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September 14th 2020

Tender for a Glove Box

This is an RFQ (Request for Quote) for procurement of a glove box system 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 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 scientific community at IISc and beyond. The vendors are requested to factor in the value of this exposure in to their quotes. Details of existing facilities and INUP program can be gleaned from:
http://nnfc.cense.iisc.ac.in/
http://www.mncf.cense.iisc.ac.in/

Amendment added on 18th Sept 2020
This order is being processed using Government of India funds. As such these funds are governed by GFR 2017 rules. Govt recently amended the GFR rules of global tender enquiry (GTE) which affects this tender as well. The relevant communication is F. No.11018/03/2019-CDN dated 24th August,2020. Vendors must submit bids that are compliant with these new rules.

Amendment added on 25th Sept 2020
The last date of the tender has been extended to 5th October.

1 Procedure

1. Vendors will be 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.
2. **The deadline for submission of proposals is the September 28th 2020 (extended to 5th October 2020), 5:30 pm Indian Standard Time.** Proposals should arrive in hardcopy at the office of Dr. Sushobhan Avasthi, TF-06, Centre for Nano Science and Engineering, Indian Institute of Science, Bangalore 560012, India, by the above deadline.
3. 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, qualify response of previous columns, or provide additional details.

4. Vendors are encouraged to highlight the advantages of their tools over comparable tools from the competitors
5. If multiple systems can fulfill the requirements, vendors can submit multiple bids.
6. In the commercial bid, please provide itemized cost of the system and required accessories, such as software, power supply, etc.
7. As an option, please provide itemized cost for any suggested accessories/add-ons that may enhance the usability, capability, accuracy or reliability of the tool. Vendors are encouraged to quote for as many add-ons as their tool portfolio permits.
8. The quotes should be CIF Bangalore, India. So please include cost of shipping. Customs can be extra.
9. Provide itemized cost for required spares for 2 years of operation. For sake of this calculation, the vendor may assume active tool usage of 20 hours/ week. The system will remain powered on continuously. This number will be used to estimate the life cycle cost of the tool.
10. Any questions can be directed to Dr. Sushobhan Avasthi, TF-06, Centre for Nano Science and Engineering, Indian Institute of Science, Bangalore 560012, India. (savasthi@iisc.ac.in)

2 Terms and Conditions

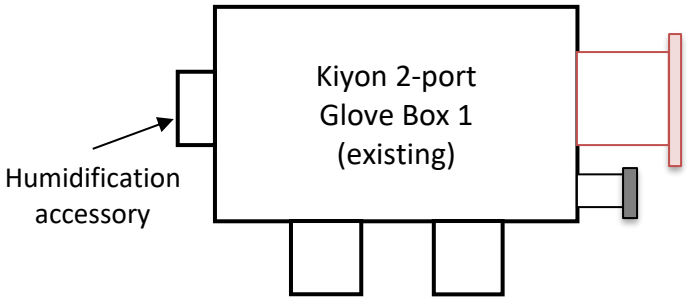
1. The decision of purchase committee will be final
2. The vendor is responsible for the installation of the system at the IISc campus.
3. The RFQ must include references of 5 previous installations, preferable in India. Please provide the names and contact addresses of the referees, so that the committee 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 record of service, build quality, system performance, or poor availability of spares.
4. The vendor must also submit a list of 50 customers where similar systems have been installed.
5. Clarify if periodic (preventive) maintenance be done by a trained on-site engineer 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 3 months from the date of receipt of our purchase order.
7. The indenter reserves the right to withhold placement of 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. All guaranteed specifications will have to be demonstrated, upon request, in an active installation. Failure to demonstrate any promised specifications will be deemed as technical non-compliance.
10. Printed literature and published papers in support of all compliance to the prescribed specifications may be provided.

11. Technical evaluation by the institute may include demonstration to verify functionalities and capabilities of the system quoted. Any discrepancy between the promised specifications and demonstrated specifications will be deemed as technical non-compliance. If need arises, the vendor must be ready to physically visit IISc for a techno commercial discussion.
12. The **validity of commercial quotation should be at least 60 days** from the last date for the submission of tender documents.
13. For foreign vendors, the payment terms will be via letter of credit. 75% on arrival of equipment at IISc and submission of documents to the bank. 25% on satisfactory installation and training.

