



Date: 9th May 2023

Local Tender (India-based vendors only)

To Whom It May Concern

This is an RFQ (Request for Quote) for setting up a central glove box facility as part of a limited tender for the Centre for Nano Science and Engineering (CeNSE) at IISc, Bangalore.

CeNSE is a multidisciplinary research department at IISc that houses a 14,000 sq. ft. cleanroom and characterization facility used by over 50 faculty members from various disciplines at IISc. CeNSE also runs a program called Indian Nanoelectronics Users Program (INUP), which has allowed 4200 participants from more than 700 universities and institutes all over India to use the facilities at CeNSE. Consequently, any tool in CeNSE receives significant exposure to the scientific community at IISc and beyond. The vendors are requested to factor this exposure's value into their quotes. Details of existing facilities and the INUP program can be gleaned from:

<http://nnfc.cense.iisc.ac.in/>

<http://www.mncf.cense.iisc.ac.in/>

I. Procedure:

- Vendors are required to submit a technical proposal and a commercial proposal in **two separate sealed envelopes**. Only vendors who meet the technical requirement will be considered for the commercial negotiation.
- The Bidder should belong to either class 1 or class 2 suppliers distinguished by their "local content" as defined by recent edits to GFR. They should mention clearly as to which class they belong to in the cover letter.
 - Class 1 supplier: Goods and services should have local content of equal to or more than 50%.
 - Class 2 supplier: Goods and services should have local content of equal to or more than 20 % and less than 50%.
- Purchase preference as defined by the recent edits to GFR (within the "margin of purchase preference") will be given to Class-1 supplier.
- MSMEs can seek an exemption to some qualification criteria. IISc follows GFR2017 for such details
- Sperate detailed justification needs to be given to substantiate the qualification as Class 1 and Class 2 suppliers, and the intender reserves the right to cross-check the factual validity of the same.
- The quote should come only from Indian Original Equipment Manufacturer (OEM) or their Indian authorized distributor.



7. The deadline for submission of proposals is **8th June 2023, 5:30 pm** Indian Standard Time. Bids should arrive at the office of **Prof. Aditya Sadhanala, TF-12, Centre for Nano Science and Engineering, Indian Institute of Science, Mathikere, Bangalore 560012**, India, by the above deadline.
8. The technical proposal should contain a technical compliance table with 5 columns.
 - a. The first column must list the technical requirements in the order that they are given in the technical requirement below.
 - b. The second column should provide specifications of the instrument against the requirement (please provide quantitative responses wherever possible).
 - c. The third column should describe your compliance with a “Yes” or “No” only. Ensure that the entries in column 2 and column 3 are consistent.
 - d. The fourth column should state the reasons/explanations/context for deviations, if any.
 - e. The fifth column can contain additional remarks from the OEM. You can use this opportunity to highlight technical features and qualify the response of previous columns.
9. Vendors are encouraged to highlight the advantages of their tools over comparable tools from the competitors
10. If multiple systems can fulfil the requirements, vendors can submit multiple bids.
11. In the commercial bid, please provide the itemized cost of the system and required accessories, etc.
12. As an option, please provide itemized cost for any suggested accessories/add-ons that may enhance the tool’s usability, capability, accuracy or reliability. Vendors are encouraged to quote for as many add-ons as their tool portfolio permits.
13. In the quote, you are requested to provide itemized cost for spares expected over 2 years of use.
14. Please indicate the warranty provided with the tool.
15. Any questions or clarifications can be directed to:
Prof. Aditya Sadhanala,
TF-12, Centre for Nano Science and Engineering,
Indian Institute of Science, Mathikere, Bangalore 560012
sadhanala@iisc.ac.in

