

Government of India  
Bhabha Atomic Research Centre  
Accelerator Control Division

Ref. ACnD/EMAS/17/309

Date: 04.05.2017

-----TO WHOM SO EVER IT MAY CONCERN-----

Sub: Fabrication, testing and supply of cryogenic power feedthrough through assembly conforming to technical specification no: ACnD/EMAS/SCM/17/16 dated:03.05.2017

Dear Sir/Madam,

1. Quotations are invited for fabrication, testing and supply of cryogenic power feedthrough through assembly conforming to technical specification no: ACnD/EMAS/SCM/17/16 dated:03.05.2017.
2. Bidder shall quote for purchase of raw materials, support for assembly, integration, testing of test setup as per the tender technical specification.
3. Taxes and Excise Duties shall be quoted separately. Form AF / H whichever is applicable shall be provided, if required.

The quotation must reach The Head, Electromagnetic Applications Section, Accelerator Control Division by 19.05.2017 (12:00 PM) and must be sent in a sealed envelope superscribed with the reference number & the due date given above only through India Ordinary Post/ Speed Post.

4. The address on the envelop should read: The Head.  
Electromagnetic Applications Section  
Accelerator Control Division,  
RCnD Bldg., North Site  
BARC, Trombay,  
Mumbai - 400 085.  
(Kind Attn: S.Sundar Rajan, SO/F)
5. The bidder shall complete the job within 2 months from the date of firm work order issued to the bidder.
6. Head, Electromagnetic Applications Section, Accelerator Control Division reserves the rights to accept / reject any or all quotations without assigning any reason.
7. Quotation must also indicate the validity of offer. Quotation must also indicate the VAT no and PAN no of the party.
8. Drawings / Sketches, technical specification must be returned along with the offer.
9. The quotation has to be signed by authorized person with company seal.
10. Payment will be made by cheque only after satisfactory completion of work on production of bill, delivery challan and advance stamped receipt. It may be noted that IT @ 2% shall be deducted from your bills.
11. In case of any technical clarifications, the supplier may kind contact Shri S.Sundar Rajan ([sundara@barc.gov.in](mailto:sundara@barc.gov.in)), Extn No : 25591851.

Encl.: Technical Specification Sheet no.: ACnD/EMAS/SCM/16/17 dated 03.05.2017

*S.Sundar Rajan.*  
S.Sundar Rajan  
SO/F, EMAS, ACnD

Technical specification

Document no.	Revision no.	Date of Issue	No of pages
ACnD/EMAS/SCM/17/16	0	03.05.2017	04

Fabrication, testing and supply of cryogenic power feedthrough assembly

1.0 SCOPE

This tender specifies the requirements of fabrication, testing and supply of cryogenic power feedthrough assembly. The complete job shall be carried out strictly as per requirements, specifications and its compliance standards as detailed in this document. In this document, BARC shall be referred as purchaser and company who will be executing job is mentioned as the supplier.

Supplier shall provide raw materials, components required for fabrication, supply and testing. The supplier shall be qualified based on the requirements specified in the para 10.0 of this tender document. The brief description of contents of this tender specification document is as described below.

Para 2.0 gives the deliverables

Para 3.0 gives the detailed job description.

Para 4.0 gives the engineering requirements.

Para 5.0 gives the documentation requirements

Para 6.0 gives the raw material requirements.

Para 7.0 gives the inspection and testing.

Para 8.0 gives the requirements of quality assurance

Para 9.0 gives the requirements of packaging and safe delivery.

Para 10.0 gives the requirements of supplier qualification.

Para 11.0 gives the requirements of price and delivery schedule.

Para 12.0 gives the confidentiality requirements.

2.0 DELIVERABLES

S.No	Description	Qty
1	<u>Fabrication, testing and supply of cryogenic power feedthrough assembly</u>	02 Set

3.0 DETAILED JOB DESCRIPTION

3.1 The feed through assembly consist of a five way cross with 100CF flange at the bottom and top. The side two flanges are of CF63 and the other flange is of 100CF. The length of the cross between DN 100 CF flanges are 200 mm, the length of the cross between the DN 63 CF flanges are 250 mm in prototype-01 (01 Set) and 300 mm in prototype-02 (2<sup>nd</sup> set).