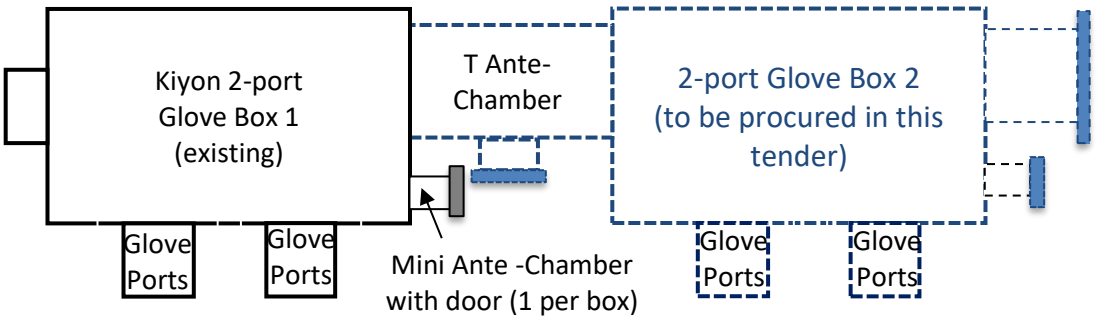
3 Technical Requirements

3.1 System Arrangement

The glove box must be connected to an existing glove box (Box 1). The new glove box (Box 2), must be interconnected to Box 1 via a T-shaped ante chamber (see Figure 1). Box 1 is a 2-port glove box (1,200(W) X 890(H) X 760(D)mm) from Kiyon, Korea. Details can be provided to the winning bid. The intended specifications of Box 2 are provided below. The vendors must take complete responsibility of integration.



a) Current system. Red refers to the parts that must be removed.



b) Intended system. Blue refers to the parts that must be added.

Figure 1: Over schematic of the system being discussed in this tender. Not to scale.

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3.2 Enclosure

1. The working space of each glove box should be at least 890 mm in height, 1200 mm in length and 760 mm in depth.
2. The window materials should be impact-resistant polycarbonate that is atleast 4 mm thick.
3. Main body must be SS304 or SS316 brushed stainless steel, atleast 3 mm thick.
4. The trays, rails and other components in the ante-chambers should also be of 304 grade or 316 grade or similar corrosion/chemical resistant grades of brushed stainless steel.
5. The external should either be coated with a chemical/abrasion resistant coating or be the brushed stainless steel of the same or better quality as the inners.
6. We *strongly* prefer a system in which the space underneath the globe box is empty. At the very least half of the bottom must be free for external instrumentation (*see discussion in Feedthroughs*)
7. Need a modular system that can be expanded further. The side-panels must be removable to accommodate future expansions.

3.3 Programmatic Logic Control

8. Glove box should be controllable with independent and fully integrated programmatic logic control (PLC), with a touch panel interface
9. The touch panel interface should serve as a central control unit for all glove box functions and procedures.
10. All glove box functions should be accessible via the touch panel.
11. The PLC should also enable plotting graphical trends of box pressure, oxygen and moisture levels over at least 24 hours. To prove the capability, vendors must attach plots of this data obtained from a similar system. The attached data must have been collected within the past six months.
12. Graphical display of the box pressure, O_2 and moisture levels should be available in the touch panel interface.
13. Automatic Box purge should be possible via PLC.
14. PLC should trigger an automatic box purge either due to high O_2 or moisture or both in the glove box or an automatic timer option to trigger box purge at a preset time for a preset duration. Touch panel implementations showing this should be provided. A copy of relevant documentation from the user manual should also be provided.
15. Gas (argon or nitrogen) flow rate of 200 liter/min or greater during purging should be possible.
16. The O_2 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.

3.4 Purifier

17. Each glove box should have at least one independent purifier capable of purifying the glove box ambient to attain a purity of <1 ppm H_2O and O_2.
18. The removable capacity should be a minimum of 50 liters for oxygen and at least 2000 grams for moisture. Specification sheets or data sheets attesting to this must be provided.
19. The purifier should be fully regenerable with an automatic/programmed control using forming gas (5% H2 or lower) or Ar or N2.

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20. The purification system of the glove box should be fully integrated with the heat exchanger and a gas circulation blower.
21. The gas circulation blower should be capable of a circulation rate of at least 100 m^3/hour. The maximum and minimum circulation rates of the blower should be provided.
22. 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.
23. The purifier loop must have at least two 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.
24. An additional pair of filters for each box should be supplied with the equipment.
25. Oil bubblers should NOT be used in any of the gas circulation lines. The mechanism for pressure regulation should be clearly mentioned.
26. NO component in the gas circulation line (except for the vacuum pumps) should use oil or oil containing parts.