II. Terms and Conditions

1. The decision of the purchase committee will be final
2. The vendor is responsible for the installation of the system at the IISc campus.
3. The RFQ must include references to 5 previous installations, preferably in India. Please provide the names and contact addresses of the referees so that the committee can contact them independently. Details of such systems with model numbers and users should be provided. The reference letters can be used to disqualify vendors with poor track records of service, build quality, system performance, or poor availability of spares.
4. The vendor must also submit a list of customers where similar systems were installed.
5. Clarify if a trained on-site engineer does periodic (preventive) maintenance or requires a specialist from the OEM. The vendor should have qualified technical service personnel for the equipment based in India and must assure a response time of <2 business days after receiving a service request.
- 6. The lead time for the delivery of the equipment should not be more than two months from the date of receipt of our purchase order.**
7. The indenter reserves the right to withhold placement of the final order. The right to reject all or any of the quotations and to split up the requirements or relax any or all of the above conditions without assigning any reason.
8. Wherever requested in this specifications sheet, data must be supplied along with technical compliance documents. Technical bids without supporting data will be deemed as technically non-compliant.
9. Upon request, all guaranteed specifications will have to be demonstrated in an active installation. Failure to demonstrate any promised specifications will be deemed as technical non-compliance.
10. Printed literature and published papers to support compliance with the prescribed specifications may be provided.
11. Technical evaluation by the institute may include a demonstration to verify the functionalities and capabilities of the system quoted. Any discrepancy between the promised and demonstrated specifications will be deemed technical non-compliance. If the need arises, the vendor must be ready to visit IISc for a techno commercial discussion physically.
12. The **validity of commercial quotations should be at least 60 days** from the last date for the submission of tender documents.
13. The quotations should be on FOR-IISc Bangalore basis in INR only.
14. 100% of payments will be released after delivery and satisfactory installation completion, subject to TDS as per rules. As per GFR, no advance payment can be made to domestic vendors unless an equal amount of bank guarantee is provided.

III. Tender specification

Common Technical Requirements

A. Enclosure:

1. The window materials should be impact-resistant polypropylene that is at least 10 mm thick.
2. The main body must be SS316 brushed stainless steel, at least 2.5 mm thick.
3. The trays, rails and other components in the antechambers should also be of 316 grade or similar corrosion/chemical resistant grades of brushed stainless steel.
4. The external should either be powder coated or Spray paint finish.
5. Need a modular system that can be expanded further. The side panels must be removable to accommodate future expansions.
6. Glove Ports: Delrin (POM) Natural white/PP

B. Programmable Logic Control-Based Operation:

1. The glove box should be controllable with independent and fully integrated programmable logic control (PLC), with a touch panel interface
2. The touch panel interface should serve as a central control unit for all glove box functions and procedures.
3. All glove box functions should be accessible via a minimum 7 inch touch panel based Human Machine Interface (HMI).
4. Graphical display of the box pressure, O₂ and moisture levels should be available in the touch panel interface with a capability of at least 24-hour history.
5. Automatic Box purge should be possible via PLC.
6. PLC should trigger an automatic box purge either due to high O₂ or moisture or both in the glove box or an automatic timer option to trigger box purge at a pre-set time for a pre-set duration.
7. Touch panel implementations showing this should be provided. A copy of relevant documentation from the user manual should also be provided.
8. A gas (argon or nitrogen) flow rate of 200 litre/min or greater during purging should be possible.
9. The O₂ and moisture trigger set-point range for automatic box purging should be between 10-999 ppm. Touch panel implementations showing this should be provided. A copy of relevant documentation from the user manual should also be provided.

C. Sensors

- The glove box vendor should provide a solid-state/Electrochemical oxygen sensor capable of measuring oxygen levels from 0.1 ppm to 1000 ppm.
- The glove box vendor should provide a solid-state moisture sensor capable of measuring moisture levels from 0.1 ppm to 3000 ppm.

D. Box pressure

- Box pressure should be controllable automatically (via PLC) within a pressure range of -15 to +15 mbar.
- The desired pressure should be settable via the touch panel interface (HMI). Touch panel implementations showing this should be provided. A copy of relevant documentation from the user manual should also be provided.

E. Gloves and Glove Port Covers

- The size of each glove port should be at least 9" in diameter.
- The glove ports should be O-ring sealed against the gloves.
- Must include at least one glove port cover.
- The thickness of the butyl gloves should be a minimum of 0.4 mm.

F. Mini antechambers

- There should also be a tray, preferably mounted on telescopic rails, which can be slid back and forth
- The antechamber should be at least 150 mm in diameter and 400 mm in length.
- The antechamber should have a tray to enable sample transfer.
- The chamber must have a manual pump and purge system: with a pressure gauge, manual valve and connection to a vacuum pump.
- The antechamber should have a door that can seal the antechamber for evacuation.

