tested for particle content (less than 10 particles for size above 0.1 micron).
- The panel shall be tested and certified for Trace moisture & Trace oxygen content for less than 5 ppb.

- All panels must be Helium leak test at leak rate of 10^{-9} mbar l/s.
- All panels must be pressure tested as per SEMI standard.
- All panels shall be assembled in class 1000 or higher standard clean room.

c. Dual cylinder, Semi-automatic change over gas supply panel for process gas: For CH_4 and H_2

- Semi-Auto changeover Panels must have pressure changeover regulator, line regulator to provide constant pressure of gas, high pressure pneumatic isolation valve, high pressure vent valve, process isolation valve, Safety relief valve, 0.4-micron filter at both inlet side and 0.003-micron filter at outlet side of supply panel, SS316L.
- The panel must be of 5-Valve manifold.
- All fittings should be micro fittings. No block assembly will be allowed from the maintenance point. Each and every component should have VCR end connection only.
- All panels shall be tested for particle content (less than 10 particles for size above 0.1 micron).
- The panel shall be tested and certified for Trace moisture & Trace oxygen content for less than 1 ppb as per SEMI standard.
- All panels must be Helium leak test at leak rate of 10^{-9} mbar l/s.
- All panels must be pressure tested as per SEMI standard.
- All panels shall be assembled in class 1000 or higher standard clean room.
- The panel for CH_4 and H_2 shall have an emergency shutoff valve to take immediate action in case of leak detection by the GLDs.

d. Single cylinder gas supply panel for process gas: For Argon, Oxygen, Nitrogen (High Pure)

- Panels have high pressure isolation valve, high pressure purge facility, high pressure vent valve, process isolation valve, Safety Relief Valve, 0.4-micron filter at inlet side, SS316L.
- Single stage regulator, SS316L.
- The panel must be of 3-Valve configuration.
- All fittings should be micro fittings. No block assembly will be allowed from maintenance point of view. Each and every component should be of VCR end connection only.
- All panels shall be tested for particle content (less than 10 particles for size above 0.1 micron).
- The panel shall be tested and certified for Trace moisture & Trace oxygen content for less than 1 ppb as per SEMI standard.
- All panels must be Helium leak test at leak rate of 10^{-9} mbar l/s.
- All panels must be pressure tested as per SEMI standard.
- All panels shall be assembled in class 1000 or higher standard clean room.

e. Dual cylinder gas supply panel with semi-automatic change over for Nitrogen (Industrial Pure):

- Panels have high pressure isolation valve, high pressure vent valve, process isolation valve, Safety Relief Valve, 0.4-micron filter at inlet side, SS316L.
- Dual stage regulator, SS316L.
- The panel must be of 5-Valve configuration.
- All panels must be pressure/leak tested as per industrial standards.
- Fittings for N_2 (Industrial Pure) and CDA: SS 316 BA. End connection: Compression end.

9. Isolation valve at point of use: For all process gas, Nitrogen (Industrial Pure) & CDA.

- Isolation valve shall be of diaphragm type for all the process gases mentioned above and Ball valve for N_2 (Industrial pure) and CDA.
- The ball valve must be of compression end for N_2 (Industrial pure) and CDA Gas stick.

10. Tubing Material / Type:

- 1/2" X 1/4" SS316L, electro-polished, coaxial Tube, 10µIN Ra max. Tubing for TMB. Coaxial pressure switch should be considered for each branch of the tubing system.
- 1/4" OD X 0.035" WT Seamless EP tube, SS316L, 10µin Ra max tubing for CH_4, H_2, N_2 (High Pure), Ar, and O_2.
- 1/4" OD X 0.035" WT Seamless BA tube, SS316L, 10µin Ra Max. Tubing for N_2 (Industrial pure) and compressed dry air (CDA).
- All Valves fitting (except N2 (Industrial Pure) and CDA): SS 316 L EP – electropolished. End connection: VCR
- Fittings for N_2 (Industrial Pure) and CDA: SS 316 BA. End connection: Compression end.

