To whom it may concern

Sub: Fabrication, Supply and Installation of Trolley mounted vacuum system with control panel -1 Unit

Invitation of Quotations

DUE DATE: September 7, 2020

Dear Sirs,

1. Quotations are invited for the fabrication job as per the enclosed job details.

2. The quotations must reach Associate Director, Beam Technology Development Group by September 7, 2020, and must be sent in a sealed envelope superscribed with the above reference number, subject and due date given above.

3. The address on the envelope should read

(Attn. Nagaraj Alangi)
To,
Associate Director,
Beam Technology Development Group
BARC, Trombay, Mumbai - 400 085.

4. The bidder may contact on Telephone Nos. +91-22-25594396/0218 or by email at nagaraj@barc.gov.in for any clarifications in the enquiry.

5. Sealed Quotations should be submitted only through Registered post/speed post through Indian Postal Service. Offers sent by telegram, telex, courier, fax or e-mail will not be considered.

6. Associate Director, Beam Technology Development Group BARC reserves the right to accept or reject any or all quotations without assigning any reason.

Yours faithfully,

[Signature]

Associate Director
Beam Technology Development Group

Encl: One (Job details)
C.C. AAO, (WORKS) CC, BARC
Technical specifications for Fabrication, Supply and installation of Trolley mounted vacuum system with control panel -1 Unit

The requirement is for a complete vacuum system with a Diffusion pump for high vacuum applications backed by rotary pump, mounted on a trolley and integrated with control panel for providing interlocks. All vacuum plumbing has to be of stainless steel. The detailed specifications of the diffusion pump, rotary pump, gauges and control panel and trolley are provided in table 1. All the vacuum flange dimensions shall conform to ISO 2881, and the raw material standards are as per ASTM standard ASTM A240/ 304L. The scope of the work includes

1. Procurement of all the raw materials as per applicable ASTM standard, testing for composition and other properties.
2. Fabrication of all metallic and Viton components as per the specifications and procurement of suitable vacuum gauges.
3. Thorough cleaning of fabricated components by use of suitable solvent.
4. Integration of all the components and performance evaluation of each component
5. Inspection and testing as per the detailed QA/QC program.
6. Packing and safe delivery of the fabricated components to BARC, Mumbai.

Table 1. Technical specifications of Diffusion pump with control panel and trolley

<table>
<thead>
<tr>
<th>S.no</th>
<th>Description</th>
<th>Value / Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Diffusion pump type</td>
<td>Diffstack</td>
</tr>
<tr>
<td>2.</td>
<td>Operating Range</td>
<td>$2 \times 10^{-3}$ to better than $10^{-6}$ mbar</td>
</tr>
<tr>
<td>3.</td>
<td>Pumping Speed for Nitrogen</td>
<td>750 lps (with DC704)</td>
</tr>
<tr>
<td>4.</td>
<td>Warm-up time</td>
<td>~ 15 min</td>
</tr>
<tr>
<td>5.</td>
<td>Cool-down time</td>
<td>~ 25 min</td>
</tr>
<tr>
<td>6.</td>
<td>Rotary pump type</td>
<td>Direct driven Rotary vacuum</td>
</tr>
<tr>
<td>7.</td>
<td>Pumping speed</td>
<td>&gt;325 LPM</td>
</tr>
<tr>
<td>8.</td>
<td>Ultimate partial pressure (gas ballast closed)</td>
<td>$1 \times 10^{-3}$ mbar</td>
</tr>
<tr>
<td>9.</td>
<td>Ultimate partial pressure (gas ballast open)</td>
<td>$6 \times 10^{-2}$ mbar</td>
</tr>
<tr>
<td>10.</td>
<td>Maximum nominal power rating</td>
<td>0.37 kW</td>
</tr>
<tr>
<td>11.</td>
<td>Pump rotational speed</td>
<td>1340 – 1440 rpm</td>
</tr>
<tr>
<td>12.</td>
<td>Oil capacity</td>
<td>2.75 Litres</td>
</tr>
<tr>
<td>13.</td>
<td>Inlet flange</td>
<td>KF-25</td>
</tr>
</tbody>
</table>