G. Feed-throughs

- The box should have at least 4 KF-40 feed-throughs. These can be connected to liquid, electrical or vacuum feed-throughs. The details of placement can be discussed at the time of ordering

- The system must have at least 1 electrical feed-through with 15 A connectors that are compatible with 220 V – 240 V supply.

H. System control

- The glove box should be PLC controlled with Color touch panel operation of glove box parameters with features of circulation control, pressure control, regeneration control and monitoring of pressure, oxygen and moisture. Each function should be clearly displayed on the touch panel. Alarms and reminders are required for maintenance and parts. Activation at user-set timings
- Should have an upgradeable app facility for 24/7 remote monitoring of glove box parameters and provision for sending alerts and notifications about upcoming service schedules. It must be freely downloadable from the google play store /app store. The play store/app store link should be provided in the technical bid, and the vendor needs to demonstrate the working of the app (if called for).

I. Other

- The vendor should have minimum 5 installations in a reputed institute like IIT, IISc, or IISER (Supporting document should be submitted)
- There must be a lamp inside, preferably LED. A switch on the outside of the body or touchscreen must be switched to turn the light on/off.
- The circulation system should make it possible to have positive pressure regulation without a vacuum pump
- A foot pedal for controlling box pressure should be provided.
- At least three height-adjustable stainless-steel shelves of at least 1000 mm in length and at least 200 mm in depth should be provided. These should be accessibly located so that any chemicals or tools are accessible from glove ports.
- All electrical connections should comply with line power specifications in India. The single-phase voltage range is 220-240 Vac, and the three-phase voltage range is 415 - 440 Vac. The line frequency is 50Hz.

J. Acceptance Tests

- IISc will expect acceptance tests post-installation. These can be recorded in the presence of representatives of the OEM. The inability to pass these tests will be counted as a technical failure and breach of contract.



- IISc has the absolute right to reject or accept the bids based on user feedback and references.
- Maintain <1 ppm of H₂O and O₂ for a 24-hour period.
- Demonstrate automated routines for catalyst regeneration
- Demonstrate automated routines for maintaining target pressure.

K. Regular Maintenance: The system should require minimal maintenance. Any regular maintenance (calibration, cleaning, etc.) needed to keep these glove boxes running in good working condition should be clearly mentioned. The cost of this regular maintenance (if requiring additional consumables or spare parts) for 2 years should be quoted separately as a “maintenance contract”.

L. Operating Conditions: The system must function year-round in Bangalore conditions, i.e. the ambient temperature of 10-40 °C and relative humidity of 30-95%.

M. Local Support: Please mention if a local distributor will support the system. A Bangalore-based vendor who can quickly respond to issues will be preferred.

N. Warranty: The equipment should have a 3-year warranty except for the consumables used in the glove box operation (purifier consumables and gloves).

Exclusive Technical Specifications for Glove Box - 1 (Eight Port Glove Box with Two side operation 4 + 4):

1. The working space of each glove box should be at least 850 - 890 mm in height, 1750 to 10 mm in length and 950 mm to 1050 mm in depth.
2. - **20 Freezer RHS of the Glove Box**
 - 27 Litter capacity
 - Designed for the low-temperature storage of reactive materials, which need to be processed or held in a pure inert atmosphere, these glove box freezers can be dedicated systems or used with other process operations.
 - The vendor should provide a minimum of **THREE** installation details of the Glove Box integrated with the freezer, failing which they would not technically comply.
 - The freezer should be upgradable in future.
3. **Double-column Purifier Underneath the Glove Box:**
 - Double Column Gas purification system 7-inch Siemens or other globally reputed established touch screen HMI, remote and graphical PLC controller with Auto-regeneration
 - The purifier should be underneath the glove box to conserve space.
 - The glove box should have at least one independent purifier capable of purifying the glove box ambient to attain purity of <1 ppm H₂O and O₂.
 - The gas removal capacity of the purifier should be a minimum of 41 -45 litres for oxygen and at least 1400 to 1600 grams for moisture. Specification sheets or data sheets attesting to this must be provided.
 - The purifier should be fully regenerable with an automatic/programmed control using forming gas (10% H₂ or lower), Ar, or N₂.
 - Continuous gas purification, even during regeneration phases
 - The two reactor columns should allow continuous operation. One regenerable reactor column per line should maintain ultra-low oxygen and moisture levels in inert enclosures at any given time.
 - The gas circulation blower should have a circulation rate of at least 88 to 100 m³/hour. The blower's maximum and minimum circulation rates should be provided and should work without any heat exchanger.
 - The blower speed should be dynamically controlled via PLC based on the moisture and oxygen content in the glove box to make the blower operation power efficient. Implementation diagrams or specifications that prove this is possible must be provided.

