

**GOVERNMENT OF INDIA  
BHABHA ATOMIC RESEARCH CENTRE  
CHEMICAL TECHNOLOGY GROUP  
Chemical Technology Division**

NOTICE INVITING TENDER

Tender Ref. No. ChTG/CTD/H10/Karim/2019/2

Date : 03/04/2019

Sealed quotations are invited on behalf of President of India by Head, MDD/ BARC for the following work from contractors having adequate experience and capabilities to execute such magnitude and quality of similar works and who have similar experience with different units of Department of Atomic Energy (DAE).


Name of work: *Fabrication & supply of Casing for High vacuum application as per the technical specification & drawings.*

**Quantity: 4 sets.**

1. The bidder shall quote on original letterhead signed with company seal, quoting GST number, PAN number.
2. The contractor should be registered under Goods & Service Tax (GST) and GST as applicable as per the extent order on the work shall be paid by the contractor to concerned tax authorities.
3. The price quoted shall be inclusive of GST(5%) and shall be payable by the contractor and BARC will not entertain any claim whatsoever in this respect.
4. Period of completion: 90 days from the date of issue of work order. Delay in execution of order can lead to termination of order.
5. Vendors shall contact on Telephone No. 25591781/1949 (email id: skarim@barc.gov.in,sohane@barc.gov.in) for more details and drawings.
6. Sealed quotations should be submitted only through registered post/speed post through Indian Postal Service. **Hand delivery of quotation will not be accepted.**
7. The quotation shall reach Head, CTD, ChTG by 18/4/2019 and must be sent in sealed envelope super-scribed with the above reference number and due date given above. Also name of the work shall be displayed on the envelope.
8. Address on the envelope shall read  
The Head, Chemical Technology Division,  
Bhabha Atomic Research Centre,  
CEL-5, Trombay, Mumbai-400085  
Attn: S.Karimulla, Scientific Officer-F
9. **Due date:** Last date of submission of application will be 18/4/2019 upto 16:00 hrs.
10. Sealed quotations received upto 16: 00 hrs on 18/4/2019 will be opened on 22/4/2019 at 10:30hrs.

The Head, Chemical Technology Division, B.A.R.C. reserves the right to accept or reject any or all quotations without assigning any reason.

  
A.K Kalburgi  
Head, CTD/ChTG./BARC.

  
S.Karimulla  
Scientific Officer (F)  
(For and on behalf of The President of India)

**Technical Specifications for**  
**Parts H10/RD/002-C**

**1 . Scope**

This specification establishes the requirements for supply of material, fabrication and finish machining within specified tolerances, inspection, packaging and shipment of following components:

- 04 Nos. of Part titled “CASING 3” & Drawing no: H10/RD/002-D

**a. Applicable Documents and Drawings:**

Note: 1. The latest issues of the documents listed below constitute a part of this specification to the extent specified herein. In the event of certain requirements of the specifications, drawing or data listed below conflict, the decision will be at the discretion of the purchaser.

2. All the documents, not mentioned here, subsidiary to the documents specified be considered to the extent required by the parent document in its true meaning.

**b. Applicable Documents.**

- i. ASTM A 240 Heat resisting chromium and nickel stainless steel plates, sheets, and strips for pressure vessels
- ii. ASTM A 262 Standard practices for detecting susceptibility to intergranular attack in stainless steels.
- iii. ASTM A 312 Seamless and welded austenitic stainless steel pipes
- iv. ASTM A 480 General requirements for flat rolled stainless and heat resisting steel plate, sheet and strip.
- v. IS 2102 (Part 1 & 2) - 1980...General Tolerances for Dimensions, Form & Position.
- vi. IS 3455 - 1971...Gauging Practice for Plain Work pieces.
- vii. IS 7018...Technical Supply Conditions for Gauges.

**c. Applicable Drawings:**

- Drawing No: H10/RD/002-D

**d. Material: -**

1. Material for “CASING 3”, shall conform to **ASTM A 312 TP 304L(Seamless pipe/welded pipe)** and stainless steel AISI 304L plate conforming to ASTM A 240.
2. Welding filler materials shall be suitable for base metal combinations and shall meet relevant AWS specifications.
3. All stainless steel materials shall be supplied in the solution annealed condition and shall be tested for chemical composition, mechanical properties and susceptibility to intergranular corrosion as per ASTM A 262 Practice A or E.
4. Original mill certificates shall be produced at the time of identification of the materials. In case original mill certificate with correlating original markings on the materials are not available, individual items shall be tested for all the

requirements at test laboratories approved by Purchaser. If original mill certificates are available, one time check testing for chemical composition and IGC Practice A or E shall be adequate.

