

Government of India  
Bhabha Atomic Research Center  
Pulsed Power & Electromagnetics Division

Ref: BARCV/PPEMD/2019-20/R&D41/WO/RV/ 13

Date: 18/04/2019

SUB: Inviting quotations for “Fabrication & Supply of “Mass Flow Controller based Gas Mixing System (Qty. 1 No.)” as per attached drawing and provided specification.

Dear Sir,

1. Quotations are invited for the fabrication & supply work, as per the enclosed specification
2. Bidder shall quote for fabrication & supply work.
3. Taxes shall be quoted separately.
4. The quotation must reach the Head, Pulsed Power & Electro-Magnetics Division by date 29/04/19 and must be sent in a sealed, printed envelope superscripted with reference number and the due date given above by 4pm, 29/04/19.
5. The address of the envelop should read –  
Dr. Rishi Verma  
C/o Dr. Archana Sharma  
PP&EMD, PEB-1, Bhabha Atomic Research Centre  
Gandivanipalem Village,  
Atchutapuram Mandal, Visakhapatnam – 531011
6. Head, PP&EMD reserves the rights to accept/ reject any or all quotations without assigning any reasons.
7. Quotation must also indicate the validity of offer & required delivery time.
8. Quotations are to be in printed letter-head / quotation format only. Quotation received in computer-generated forms will be considered as invalid and rejected.
9. Quotation should consist of Sales Tax registration number (Registered with local ST / CST authority), PAN number of the firm, services tax registration number etc.
10. Claim preferred by the firms are also be in printed INVOICE format consisting of the above registration numbers.
11. No Free issue material will be given
12. 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.
13. In case of any query, the party can contact on rishiv9@gmail.com, ph. No 8374512797 between 10am to 5pm.

Approving Authority



(Dr. Archana Sharma)  
Head, PP&EMD  
BARC, Visakhapatnam

डॉ अर्चना शर्मा

Dr. ARCHANA SHARMA

अध्यक्ष, स्पंद शक्ति एवं विद्युत-चुंबकीय प्रभाग  
Head, Pulsed Power & Electro-Magnetics Division (PP&EMD)  
भाभा परमाणु अनुसंधान केंद्र (भारत सरकार)  
Bhabha Atomic Research Centre (Government of India)  
आटोनगर, विशाखपट्टणम  
Atonnagar, Visakhapatnam

## Annexure-II

### General Terms and Conditions

#### **1. Quality surveillance, inspection and inspection report**

- 1.0 All work covered by the inspections shall be subjected to quality surveillance by the purchaser or his authorized representatives for which purpose the fabricator shall allow access at all reasonable times during manufacture to
- 1.1 The premises in which the work is being carried out.
- 1.2 The drawings and or tooling involved.
- 1.3 Gauges, instruments etc. required for inspecting the work.
- 1.4 Inspection and tests shall be carried out by the fabricator as per the requirements detailed in the drawings and these specifications.
- 1.5 The fabricator shall submit three copies of inspection reports to the purchaser for approval.
- 1.6 Components found unsatisfactory as to workmanship or material shall be removed by the fabricator and replaced by the components which is satisfactory.
- 1.7 The finished components shall not be dispatched prior to approval by our Engineer.

#### **2. Raw Material**

- 2.0 Raw Material for all the components and hardware will be provided by the supplier.
- 2.1 Material test certificate with sample may need to be submitted if asked.

#### **3. Delivery**

- 3.0 The bidder shall deliver the finished components after approval by our Engineer within 4 weeks from the date of receipt of work order.
- 3.1 In case any extension in delivery is to be granted to the contractor, party's should make request for extension in writing justifying the reason for extension.
- 3.2 Any delay which is attributable to the contractor is liable for penalty @ ½% per week (max. 5%) to be imposed on the contractor.

#### **4. Sub Contract**

- 4.0 The fabricator shall not sub-contract any or all the work without written consent from the purchaser. The fabricator shall be responsible to the purchaser for all of the sub-contractor of the fabricator, if at all allowed by the purchaser.

#### **5. Taxes**

- 5.0 GST @ 5% against undertaking from the supplier.

#### **6. Payment**

- 6.0 Payment will be made only after satisfactory completion of work and on production of Invoice with details of location of supply, separate tax components, GSTN and PAN, receipt cum issue voucher from stores, advance stamped receipt, and guarantee certificate (4 nos.) and Bank details.
- 6.1 Advance/ part payment or against delivery cannot be made.
- 6.2 It may be noted that Income Tax at 2% and surcharge on IT at the rate applicable will be deducted from the bill.
- 6.3 TDS @ 1% will be deducted on payments made to the supplier of taxable goods and/ or services where the total value of such supply, under an individual contract, exceeds 2.5 lakhs.