- The purifier loop must have at least two H14 dust filters (HEPA or ULPA filters) -- one for filtering inlet gas (nitrogen or argon) and one for filtering the box ambient before it goes out to the gas circulation system.
 - Oil bubblers should NOT be used in any of the gas circulation lines. The mechanism for pressure regulation should be clearly mentioned.
 - NO component in the gas circulation line (except for the vacuum pumps) should use oil or oil-containing parts.
 - Additional functionalities required through the PLC control touch panel:
 - Eco Mode Operation
 - Auto purge with time sequence or ppm of O₂ and H₂O
 - Automated Activation: Yes/No
 - Time of Day for Automated activation: HH:MM:SS
 - Blower Speed Reduction: Yes/NO
 - Reduced speed set: option with between 10-100%
 - Max. H₂O/O₂ at set RPM reduction: such as 10 PPM
 - Switch Off Vacuum pump purifier: Yes/No
 - Switch off Vacuum pumps antechambers: Yes/NO
 - Stopping time for Vacuum pumps: ---- Minutes
 - Switch off Box-light: Yes/No
 - Touch panel implementations showing this should be provided. A copy of relevant documentation from the user manual should also be provided.
 - Auto purge with time sequence or ppm of O₂ and H₂O with touch panel implementations showing this should be provided. A copy of relevant documentation from the user manual should also be provided.
4. A separate 7 Kg solvent absorption unit should be provided (a regenerable option would be preferred if possible), with the unit having both inline and bypass modes
5. There should be four POM (polypropylene is preferred) glove ports on two opposite sides of the box (Total 8 glove ports), and butyl gloves should be provided for these glove ports.
- 6. Automatic Large Antechamber Underneath the Glove Box(refer to the schematic image below)**
- The box must have one large antechamber for sample transfer and should be present underneath the glove box, as shown in the figure below.
 - The antechamber should be of square shape with a width of at least 400 mm and a length of ~600 mm.
 - The doors should preferably be with a swing-type hydraulic-assisted opening mechanism to conserve working space.
 - Automatic sample lift provision with pneumatic or hydraulic provision.

- There should also be a tray, preferably mounted on telescopic rails, which can be slid back and forth. The tray should facilitate the transfer of tools and chemicals.
- The chamber must have an Automatic PLC controlled evacuate and purge system with a pressure gauge.