## 2. General Description and Requirements

- i) The items shall be manufactured strictly conforming to the applicable drawing.
- ii) The manufacturer shall submit the following documents to the purchaser for approval prior to the fabrication and only after the approval of the same, the fabrication shall be taken up.
  1. Test certificate for the raw materials
  2. Quality Assurance Plan QAP
  3. Welding Procedure and performance qualification records.
  4. Manufacturing drawings.
  5. The procedure for NDTs VIZ. LPT, Radiography test, etc.
  6. The procedure for Vacuum hold test
  7. The procedure for pickling and passivation of S.S items
- iii) All welding on the equipments shall be done by GTAW process using argon as shield gas. The argon shall have purity of 99.9% minimum with a dew point of -40 degree centigrade or lower. The gas flow shall be continued for a period sufficient to prevent oxidation of weldment after arc is extinguished. The inert gas shall be so vented as to prevent blow through when root pass is welded.
- iv) Final machining of the housing shall be done only after completing the welding.
- v) The machining process selected shall be such that the components shall have required concentricity, surface finish and other dimensional tolerances.
- vi) Suitable datum shall be established on the OD of the pipe for finish machining and inspection of the item. Integrity of the datum surfaces shall be preserved at all stages of machining & inspection
- vii) The party shall make necessary fixtures and jigs for the machining in such a way that the geometry and positional relationship of various features are maintained as per the drawing.
- viii) The surfaces if marked N6, shall have a roughness value Ra of 0.8 $\mu$ m or better. These surfaces shall be free of scratches, tool marks, dents etc. Such surfaces shall also be protected properly during subsequent operations if any, inspection, storage and transportation with extra care.
- ix) Dimensional/geometrical tolerances wherever not specified, general tolerances as per IS 2102 (fine) shall apply.
- x) General surface finish of N7 shall be maintained on all machined surfaces unless specified otherwise.
- xi) Form tolerances applicable shall be 50% of the dimensional tolerances unless specifically indicated.
- xii) All sharp corners shall be deburred and rounded to 0.2 R.

- xiii) The fabrication ,inspection and testing of the tanks shall be in accordance with ASME Boiler and pressure vessel code section VIII,Division-II latest edition.
- xiv) The welding qualifications shall be in accordance with ASME Boiler and pressure vessel code Section IX, latest edition.
- xv) Standard test method for liquid penetrant examination shall be followed as per ASTM E1220 (test method for visible penetrant examination using the solvent removable process) of ASTM E165/Article 24 of ASME Boiler and pressure vessel code Section V.
- xvi) Liquid penetrant examination shall be performed in accordance with SecVIII, Appendix-8 of ASME Boiler and pressure vessel code latest addition with following additional requirements:
  - 1. The application of penetrant from spray cans is preferred.
  - 2. No cleaning agents,penetrant or developers shall be used which contain halogens exceeding 50ppm. Approved chemicals only shall be used.
  - 3. All traces of penetrant and developer shall be removed from the welds on completion of inspection.
- xvii) Acceptance criteria shallbe as per clause 7.5.6.2 of Part 7 (Inspection and Examination requirements) of ASME Boiler and Pressure vessel Code Section-VIII. Div-II.
- xviii) The extent of radiography shall be in accordance with paragraph 7.4.3 (Extent of Non Destructive Examination (CEN Part 5 Par 6.6.2)) and Table 7.2.
- xix) The method followed for radiographic examination of weldments shall be as per ASTM E94 Standard Guide for Radio Examination /Article 22 of ASME Boiler and Pressure Vessel Code Section V.
- xx) The radiographed joints shall be performed and documented in accordance with Article 2 of ASME Boiler and Pressure Vessel Code Section V.
- xxi) Radigraphic acceptance criteria shall be as per Paragraph 7.5.3 of Part 7 ( Inspection & Examination Requirements) of ASME Boiler and Pressure vessel Code Section-VIII. Div-II. And subject to approval by the purchaser's representative. Purchaser's decision regarding radiography shall be final.
- xxii) Evaluation of radiographs shall only be performed by RT Level II personnel qualified by International accreditation agencies viz. ISO,ASNT etc.
- xxiii) Details of examination such as method, film specifications, source,penetrameter,exposure time etc. shall be submitted in the form of procedure for prior approval by the purchaser. And the test shall be conduted only as per the approved procedure.
- xxiv) The radio graphs shall be subjected to approval by the purchaser or his authorized inspector whose decision is final.