**Construction and plumbing**

14. High vacuum connection | SS304 ISO K 160 supplied with blank flange, rotatable
15. Fore vacuum connection | 25mm
16. Pump body | SS304 L
17. Jet | Die-cast Al
18. Seals | Viton only
19. High vacuum valve (QSV) | Butterfly 150, mm
20. Roughing valve | Butterfly, 25mm
21. Backing valve | Butterfly, 25mm
22. Vent valve | Manual, 6mm
23. Needle valve for gas admittance | To be provided
24. Inlet collor diameter | 150 mm

**Pirani gauge**

25. Pressure range | $0.5 \text{ mbar} - 1 \times 10^{-3}\text{mbar}$
<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>Display</td>
<td>Digital Pirani Gauge with Two pirani gauge heads are provided to independently monitor the roughing and backing pressure, continuous single scale meter read-out. Selector switch for gauge head selection</td>
</tr>
<tr>
<td>27</td>
<td>Capacity</td>
<td>2 gauge heads</td>
</tr>
<tr>
<td>28</td>
<td>Power chord</td>
<td>2 meter long with 3 pin 5 A as standard</td>
</tr>
<tr>
<td>29</td>
<td>Calibration</td>
<td>Factory set</td>
</tr>
<tr>
<td>30</td>
<td>Mounting</td>
<td>Vertical preferred</td>
</tr>
<tr>
<td>31</td>
<td>Gauge head cable</td>
<td>5 meter long</td>
</tr>
<tr>
<td>32</td>
<td>Pressure range</td>
<td>$1 \times 10^2$ - $10^6$ mbar</td>
</tr>
<tr>
<td>33</td>
<td>Display</td>
<td>Digital Penning Gauge with large digit LCD calibrated directly in mbar, supplied with Two penning gauge heads to independently monitor Diffusion pump and chamber pressure</td>
</tr>
<tr>
<td>34</td>
<td>Capacity</td>
<td>2 gauge head</td>
</tr>
<tr>
<td>35</td>
<td>Power input</td>
<td>220V AC, 50 Hz</td>
</tr>
<tr>
<td>36</td>
<td>Power chord</td>
<td>2 meter long cable</td>
</tr>
<tr>
<td>37</td>
<td>Gauge head model</td>
<td>PNG2</td>
</tr>
<tr>
<td>38</td>
<td>Range</td>
<td>$1 \times 10^2$ - $10^6$ mbar</td>
</tr>
<tr>
<td>39</td>
<td>Gauge head cable</td>
<td>5 meter long</td>
</tr>
<tr>
<td>40</td>
<td>Cryo coolant</td>
<td>Liquid nitrogen</td>
</tr>
<tr>
<td>41</td>
<td>Cryo coolant consumption</td>
<td>Manufacturer to specify</td>
</tr>
<tr>
<td>42</td>
<td>Cooling media</td>
<td>Water (Temp. 30°C)</td>
</tr>
<tr>
<td>43</td>
<td>Cooling media connections</td>
<td>8mm ID, 13 mm OD Legris Push-in fittings</td>
</tr>
<tr>
<td>44</td>
<td>Cooling media flow rate</td>
<td>Manufacturer to specify</td>
</tr>
<tr>
<td>45</td>
<td>Fluid charge</td>
<td>1 additional charge to be supplied</td>
</tr>
<tr>
<td>46</td>
<td>Power requirement</td>
<td>Manufacturer to specify</td>
</tr>
<tr>
<td>47</td>
<td>Heaters (specified by the manufacturer)</td>
<td>Cartridge type (preferred)</td>
</tr>
<tr>
<td>48</td>
<td>Supply</td>
<td>1 Phase, 50 Hz, 240 V AC</td>
</tr>
<tr>
<td>49</td>
<td>Trolley</td>
<td>1025mm x 950mm x 500mm depth maximum, with lockable castor wheels preferable. Manufacturer to specify the deviation</td>
</tr>
<tr>
<td>50</td>
<td>Control panel</td>
<td>Control panel for interlocking to integrate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Pirani and Penning vacuum gauges</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Backing pump</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Water flow status</td>
</tr>
<tr>
<td>51</td>
<td>Safety features</td>
<td>A water flow switch to trip diffusion pump heater under no flow condition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A Thermostat switch fitted to the water cooling coils to trip the heater of the diffusion pump to protect from excessive heating</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Over Load protection devices for the vacuum pump motor and diffusion pump are provided.</td>
</tr>
<tr>
<td>52</td>
<td>Spares to be supplied</td>
<td>One complete set of O rings for the system</td>
</tr>
</tbody>
</table>