11. Air Compressor: For Compressed Dry Air

- Technology: Rotary Screw Compressor
- Drive: Fixed Speed Drive with IE3 Motor
- Motor Rating: 3 KW // 4 HP
- Flow Capacity: 12 CFM @10 Bar
- Maximum Operating Pressure: 10 bar
- Dryer: with Inbuilt Refrigerated Air Dryer
- Tank Capacity: Inbuilt 200L Receiver Tank
- The system should have pre- and post-filtration filters to remove particles, moisture, and oil contamination.
- Noise Level: < 65 DB

12. Exhaust distribution System:

- Complete Exhaust ducting interconnecting gas cabinets' outlets, Valve manifold panel outlet, MP-CVD vacuum pumps outlet (Max. 10 CFM flowrate) with appropriate dampers to dry/wet scrubber.
- Dry/Wet Scrubber with blower of required flowrate (CFM) with its chemical media and the accessories needs to be installed. ***Available space for scrubber installation is 1 M x 1 M (L x B) will be kept in the balcony as shown in the figure 1.***
- MOC of DUCT, nuts and bolts must be SS304, minimum 0.8 mm thickness or higher.

13. Instrumentation:

- Gas detection system for TMB, H_2 and CH_4 must indicate the area of leakage and integrated with Gas Cabinet /Gas panel/ H_2 generator to auto shut off the gas flow in the event of leakage.
- Pneumatically actuated solenoid valve to be provided in H_2 and CH_4 process line for shut down the system in the event of respective gas detection.
- Self-Extraction type Gas detection system for H_2 and CH_4 must indicate the area of leakage and integrated with pneumatic actuated solenoid valve to auto shut off the gas flow in the event of leakage.
- Gas detector to be provided (**3 Nos**.) for CH_4 and H_2. A single detector should be capable of detecting both CH_4 and H_2 (*Hydrogen detector can also be used to identify leaks in the TMB gas line, since it is a mixed gas with more than 90% hydrogen*). Gas detector installation: One in gas cabinet / Gas panel, one is machine room and other development room.
- Gas detection Control panel suitable for above along with control card and other accessories

14. Cylinder Holding Structure:

- Ground mounted cylinder & manifold holding structure with cylinder bracket capable of handling dual cylinders for CH_4, H_2 and N_2 (Industrial Pure). Material: MS with powder coated. Individual cylinder capacity is 47 to 50 Liters.

- Ground mounted cylinder & manifold holding structure with cylinder bracket capable of handling single cylinders for Ar, O_2 and N_2 (High Pure). Material: MS with powder coated. Individual cylinder capacity is 47 to 50 Liters.
- **The structure should have a top canopy to safeguard it from rain as it will be kept in an open balcony area.**

Bill of Materials with Approved Makes:

S.No.	Description	Approved Makes	Make and Model No	Complied/Not Complied	Page No	Remarks if any
1	**Dual cylinder, Semi-automatic change over panel for Methane gas**	• Norcimbus • Spectron • KAS Tech • CCD TPL • Ceres • Applied Energy • Air Products • Air Liquide				
2	**Single cylinder TMB/Diborane gas cabinet with inbuilt Valve Manifold Box of one stick inlet and 3 stick outlets**					
3	**Single cylinder Oxygen (O_2) gas panel**					
4	**Single cylinder Argon (Ar) gas panel**					
5	**Single cylinder Nitrogen [high purity] gas panel**					
6	**Dual cylinder gas supply panel with semi-automatic change over for Nitrogen (industrial pure) gas**					
7	**Dual cylinder, Semi-automatic change over panel for Hydrogen gas**					
8	**Air compressor with it's components for oil free compressed dry air (CDA)**	• Atlas Copco • ELgi • IR				
9	**¼" Diaphragm valve** The valves shall be manually operated and made of	• Parker USA • Spectron • Daja • Swagelok USA • Carten				