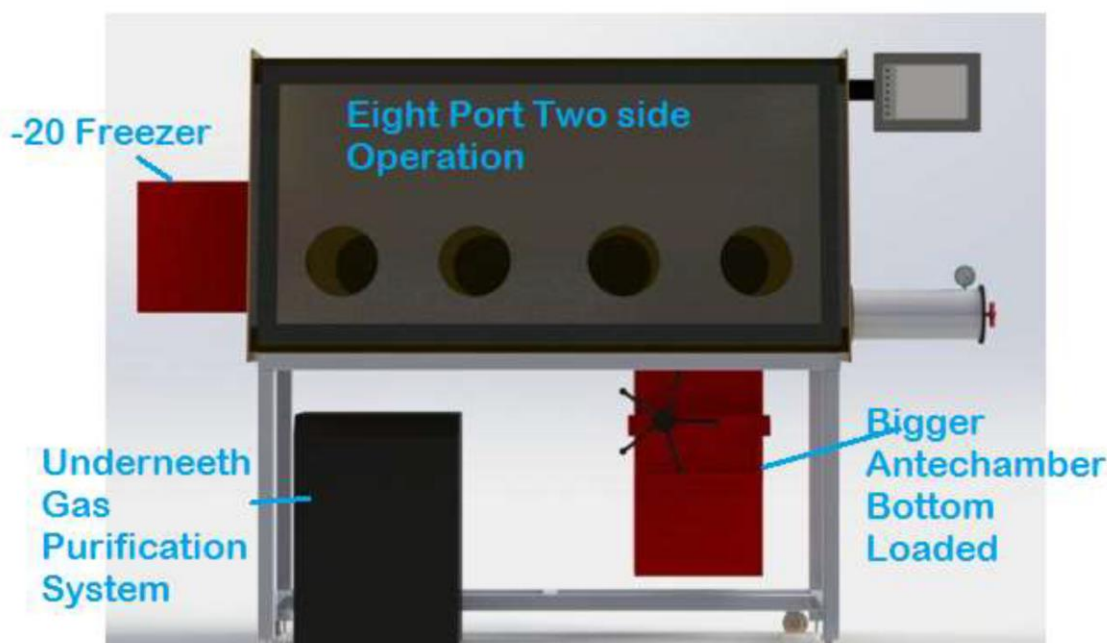


Figure: Schematic of the 8-port double-side operated glove box and its layout required for various elements like purifier, freezer, and big-antechamber.

Exclusive Technical Specifications for Glove Box - 2 (Four Ports Glove Box with single side operation):

1. The working space of each glove box should be at least 850 - 890 mm in height, 1750 to 1850 mm in length and 750 mm to 850 mm in depth.
2. Four POM (polypropylene is preferred) glove ports and butyl gloves should be provided for these ports.
3. Future upgrades in the form of freezer attachments should be possible.

4. Purifier

- Single Column Gas purification system with a minimum 7-inch touch screen HMI, remote and graphical PLC controller with Auto-regeneration
- The glove box should have at least one independent purifier capable of purifying the glove box ambient to attain a purity of <1 ppm H₂O and O₂.
- The gas removal capacity of the purifier should be a minimum of 41 -45 litres for oxygen and at least 1400 to 1600 grams for moisture. Specification sheets or data sheets attesting to this must be provided.
- The purifier should be fully regenerable with an automatic/programmed control using forming gas (10% H₂ or lower), Ar, or N₂.
- The gas circulation blower should be capable of a circulation rate of at least 88 to 100 m³/hour. The blower's maximum and minimum circulation rates should be provided and work without any heat exchanger.
- The blower speed should be dynamically controlled via program logic based on the moisture and oxygen content in the glove box to make the blower operation power efficient. Implementation diagrams or specifications that prove this is possible must be provided.
- The purifier loop must have at least two H14 dust filters (HEPA or ULPA filters) -- one for filtering inlet gas (nitrogen or argon) and one for filtering the box ambient before it goes out to the gas circulation system.
- Oil bubblers should NOT be used in any of the gas circulation lines. The mechanism for pressure regulation should be clearly mentioned.
- NO component in the gas circulation line (except for the vacuum pumps) should use oil or oil-containing parts.
- Additional functionalities required through the PLC control touch panel:
 - Eco Mode Operation function
 - Automated Activation: Yes/No
 - Time of Day for Automated activation: HH:MM:SS
 - Blower Speed Reduction: Yes/NO



- Reduced blower speed set: option with between 10-100%
 - Max. H₂O/O₂ at set RPM reduction: such as 10 PPM
 - Switch Off Vacuum pump purifier: Yes/No
 - Switch off Vacuum pumps antechambers: Yes/NO
 - Stopping time for Vacuum pumps: ---- Minutes
 - Switch off Box-light: Yes/No
 - Touch panel implementations showing this should be provided. A copy of relevant documentation from the user manual should also be provided.
- Auto purge with time sequence or ppm of O₂ and H₂O and touch panel implementations showing this should be provided. A copy of relevant documentation from the user manual should also be provided.

5. Automatic Large Antechamber

- The box must have one large antechamber for sample transfer.
- The antechamber should be cylindrical with a diameter of at least 400 mm and a length of ~600 mm.
- The doors should preferably be with a swing-type hydraulic-assisted opening mechanism to conserve working space.
- There should also be a tray, preferably mounted on telescopic rails, which can be slid back and forth. The tray should facilitate the transfer of tools and chemicals.
- The chamber must have an Automatic PLC controlled evacuate and purge system with a pressure gauge with a selectable number of cycles.

Thank you,

Aditya Sadhanala