1. **Procurement of raw material and testing**
   a. All materials shall be as per the applicable standard specified.
   b. Certificates for material and purchase order copies for all bought out items shall be provided.
2. Submission and approval of drawings
   a. The contractor shall submit detailed drawings within 10 days from the date of placement of order.
   b. The drawings supplied by the purchaser are essentially design drawings. All necessary shop drawings for fabrication will have to be prepared by the contractor and submitted for purchaser’s approval.
   c. The comments of purchasers in fabrication drawing shall be incorporated in the drawings. Revised drawings will be transmitted to the contractor. Approval of contractor’s drawings by the department shall not relieve the contractor from the responsibility of any error or obligation or liability under the contract.

3. Fabrication of components.
   a. All components shall be free from dents, projections, surface and sub-surface crack, discontinuity of material across the thickness.
   b. The vendor shall procure all materials and bought out components as mentioned in specifications, and shall be purchased from reputed manufacturer.
   c. The fabrication of components demands the highest standard of workmanship. The surfaces shall be absolutely free from steps, pits, dents, scratches and spatter of weld metal. Various sub-assemblies shall be fabricated utilizing proper jigs and fixtures.
   d. Workmanship be in accordance with high grade practice and adequate to achieve the accuracies and finishes mentioned in the drawings and the specifications to ensure satisfactory operation and service life of ports.
   e. The Supplier shall submit the complete fabrication drawing, detailed QA/QC program and the manufacturing procedures for Purchaser’s approval.
   f. The materials may be cut and formed to the required shape by any process that will not unduly impair the physical properties of materials. In general, machining shall be specified in drawing and care shall be taken to ensure that chatter marks, scratches, dents are removed from machined surfaces.
   g. There should not be any crevice in the joints. All machined and vacuum sealing faces should have 0.4-0.8-micron finish. All surface of the component shall be polished for low outgassing rate.

4. Cleaning of machined components and leak testing where applicable
   a. The system shall be degreased by steam jet, chemically cleaned followed by cleaning with de-ionised water, dried and properly cleaned before welding.
   b. Cleaning of material shall be in accordance with written procedures and to standards prepared by the Supplier and approved by the Purchaser.
   c. During fabrication and storage, components and subassemblies shall be protected from exposure to solutions, cleaners or other chemicals such as chlorides that may induce corrosion.
   d. During handling, forming, positioning and welding joint preparation the components shall be protected against any physical damage which will be cause for rejection of the component during the inspection process.
   e. Leak testing of the components should be done wherein specified by the purchaser.

5. Inspection, testing and acceptance criteria
   a. The contractor shall rigorously inspect the components before delivery to ensure that they will comply with the specifications and relevant drawings. The purchaser shall have access at all reasonable time to all shop where components are being fabricated/assembled and all facilities for inspection shall be provided.
   b. Each component shall undergo the following tests at suppliers shop before dispatch
      i. Metrological inspection as per drawings
ii. Compliance of applicable standards

Acceptance criteria

1. The testing of the raw material shall be Government approved laboratory as per the relevant ASTM standards. Testing charges have to be borne by the supplier. After inspection of raw material testing results, workmanship and specifications of each of the components material shall be accepted for final delivery to BARC, Mumbai. The material which will not qualify the standards shall be rejected.