3.2 All the five flanges shall be provided with 02 set of OFHC soft copper gasket (total 20 nos) and 02 set of VITON O-rings compatible for standard ISO CF flanges.

3.3 The supplier shall arrange for 02 nos DN 63CF 183A cryogenic power feed through which shall be attached to the CF 63 flanges. The cryogenic power feed through shall qualify for a leak rate of less than 10<sup>-8</sup> torr.l/sec at 4.2K of operation and shall have voltage isolation of above 5 kV.

3.4 Blanking flanges shall be provided for each test setup (03 nos of DN 100 CF and 02 nos of DN 63 CF flanges).

#### 4.0 ENGINEERING REQUIREMENTS/APPROACH

##### 4.1 Machining, deburring and polishing

4.1.1 Suitable precaution shall be taken to finish the surfaces communicating with the inside vacuum areas. The preferred technique for the finishing may be only machining. Metal removal other than by machining such as grinding, honing, EDM may be avoided. If polishing has to be done excessive pressure during polishing may be avoided. Buffing using fine grid cloths are allowed.

4.1.2 The machining coolant shall be sulfur free to reduce outgassing.

4.1.3 Deburring may be with file, deburring knife or using abrasives. Deburring by abrasive vibrating or tumbling may be avoided.

##### 4.2 Cleanliness

4.2.1 The contamination of the stainless steel material shall be avoided. Surfaces shall be cleaned as fabrication is progressing.

4.2.2 Internal surfaces shall be cleaned to remove all trace of oil, grease and other chemical contaminations. Visual examination shall demonstrate the absence of all contaminants and if at all any defects such as dirt, metal chips and sharp edges.

4.2.3 The vessel shall be cleaned using synthetic detergents before connecting to vacuum pump.

##### 4.3 Welding

4.3.1 All welding shall be performed by qualified welders in accordance with section IX of ASME code or approved equivalent.

4.3.2 All butt welds shall be made with through-thickness penetration.

4.3.3 Weld surfaces shall not be modified by grinding or by any other form of mechanical abrasion.

4.3.4 It is the responsibility of the supplier to evaluate whether post –welding heat treatment is necessary for stress relieving prior to final machining. If necessary, all heat treatment shall be executed according to written procedures, which shall be submitted to buyer for approval.

##### 4.4 General Guidelines to be followed during entire welding/fabrication:

4.4.1 Before welding all parts shall be cleaned initially with detergent and then with acetone or 1:1:1 Tri-Chloro-Ethane.

4.4.2 As specified in the drawings all welds which are to be done should be Tungsten argon arc welding (TIG) according to ASME – Sec. IX.

4.4.3 During welding high purity (99.99%) Argon purge gas shall be used to reduce or eliminate oxygen entrainment and carbide precipitation that cause outgassing.

4.4.4 Trapped volume shall be avoided during welding on vacuum side surfaces. Full penetration weld shall be employed wherever it is possible. When welding is to be done on both sides of the wall, continuous welding on inner side (high vacuum side) and tack welding outside is to be done.

4.4.5 Single pass weld up to a maximum extent is preferred. Interruption during welding shall be reduced to a minimum possible extent.

4.4.6 Filler material, if used, shall be compatible with the parent material and procured from original manufacturer. Bidder shall submit the material test certificate of filler material from the original supplier. Bidder shall take approval from buyers, for the use of filler material needed.

## 5.0 DOCUMENTATION REQUIREMENTS

5.1 Before commencing manufacturing, supplier shall furnish the following for purchaser's approval:

5.1.1 The fabrication drawing shall be submitted for approval.

5.2 The supplier shall submit a quality assurance (QA) plan to the buyer for acceptance. The plan shall ensure that each item offered for acceptance conforms to the requirements herein.

5.3 The following inspection and test procedure documents shall be supplied

5.3.1 Dimensional tolerance test.

## 6.0 RAW MATERIAL PROCUREMENT

The raw material used by supplier for the manufacturing of these components shall conform to their following standards and QA plan specified in drawings.