	SS316L according to ASTM A276 specifications. The maximum working pressure of the valve shall be 10 bar. The valves shall bear leak integrity of 10^-9 mbar lit/sec. The end connections shall be VCR end.	• AP Tech • Rotarex • Hamlet				
10	**¼" Ball Valve** The ball valves shall be manually operated and made of SS316L and of single piece construction. The maximum working pressure shall be at least 10 bar or above. The end connections shall be double compression end.	• Parker USA • Spectron • Daja • Swagelok USA • Carten • Gas Arc				
11	**¼" tube for process gases:** ¼" tube stainless steel electropolished with necessary fittings and supports					
12	**½" x ¼" co-axial tube for TMB/Diborane process gas:** ½" (bright annealed), ¼" tube stainless steel electropolished with necessary fittings and supports	• Valex USA • Dockweiler Germany • Sandvik Sweden				
13	**½" tube for N_2(Industrial Pure) and CDA:** ½" (bright annealed) stainless steel with					

	necessary fittings and supports					
14	**¼" tube for N_2(Industrial Pure) and CDA:** ¼" (bright annealed) stainless steel with necessary fittings and supports					
15	**Gas detector (SIL 2 certified) for CH_4 and H_2:** Lel gas detector (single sensor for both H_2, CH_4) with its accessories.	• Honeywell • Draeger • Bionics • Cosmos • Riken Keiki				
16	**Gas leak detection system with centralized controller for gas handling system with related cables, wiring, PLC, HMI panel (7" Display or higher) with controller card and other accessories.**	• Honeywell • Bionics • Draeger • Cosmos • Allenbradley • Siemens • ABB • Moviecon • Wonderware				
17	**Gas distribution system installation** by means of orbital welding followed by testing (Pressure hold test & Helium leak check (TMB/Diborane, CH_4, H_2, Ar, O_2, N_2 (High pure) followed by validation (Trace oxygen, Trace Moisture & Trace particle)). The gas line connections need to be tested and validated for pressure hold test, for 24 hours, Helium leak, up to 1 X 10^{-9} He mBar lit sec^{-1}, trace moisture, tested for	Any Reputed Indian Company				

	less than 5 PPM impurities, trace Oxygen tested for less than 5 PPM and particles, up to 0.1-micron level.					
18	**Support structure for gas tube lines:** Unistruts for the support structure (GI), cable tray/conduits for single cables	• RSSIPL • Divine • DKNV • Hilti • AKI • Stauff • Any Reputed Indian Company				
19	**Tube clamps (MOC SS with PVC/PP Inserts)**	• Hilti • AKI • Any Reputed Indian Company				
20	**Anchor bolts & Nuts and fittings** (required for above mentioned gas lines)	• Hilti • AKI • Any Reputed Indian Company				
21	**Dual Cylinder holding structure: For CH_4, H_2 & N_2 (Industrial pure)** **Structure should have a canopy to safeguard it from rain as it will be kept in open balcony.Individual cylinder capacity is 47 to 50 Liters.*	Reputed Indian Make				
22	**Single Cylinder holding structure: For Ar, O_2 & N_2 (High pure)** **Structure should have a canopy to safeguard it from rain as it will be kept in open balcony. Individual cylinder capacity is 47 to 50 Liters.*					
23	**Exhaust duct (from gas cabinet):** 4" exhaust duct, 2mm thickness with fittings and	• AKI • SE Products • Any Reputed Indian Make				

	accessories.					
24	**Exhaust duct (for MPCVD vacuum pump outlet):** 1.5" exhaust duct, 2mm thickness with fittings and accessories.					
25	**Dry/Wet scrubber:** **Available space for scrubber installation is 1 M x 1 M (Lx B) will be kept in the balcony as shown in the figure 1.*	• Edwards Systems • CS Clean, Germany • KAS Tech • Centrotherm • ATMI Inc • CCD TSPL • DAS • Any Reputed Indian Make				
26	**Blowers for Exhaust:** ** Designed for Flowrate as per the requirement of gas cabinet/panel and CVD vacuum pump outlet exhaust.*	• Any Reputed Indian Make				
27	**Instrumentation Cables and Necessary Cable Trays:** CAT6 cable with necessary cable lugs and cable tray	• Polycab • LAPP • ManCab • Varsha • Finolex • Reputed Indian Make				

Note: Quantities of the items given in above table are approximate, it can be less or more according to the design **requirement. Bidder can come up with their own design for the gas distribution system. Actual billing would be based on actual consumed quantities.** Thus, the bidder should quote a total price based on the quantity given in the table along with per unit price of these items.