2. Leak testing has to be cleared and the maximum value of allowable leak rate is $<10^{-9}$ mbar. L/s for all vacuum related components.

3. After fabrication, testing and integration of vacuum system at suppliers site, material shall be dispatched to BARC. Post installation inspection for the quality for workmanship, accuracy, reliability, repeatability and verification of the specifications will be done, followed by final acceptance.

Final acceptance is after the performance testing of the vacuum system as BARC.

6. General specifications, terms and conditions

a. Dimensional Tolerances: As specified in the drawings or Diameter: ±2% (but not less than ±0.1mm), Height: ±1%, Linearity: Maximum deviation 0.5% of total length if not specified in the drawing.

b. Quotation details: The quotation should be in the printed letter head /quotation format which should consist of the PAN No., GST No. of the firm. Quotation shall be signed by proprietor or authorized person and affix company seal. Computer generated/scanned and printed quotation will not be accepted. Failing to mention the details in their quotation will become liable to be rejected. All taxes, other charges should be mentioned clearly.

c. GSTIN of BARC related details: Suppliers please note that BARC is the final consumer of the goods/services procured and does not intends to make any outward supply. BARC will not avail the benefits of Input Tax Credit and hence, the goods can be supplied without quoting the GSTIN of BARC, Mumbai on the invoice. The invoices taxed under GST, as per rates applicable under the GST Schedule of Rates, shall be admitted for payment. An undertaking shall be submitted by the supplier that the GST has been promptly deposited with the authorities (Annexure II). GST shall be paid only in the case of supplier clearly indicating their GSTN on the invoice.

d. GST exemption Certificate: Since the goods are to be supplied against the work order meant for research purpose of a research organization under DAE, the necessary GST will be exempted to the party. Interstate transaction for R&D will attract IGST only @ 5% as per notification No. 47/17-Integrated Tax (Rate) dated 14.11.2017. Transaction within the state will attract Central Goods and Service Tax (CGST) @ 2.5% as per notification no. 45/2017-Central Tax (Rate) dated 14.11.2017 and State Goods Service Tax (SGST) @2.5% as per notification no. 45/2017-State Tax (Rate) dated. 14.11.2017 of the State of Maharashtra. No claim for reimbursement of GST above the stipulated rate as per notification would be entertained later.
e. **Material test certificates:** The material testing certificates for all raw materials shall be provided along with the items. A laboratory test certificate issued by Government approved lab conforming the purity shall also be furnished before the items are dispatched to BARC, Mumbai, India.

f. **Note to Contractor:** All the persons involved in the erection and commissioning job, if any, shall possess valid Police Verification Certificate (PVC) to enter into BARC premises. In addition to that, vendor has to submit a certificate (Annexure I) that the contractors or their employees have not been involved in any corrupt or criminal activity and no police has been registered against any of them. The contractor shall observe all safe working practices and shall provide safety gears to his worker wherever necessary. For any work inside BARC, the contractor has to strictly abide by rules and regulations set by Security Section of BARC.

g. **Quality surveillance, inspection and inspection report**

i. All work covered by the specification shall be subject to quality surveillance by the purchaser or his authorized representative for which purpose the fabricator shall allow access at all reasonable time to: the premises in which the work is being carried out the drawing and/or tooling involved, and Gauges, instruments, etc. required for inspecting the work. Inspection and tests shall be carried out by the fabricator as per the requirements detailed in the drawings and the specifications.

ii. The purchaser reserves the right to inspect any material or equipment furnished or used by Supplier under the contract and to reject any, which is found defective in workmanship, design, or otherwise unsuitable for the purpose intended.