3.5 Solvent Absorption Unit

1. Box must have an independent, fully regenerable solvent absorption unit, using N2 or Ar.
2. The solvent trap should be capable of absorbing volatile organic solvents like DMF, THF, methanol, toluene, IPA, acetone, methanol, DMSO, acetonitrile, Capacity of solvent trap must be 2000 cc of methanol (or similar alcohols) or 2000 cc of THF (or similar aromatic esters) or 2000 cc of DMF or 2000 cc of chloroform or 2000 cc of toluene (or similar aromatic solvents).
3. Solvent absorption unit should be fully regenerable via PLC with a regeneration option provided in the touch panel controls. Touch panel implementations showing this should be provided. A copy of relevant documentation in a manual should also be provided.
4. The Solvent absorption unit should have both inline and bypass modes (**See Figure 2**).
5. **[Required Option]** The system should provide an option of attaching a solvent sensor, which indicates when to regenerate the solvent absorption unit. Touch panel implementations showing this should be provided. A copy of relevant documentation from the user manual should also be provided. This capability must be mentioned as a separate line item in the commercial bid as an option.

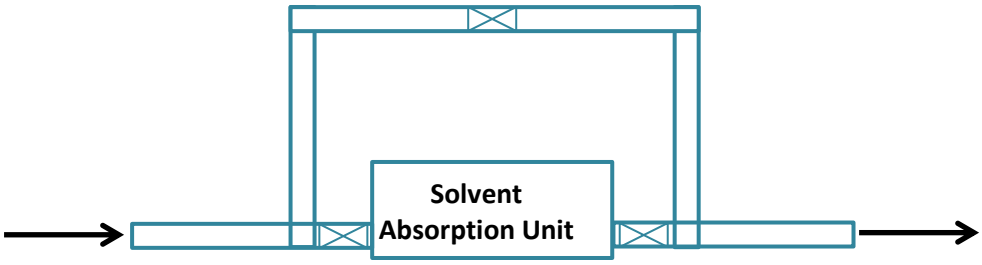

Figure 2. A schematic (not to scale) side-view of the circulation lines for the solvent absorption unit that shows the absorption unit by-pass and inline connections.

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3.6 Sensors

6. A solid-state oxygen sensor capable of measuring oxygen levels from 0.1 ppm to 500 ppm should be provided with each box.
7. A solid-state moisture sensor capable of measuring moisture levels from 0.1 ppm to 500 ppm should be provided with each box.
8. A pressure sensor capable of recording box pressure should also be available for each box.
9. The vendor should provide a list of solvents compatible with the system being quoted. For example, the vendor must provide the list of solvents that the moisture and oxygen sensors are compatible with. Sensors must be compatible with DMF, THF, methanol, toluene, IPA, acetone, methanol, DMSO, acetonitrile and chloroform.
10. The PLC should be able to show instantaneous readings from the sensor and should also have the capability to record the readings for, at the least, a period of 24 hours. Documentation and data in support of this should be provided.

3.7 Box pressure

11. Box pressure should be controllable automatically (via programmatic logic) within a pressure range of -12 to 12 mbar.
12. The desired pressure should be settable via the touch panel interface. Touch panel implementations showing this should be provided. A copy of relevant documentation from the user manual should also be provided.

3.8 Gloves and Glove Port Covers

13. There should be 2 polymer (polypropylene is preferred) glove ports for each box and butyl gloves should be provided for these glove ports.
14. The size of each glove port should be at least 9” in diam
15. The glove ports should be O-ring sealed against the gloves.
16. At least 1 additional pairs of butyl gloves should be supplied with the box. As an option, include the cost of one more pair of gloves in the commercial bid.
17. Must include at least one glove port cover.
18. The thickness of the butyl gloves should be a minimum of 0.4 mm

3.9 T-shaped ante-chamber connecting the two boxes

19. The T-shaped ante-chamber that connects the two glove boxes should have three vacuum doors, one towards each for the two boxes and one exposed to atmosphere. The goal is to transport samples from atmosphere into the ante-chamber to one of the boxes, without breaking hermeticity (**see Figure 3**).
20. The ante-chamber should be cylindrical with a diameter of at least 380 mm and a length of at ~ 800 mm.
21. The doors should preferably be with a swing-type hydraulic-assisted opening mechanism to conserve working space.
22. There should also be a tray preferably mounted on telescopic rails, which can be slid back and forth. The tray should facilitate transfer for tools and chemicals from one glove box to the other.
23. The chamber must have a manual pump and purge system: with pressure gauge, manual valve and connection to vacuum pump.
24. **[Required Option]** The system should be upgradable to automatic pump and purge operations of the ante-chamber via a software controlled touch panel or computer. Touch panel

implementations showing this should be provided. A copy of relevant documentation from the user manual should also be provided. This capability must be mentioned as a separate line item in the commercial bid as an option.