#### **7. Confidentiality:**

- 7.0 No party shall disclose any information to 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.
- 7.1 "RESTRICTED INFORMATION" categories under section 18 of the Atomic Energy Act, 1962 and "OFFICIAL SECRETS" under section 5 of the Official Secrets Act, 1923:-  
Any contravention of the above-mentioned provisions by any contractor, sub-contractor, consultant, advisor or the any employees of a contractor will invite penal consequences under the aforesaid legislation.
- 7.2 Prohibition against use of BARC's name without permission for publicity purpose: -  
The contractor or sub-contractor, consultant, advisor or the employees engaged by the contractor shall not use BARC's name for publicity through any public media like press, radio, T.V., or internet without the prior written approval from BARC. (vide circular ref: 2/Misc-9/Lg1/2001/92 dated April 30, 2001)

8. Acceptance criteria:

- A specific gas blend (with pre-defined volumetric concentration ratios) within a chamber must be produced by a procedure known as gas mixing technique (or gas blending).
- Post blending in defined ratios the gas must be stirred by static/dynamic inline mixer channel.
- The system must be controllable from a miniature Human/Machine Interface (HMI) with LCD monitor. The HMI shall communicate with two Mass Flow Controllers (MFC) via their Compods and a pressure transducer must be mounted on the tank. Each MFC shall regulate the flow of one gas into the tank.
- The HMI interface settings shall maintain the exact proportion defined above by constantly comparing MFC data with the mix equations. When the pressure reaches the set point, the PLC shall command the Compod to stop the mass flow controller.
- Should the chamber pressure drop below the set point, the PLC should send a flow command to each controller to resume gas flow into the tank manifold for continued gas blending.
- The entire blending process and monitoring of pressure gauge readings must be fully automatic.

9. Technical requirement:

Detailed technical specifications along with accuracy standards are attached herewith.



**(Dr. Archana Sharma)**  
**Head, PP&EMD**

**BARC, Visakhapatnam – 530012**

**डॉ अर्चना शर्मा**

**Dr. ARCHANA SHARMA**

**अध्यक्ष, स्पंद शक्ति एवं विद्युत-चुंबकीय प्रभाग**

**Head, Pulsed Power & Electro-Magnetics Division (PP&EMD)**

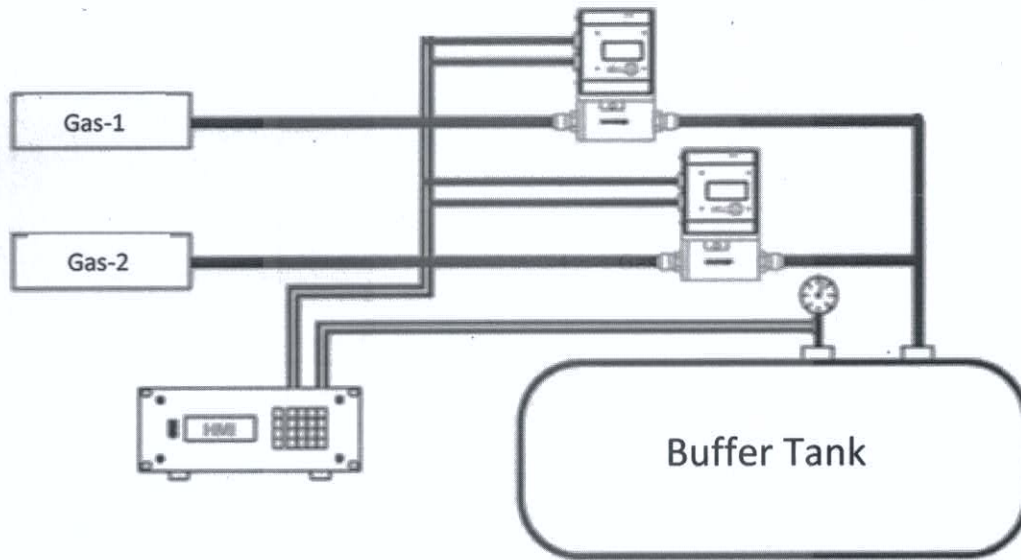
**भाभा परमाणु अनुसंधान केंद्र (भारत सरकार)**

**Bhabha Atomic Research Centre (Government of India)**

**आटोनगर, विशाखपट्टणम**

**Autonagar, Visakhapatnam**

**Scope of Work Order for the fabrication and supply of**  
**“Mass Flow Controller based Gas Mixing System”**



1. No. of gases to be mixed: 2 Nos.
2. Each gas line must have dedicated Mass Flow Controller as shown in the schematic.
3. Mass Flow Controller range: 0 – 10 SCCM (maximum internal pressure – 5 bar)
4. Mixing gases: SF<sub>6</sub>, N<sub>2</sub>, Ar, He, Ne, O<sub>2</sub> and Dry Air
5. Mixing range: 0 – 100%
6. Mixing precision: ± 0.2% or better
7. Working range of pressure gauges: 0 – 5 bar (Accuracy: ±0.25 %)
8. Mixed gas buffer tank capacity: 5 Litre
9. Maximum pressure of buffer tank: 5 bar
10. Operational compliance required:
  - a. A specific gas blend (with pre-defined volumetric concentration ratios) within a chamber must be produced by a procedure known as gas mixing technique (or gas blending).
  - b. The blended gas in pre-defined ratio must be stirred by static/dynamic inline mixer.
  - c. The system must be controllable from a miniature Human/Machine Interface (HMI) with LCD monitor. The HMI shall communicate with two Mass Flow Controllers (MFC) via their Compods and a digital pressure transducer must be mounted on the tank. Each MFC shall regulate the flow of one gas into the tank.
  - d. The HMI interface settings shall maintain the exact proportion defined above by constantly comparing MFC data with the mix equations. When the pressure reaches the set point, the PLC shall command the Compod to stop the mass flow controller.
  - e. Should the chamber pressure drop below the set point, the PLC should send a flow command to each controller to resume gas flow into the tank manifold for continued gas blending.
  - f. Each incoming gas line to MFC shall also have pressure gauge arrangement for inlet pressure measurement in respective input gas lines to MFC's.
  - g. The entire blending process and monitoring of pressure gauge readings must be fully automatic.