CHILLED WATER DISTRIBUTION SYSTEM

Chilled water supply distribution system needs to be designed to Install 7 different MP-CVD system (M-1 to M-7) shown in figure 3. Also, provision for chilled water line (Inlet & Outlet) expansion to D-102 room must be provided with gate valve for each line.

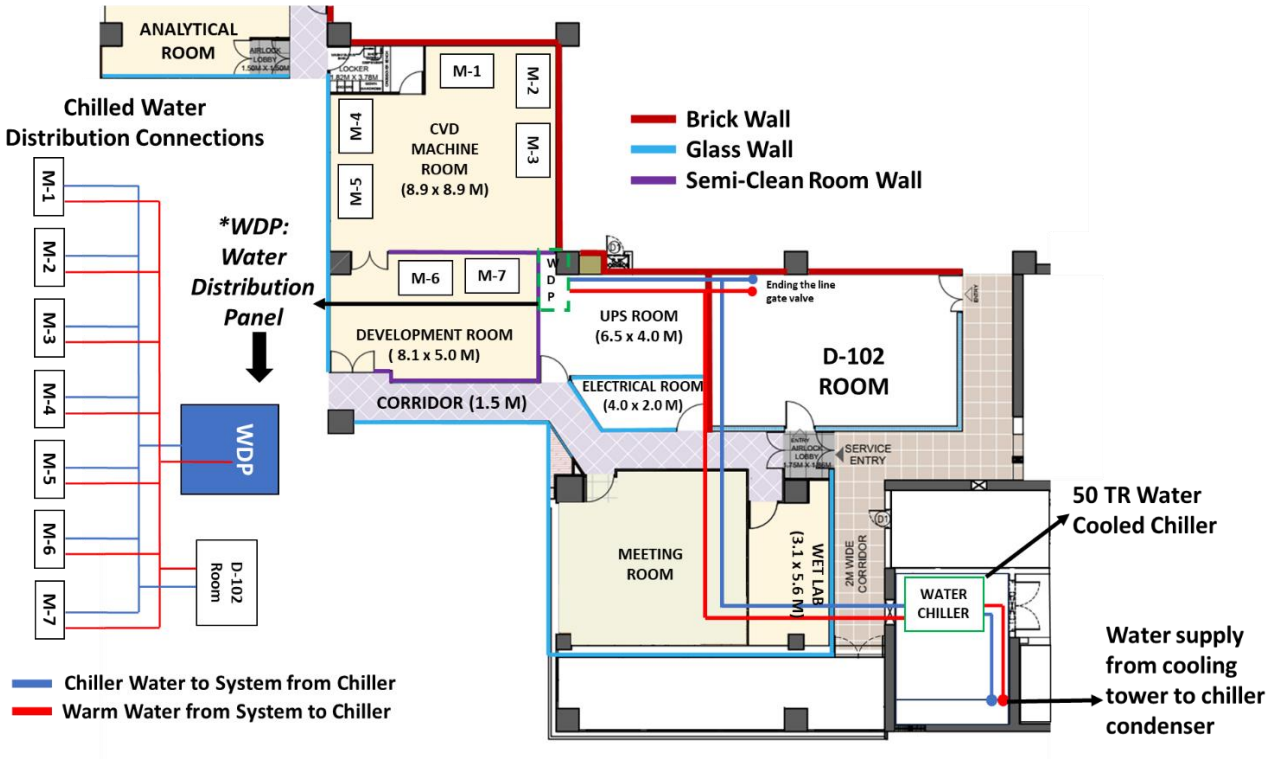

Figure 3: Floor plan with the directions of chilled water line connections

Scope Of Work:

The Scope of work is primarily the Design, Fabrication, Supply, Installation, Testing, Commissioning of process cooling water pipeline distribution system. Piping (with insulation) from end connection of pipe coming from centralised cooling tower to water cooled chiller condenser also needs to be taken care (as shown in figure 3). *The customer (IITM – IncentLGD) will be responsible for providing 50 TR water cooled chiller system.*

Approximate Bill of Materials:

S.No.	DESCRIPTION	Approved Makes	Make and Model No	Complied/Not Complied	Page No	Remarks if any
1	**3" PIPE FOR CHILLED WATER:** 3" Sch 10 Stainless Steel 304 pipe with Insulation (Nitrile Rubber and Aluminium Cladding) with necessary Gate Valves, Fittings and Supports	For Pipes – *Ratnamani/ Sumitomo*; For Pipe Fittings – *KB Forging / Sagar Forging*; For Pipe Insulation – *Armaflex/ Cflex/an equivalent*				
2	**1" PIPE FOR CHILLED WATER:**					

	1" Sch 10 Stainless Steel 304 pipe with Insulation (Nitrile Rubber and Aluminium Cladding) with necessary Gate Valves, Fittings & Supports					
3	**Chilled water distribution system installation** followed by Pressure hold test. Pressure hold test for chilled water lines at the site. Certified up to 1.5 times of the working pressure by keeping the system under pressure using RO Water/Nitrogen Gas for 24 hours without a drop in pressure.	Any reputed Indian Company				

BID EVALUATION CRITERIA

The bidder must include their statement and proof of compliance for the below in the Technical Bid.

S.No	Details	Complied/Not Complied	Page No & Remark if any
1.	Should have installed gas distribution system involving Toxic and Hazardous gases like Methane, TMB, Diborane and Hydrogen using co-axial SS 316L EP tubing for IITs/similar institutes/universities or reputed Government R&D centres or reputed Private Industries who deals with CVD process.		
2.	Must have own or rented analysers to measure trace oxygen, nitrogen (min 10 ppb), trace moisture (min 10 ppb) and sub-micron particles (minimum 0.1 micron) before commissioning the pipelines.		

3.	Must have stainless steel clean room compatible tools for handling components in the project.		
4.	Vendor must have high radius benders approved for semiconductor gas piping.		
5.	Must have used Ultra High Purity Argon purifier with impurities of oxygen less than 100 ppb, moisture less than 100 ppb, total hydrocarbons less than 100 ppb. During installation vendor must use purifiers to achieve the purity level of welding gas.		
6.	People must be trained to do the validation.		
7.	Should have experience and demonstrated design capability for safe Gas Distribution System.		
8.	**Entire gas distribution system should be SEMI- S2 compliant**.		
9.	Should be well versed to use instruments like pressure switch, gas leak detectors, pressure transducers and vacuum venturis.		
10.	The vendor should have understanding of JSA (Job Safety Analysis), MAPP (Major Accident Prevention Plan) and PSR (Pre-Start up safety review) for effective project implementation.		
11.	The vendor must have done 2 similar projects in nature for customers in CVD process involving gases like CH_4, H_2, TMB and Diborane.		
12.	Bidder to submit the cause effect matrix for the proposed equipment's in line with Gas Hazard.		
13.	Vendor must have trained team to service trouble shoot Gas Cabinet, VMB and associated gas line and safety equipment. Necessary evidence from existing customers in India for having supported Gas Cabinets Maintenance and Troubleshooting should be enclosed. Vendor must submit letter from customers confirming that similar gas cabinets (similar makes of gas cabinets) are installed by vendor and the system is running successfully since last 3 years minimum and satisfactory service support has been provided by vendor.		
14.	Vendor should demonstrate capability and experience of installation of Gas cabinet, VMB, Safe gas distribution system for Ultra High Purity gases with references from at-least 3 customers.		
15.	Must provide training to operate gas cabinets and other equipment to run the facility safely. Training must be provided by OEM only.		
16.	Vendor must provide authorization certificate from the principal.		
17.	Customer feedback letters indicating the quality of work and satisfactorily working of gas cabinets		

	from at least 3 customers in India.		
18.	List of customers, projects done with contact address, phone number, and email etc., Necessary site visit to any of the projects mentioned in your reference may be conducted at our discretion and accordingly technical capability rating will be given to bidders.		
19.	**The vendor/manufacturer/Supplier must visit the installation site before submission of the tender bid to evaluate the site location, available floor space and other safety conditions.**		