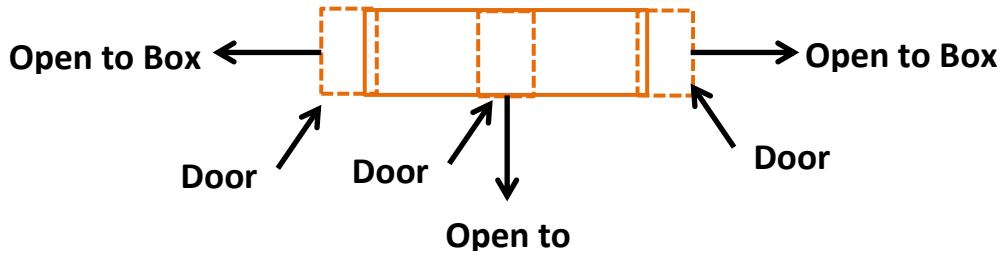

Figure 3. A schematic (not to scale) top-view of the T Ante-Chamber that connects the two glove boxes.

3.10 Mini ante-Chambers

25. The box must have one mini ante-chamber for sample transfer.
26. The ante-chamber should be at least 150 mm in diameter and 290 mm in length.
27. The ante-chamber should have a sliding tray to enable sample transfer.
28. The chamber must have a manual pump and purge system: with pressure gauge, manual valve and connection to vacuum pump.
29. The ante-chamber should have a door that can seal the ante-chamber for evacuation.

3.11 Feedthroughs

30. The box should have at least 4 KF-40 feedthroughs. These can be connected to liquid, electrical or vacuum feedthroughs. The details of placement can be discussed at the time of ordering
31. The system must have at least 3 electrical feedthroughs with 15 A connectors that are compatible with 220 V – 240 V supply
32. One 100 mm optical feedthrough with quartz window at the bottoms (base) of the system. We plan to install a solar simulator underneath the optical feedthrough. The space under the instrument must be free to house the solar simulator. The quartz window must be replaceable.
33. [Required Option] As an option, quote for two electrical feedthroughs with 4x-double-sided coax connectors

3.12 Vacuum Pumps

34. Each box should come with a Rotary vane pump (at least 20 m^3/hour capacity) with oil mist filter.
35. There should be automatic gas ballast control
36. The pump ON/OFF should be controllable via the touch panel. Touch panel implementations showing this should be provided.
37. [Required option] The option of upgrading to an oil-less scroll pump should be available and quoted as an option.

3.13 Other

38. There must be a lamp inside, preferably LED. There must be a switch on the outside of the body or touchscreen to turn the light on/off.
39. The circulation system should make it possible to have positive pressure regulation without vacuum pump and should be fully integrated with the heat exchanger. Documentation supporting this should be provided.

40. A foot pedal for controlling box pressure should be provided.
41. At least two 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 centrally located so that any chemicals or tools are accessible from glove ports.
42. All electrical connections should comply with line power specifications in India. Single phase voltage range is 220-240 Vac and the three-phase voltage range is 415 - 440 Vac. The line frequency is 50Hz.
43. IISc requires 3 years warranty.
44. IISc shall not pay extra for installation and training. The base price must include this.

3.14 Acceptance Tests

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

45. Maintain <1 ppm of H2O and O2 for 24 hour period.
46. Demonstrate successful sample transfer from the two ante-chambers and T-ante-chamber. The contamination in the glove box should not increase above 2 ppm for with H2O or O2 at any point during the transfer.
47. Demonstrate automated routines for catalyst regeneration
48. Demonstrate automated routines for maintaining target pressure.
49. Demonstrate solvent compatibility by opening bottle of anhydrous bottle of THF and DMF without impact or spurious reading on the H2O and O2 sensors.

Thanking you,

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