iii. Components found unsatisfactory as to workmanship or material shall be removed by fabricator and replaced by components, which are satisfactory. In the events of Purchaser's inspection revealing poor quality of goods, Purchaser shall be at liberty to specify additional procedures if required to ascertain supplier’s compliance with the component specifications.

iv. Even though Purchaser or his representative carries out inspection, such inspection shall not however relieve Supplier from his responsibilities for furnishing the components conforming to the requirement of the contract. The Supplier shall maintain proper inspection records and make it available to Purchaser’s representative whenever required. The fabricator shall submit three copies of inspection report to the purchaser for approval.

h. **Free issue material:** There is no free issue of material. All material required for the job is to be supplied by the bidder.

i. **Workmanship:** The surface should be free from impurities, splits, fractures and indentations, having an impact on a common processing or application of the product. Components with manufacturing defects viz. Cracks, burns, flakes, voids, inclusions, oxide scales, scratches, dirt and ingot patterns will not be accepted. The rods shall be straight and free from bends and kinks.

j. **Dispatch:** The finished components shall not be dispatched prior to approval by our engineer at bidder's works.

k. **Packing and shipment:** All components shall be packed properly to avoid damage during shipment.

l. **Delivery schedule:** Supplier shall deliver the completed components/equipment in 45 days from the date of release of order.
m. **Warranty:** Guarantee of the items shall be furnished for one year from the date of delivery.

n. **Confidentiality clause:** No party shall disclose any information to any third party concerning the matters under this contract generally. In particular, any information identified as "Proprietary" in nature by the disclosing party shall be kept strictly confidential by the receiving party and shall not be disclosed to any third party without the prior written consent of the original disclosing party. Any contravention of the above-mentioned provisions by any contractor, sub-contractor, consultant, adviser or the employees of a contractor will invite penal consequences under the aforesaid legislation.

The contractor or sub-contractor, consultant, adviser or the employees engaged by the contractor shall not use BARCs name for any publicity purpose through any public media like Press, Radio, TV or Internet without the prior written approval of BARC.

o. **Payment terms:** No advance payment will be made. Full payment will be made by NEFT/ECS on satisfactory completion of the works. Party should submit the bill along with advance stamped receipt. Income Tax @2% and GST TDS @2% will be deducted at source from the bill.

**Annexure I**

**Certificate of the Contractor / Owner of the Firm**

This is to certify that the undersigned is the proprietor / Owner of M/s ___________________________ at (address) __________________________ who have been awarded work contract in BARC, Trombay. I hereby certify that my firm / company and my employees / labourers have not been indulge in any adverse or corrupt criminal activity and no police case has been registered against any of them.

__________________________
Signature of the Contractor

__________________________
Name

__________________________
Dy. Chief Security Officer

(Through concerned Engineer/ Officer, BARC)

To,

Dy. Chief Security Officer

(North/ South Zone), BARC
Annexure - II

UNDERTAKING
(Goods & Service Tax)

The Following certificates should be submitted by the suppliers/contractors to the paying authority on the bills itself when Goods & Servant Tax (GST) is claimed as extra by the contractors/suppliers.

1. Certified that the goods and packing on which Goods & Service Tax (GST) has been charged have not been exempted under the Goods & Service Tax (GST) or the rules made there under.

2. Certified further that we have actually paid Goods & Service Tax (GST) and are being assessed to Goods & Service Tax (GST) and also that where there are statutory exemptions under the GST act concerned we have availed of the same and certify non-availability of such provisions for Goods & Service Tax (GST).

3. Certified that in respect of the amount claimed in the bill, no claim is pending for refund/ or is admissible. Certified that in the event of our getting refund in whole or in part of the element of Goods & Service Tax (GST), we shall pass on the benefit of the amount of refund obtained by us.

4. Certified further that we (our branch or agent)

__________________________
(Address)

are registered as dealer in the State of ________________________ under the
Central Registration No. ________________________ for the purpose of Goods & Service Tax (GST)

Signature & Stamp