6.1 The following flange materials shall be used

6.1.1 Stainless steel 316L plates/rods conforming to ASTM standard.

6.1.2 The cryogenic feed through flange has to be strictly of SS 316L and no magnetic material is permitted in the feed through flange.

6.1.3 The welding rod shall be of 316L with ferrite content less than 5. Certificate of the welding rod shall be provided before carrying out the welding.

## 7.0 INSPECTION AND TESTING

7.1 Dimensional testing of the components shall be carried out by the supplier and the same shall be witnessed by the buyer.

7.2 The feed through test setup has assembled inside a vacuum vessel . Provision for filling the feed through test setup with liquid nitrogen must be provided . The vacuum vessel has to evacuated to 10-5 Torr minimum and the helium leak rate shall be measured.

## 8.0 REQUIREMENT OF QUALITY ASSURANCES

8.1 Quality surveillance and expediting, relating to all the aspects of the contract will be carried out by the purchaser or his authorized representative for which purpose the supplier and his subcontractor shall

8.2 Allow access at all reasonable times during manufacture, assembly and testing to the premises in which the work is being carried out.

8.3 Furnish the latest drawings and/or tooling, gauges, instruments, testing equipment etc. required for inspecting the jobs. Prints of all the latest required drawings and approved procedures shall be made available for inspection and retention, if so desired.

8.4 Produce an inspection plan to the purchaser's satisfaction and notify when checkpoints on the plan are imminent so that the purchaser's representative may be present, if it is so desired.

8.5 Obtain acceptance of the components in the form of a shipping release from the purchaser's representative before the shipment.

8.5.1 The address of the purchaser's authorized quality surveillance representative will be intimated by the purchaser after award of contract.

8.5.2 The supplier shall be responsible for the inspection of the components that is subcontracted by him.

8.5.3 Waiving of quality surveillance by the purchaser's or acceptance of the items by the purchaser or his authorized agent, shall not relieve the supplier from the responsibility for

supplying the items in accordance with specification requirements of this document and purchase order.

#### 9.0 REQUIREMENT OF PACKAGING AND SAFE DELIVERY

9.1 Cleaning: The finish component before packing shall be degreased and cleaned.

9.2 Protective covers: Supplier shall make necessary arrangements for all components using a suitable PVC cover or moulded thermocol. Proper care should be taken while handling the component during fabrication, inspection, testing and packing.

9.3 Packaging: After completion of all testing and identifying the components, the components shall be packed suitably for shipment, so that no damage occurs in transit. The purchaser shall subject the packing procedure to prior approval. At least one copy of packing list shall be kept in the package for quick and easy verification.

#### 10.0 REQUIREMENTS OF SUPPLIER QUALIFICATIONS

10.1 Human resources: The supplier must give the details of human resources including Engineers, Draftsman, Electrical, Welder, assembly mechanic, quality control inspector, machinist etc.

10.2 Infrastructure: The supplier must give the details of infrastructure suitable for this job such as Manufacturing Machines, welding machining, electrical testing equipment, winding machine, Assembly room and other tools & tackles, Inspection facilities etc.

10.3 Past experience: The supplier must give their past three-year turnover and job executed by them with reference, volume of work and completion schedule, present commitments and anticipated commitments inside and outside India.

10.4 Sub contract: Supplier should list the jobs, which they want to sub-contract. They should also produce the list of sub-contractors and their infrastructures and facilities.

10.5 The supplier has to clearly provide the details of the cryogenic feed through welding / vacuum brazing and the proposed systems/components for testing of the feed through assembly.

#### 11.0 REQUIREMENTS OF PRICE AND DELIVERY SCHEDULE

11.1 The supplier shall give a lump-sum price with delivery schedule.

#### 12.0 CONFIDENTIALITY

12.1 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 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. This clause shall apply to sub-contractors, consultants, advisors or the employees engaged by a party with equal force.

12.2 "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 employees of the contractor will invite penal consequences under the aforesaid legislation.

12.3 Prohibition against the use of BARC's name without permission for publicity purpose. The contractor or sub-contractors, consultants, advisors or the employees engaged by a party shall not use BARC's name for publicity purpose through any public media like: press, radio, TV or Internet without any prior approval of BARC (wide circular ref.: 2/Misc-9/Lgl/2001/92 date 30/04/2001)