ANNEXURE - C

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

Item Name: Design and Installation of Gas Distribution System and Chilled Water Distribution System

It. No	Description of work	Quantity	Units	Basic Rate in INR	GST in Percentage	Total Amount with taxes in INR
	GAS DISTRIBUTION SYSTEM					
1	**Dual cylinder, Semi-automatic change over panel for Methane gas**	1	Set			
2	**Single cylinder TMB/Diborane gas cabinet with inbuilt Valve Manifold Box of one stick inlet and 3 stick outlets**	1	Set			
3	**Single cylinder Oxygen (O_2) gas panel**	1	Set			
4	**Single cylinder Argon (Ar) gas panel**	1	Set			
5	**Single cylinder Nitrogen [high purity] gas panel**	1	Set			
6	**Dual cylinder gas supply panel with semi-automatic change over for Nitrogen (industrial pure) gas**	1	Set			
7	**Dual cylinder, Semi-automatic change over panel for Hydrogen gas**	1	Set			
8	**Air compressor with it's components for oil free compressed dry air (CDA)**	1	No.			
9	**¼" Diaphragm valve** The valves shall be manually operated and made of SS316L according to ASTM A276 specifications. The maximum working pressure of the valve shall be 10 bar. The valves shall bear leak integrity of 10^-9 mbar lit/sec. The end connections shall be VCR end.	35	Nos.			
10	**¼" Ball Valve** The ball valves shall be manually operated and made of SS316L and of single piece construction. The maximum working pressure shall be at least 10 bar or above. The end connections shall be double compression end.	22	Nos.			
11	**¼" tube for process gases:** ¼" tube stainless steel electropolished with necessary fittings and supports	250	Mtrs.			
12	**½" x ¼" co-axial tube for TMB/Diborane process gas:** ½" (bright annealed), ¼" tube stainless steel electropolished with necessary fittings and supports	55	Mtrs.			
13	**½" tube for N_2(Industrial Pure) and CDA:** ½" (bright annealed) stainless steel with necessary fittings and supports	100	Mtrs			

14	**¼" tube for N_2(Industrial Pure) and CDA:** ¼" (bright annealed) stainless steel with necessary fittings and supports	25	Mtrs			
15	**Gas detector (SIL 2 certified) for CH_4 and H_2:** Lel gas detector (single sensor for both H_2, CH_4) with its accessories.	3	Nos.			
16	**Gas leak detection system with centralized controller for gas handling system with related cables, wiring, PLC, HMI panel (7" Display or higher) with controller card and other accessories.**	1	Set			
17	**Gas distribution system installation** by means of orbital welding followed by testing (Pressure hold test & Helium leak check (TMB/Diborane, CH_4, H_2, Ar, O_2, N_2 (High pure) followed by validation (Trace oxygen, Trace Moisture & Trace particle)). The gas line connections need to be tested and validated for pressure hold test, for 24 hours, Helium leak, up to 1 X 10^{-9} He mBar lit sec^{-1}, trace moisture, tested for less than 5 PPM impurities, trace Oxygen tested for less than 5 PPM and particles, up to 0.1-micron level.	1	Set			
18	**Support structure for gas tube lines:** Unistruts for the support structure (GI), cable tray/conduits for single cables	150	Mtrs.			
19	**Tube clamps (MOC SS with PVC/PP Inserts)**	450	Nos.			
20	**Anchor bolts & Nuts and fittings** (required for above mentioned gas lines)	1	Set			
21	**Dual Cylinder holding structure: For CH_4, H_2 & N_2 (Industrial pure)** **Structure should have a canopy to safeguard it from rain as it will be kept in open balcony. Individual cylinder capacity is 47 to 50 Liters.*	3	Nos.			
22	**Single Cylinder holding structure: For Ar, O_2 & N_2 (High pure)** **Structure should have a canopy to safeguard it from rain as it will be kept in open balcony. Individual cylinder capacity is 47 to 50 Liters.*	3	Nos.			
23	**Exhaust duct (from gas cabinet):** 4" exhaust duct, 2mm thickness with fittings and accessories.	30	Mtrs.			
24	**Exhaust duct (for MPCVD vacuum pump outlet):** 1.5" exhaust duct, 2mm thickness with fittings and accessories.	20	Mtrs.			
25	**Dry/Wet scrubber:** **Available space for scrubber installation is 1 M x 1 M (Lx B) will be kept in the balcony as shown in the figure 1.*	1	Nos.			
26	**Blowers for Exhaust:** ** Designed for Flowrate as per the requirement of gas*	1	Nos.			

	cabinet/panel and CVD vacuum pump outlet exhaust.					
27	**Instrumentation Cables and Necessary Cable Trays:** CAT6 cable with necessary cable lugs and cable tray	150	Mtrs			
	CHILLED WATER DISTRIBUTION SYSTEM					
28	**3" PIPE FOR CHILLED WATER:** 3" Sch 10 Stainless Steel 304 pipe with Insulation (Nitrile Rubber and Aluminium Cladding) with necessary Gate Valves, Fittings and Supports	40	Mtrs			
29	**1" PIPE FOR CHILLED WATER:** 1" Sch 10 Stainless Steel 304 pipe with Insulation (Nitrile Rubber and Aluminium Cladding) with necessary Gate Valves, Fittings & Supports	60	Mtrs			
30	**Chilled water distribution system installation** followed by Pressure hold test. Pressure hold test for chilled water lines at the site. Certified up to 1.5 times of the working pressure by keeping the system under pressure using RO Water/Nitrogen Gas for 24 hours without a drop in pressure.	1	Set			
	Grand Total					

Total Amount Rupees in words _____

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 that Local 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: _____%

_____

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. Nonsubmission of this will lead to Disqualification of bids.

Annexure – E

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

No._____ Dated: _____

CERTIFICATE

(Bidders from India)

I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India and hereby certify that I am not from such a country.

OR *(whichever is applicable)*

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

I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India and hereby certify that I from _____ (Name of 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 Tenderer
Date: Name & Address of the
Tenderer 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

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: 27/01/2023

Signature of the Competent Authority
of the Institution with seal.

उप कुलसचिव (आई.सी. एवं एस.आर.)
DEPUTY REGISTRAR (IC & SR)
आई.आइ.टी. मद्रास, चेन्नै
I.I.T. MADRAS, CHENNAI - 600 036.

27/01

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 H

TENDER CHECKLIST – Mandatory to be filled and sent (inside the Main Bid Cover) along with Bidding Document.

(1) I have registered as a Vendor with IC&SR. (Proof to be enclosed) ☐

(2) Technical bid cover and Financial Bid cover ☐

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

(4) Completed Technical Compliance Statement. ☐

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

(6) Certification of Class I / Class II & Non Local supplier to be submitted (**As a part of technical bid) per item / service / work as per Annexure D** ☐

(7) EMD (Ref. tender document pg.no. 3, Point no.2) ☐

(8) Land Border **(Annexure – E)** ☐

(9) Authorized agent certificate from OEM is mandatory if Indian agent/Indian office of OEM is participating in this tender on behalf of OEM. (Ref. tender document pg.no. 3, Point no.4) **Annexure F** ☐

The bid will be valid only 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 may result in the bid being considered as non-compliant and rejected.

Signature of the Bidder

Annexure I

FORM - A
NON-BLACKLISTING DECLARATION

Date: XXXX

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

Subject: Non-Blacklisting 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 blacklisted 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