### **3. Manufacturing Procedure and Workmanship**

- i) The manufacturing procedure shall in no way impair the chemical composition and properties of the materials either by deterioration or by pick up of impurities.

- ii) The manufacturing procedure shall be such as to achieve the requirements of the drawing with consistency. Surfaces required to be concentric to one another shall be machined in the same setting as far as possible. Suitable drilling jigs shall be employed for drilling purposes.
- iii) Workmanship shall be of high standard of engineering and shall be good enough to achieve necessary quality of the items, surface finish, concentricity etc., as required by the drawing.
- iv) All the components shall be pickled and passivated. Passivation of the weld joint as per A380. Before welding, all components shall be degreased. The parts shall be pickled and cleaned internally in such a way that the surface is entirely free from grease, dirt, etc. The oxide layer shall be reduced to a minimum. After cleaning, all care shall be taken that no metal parts enter the components and that the cleanliness is maintained during the whole further fabrication.
- v) Prior to welding, 50mm on each side of the weld shall be specially cleaned using acetone. All surfaces 150mm on each side of the joint shall be free from scale, rust, slag, paint surface, oxide etc. Wire brushing, abrasive blasting or grinding shall remove these. Sand blasting is not permitted, oil and grease from surface 300mm on each side of the weld shall also be removed.
- vi) Welding procedure shall be employed so as to produce welds of complete penetration, complete fusion and free from unacceptable defects.
- vii) Surface treatment: The aim of the surface treatment is to render surfaces of parts physically and chemically clean. All foreign matters shall be removed. The special requirements with regard to cleanliness are valid for the internal surface and the outside surface must be free from oil, grease, paint and other impurities. All materials shall be cleaned and pickled prior to start of manufacture. The finished components shall be cleaned and also passivated. Surfaces not accessible after fabrication shall be passivated prior to fabrication. Precautions shall be taken, to prevent harmful effects on parts or materials due to the use of certain cleaning agents or methods, chemical compositions, temperatures and contact time. Cleaning agents and procedures shall not cause harmful corrosion or leave residues that may be detrimental under service conditions e.g. stress corrosion cracking or react with process fluids.

#### 4. **Inspection, Testing and Guarantee**

- i) IGC test shall conform to ASTM A262 for each heat no. or lot for S.S 304L items. Materials have to qualify Practice A or E
- ii) In case welded pipe is selected for making the component (housing), all the pipes will be subjected to 100% radiography test for their longitudinal weld along full length before taking for manufacturing.
- iii) Weld tests shall include visual inspection, liquid penetrant test, radiographic examination.
- iv) Mechanical tests shall be as per ASTM A370 & ASTM E8 for tension testing which shall include UTS, yield strength, % elongation, hardness, etc. for each heat no. of S.S 304L pipes, bars, plates, flanges etc.

- v) The supplier shall carry out 100% inspection at all stages of manufacture to ensure that the workmanship, dimensions and other geometrical features are conforming to the specified requirements. Reports of inspection in format acceptable to the purchaser shall be maintained and offered to the purchaser's authorized representative at the time of purchaser's inspection.
- vi) Only items found acceptable by the supplier shall be offered for purchaser's inspection.
- vii) Liquid Penetrant Examination: All welded areas shall be inspected with liquid penetrant as per procedure ASTM E165, using water washable penetrant after welding. Any defect indications shall be evaluated and repaired if necessary, before proceeding with the machining. In case of linear indications, the defect shall be completely removed by grinding before carrying out repair welding.
- viii) Contractor shall carry out inspection of all dimensions for 100% of the items using standard inspection procedures acceptable to the purchaser.
- ix) Contractor shall use suitable inspection gauges designed and made to relevant IS standards wherever practical.
- x) For dimensions and forms having tolerances of 50µms or less, special comparators with dial gauges of suitable least count shall be preferred.
- xi) Measuring instruments when used for inspection shall have a least count better than 10% of the corresponding dimensional tolerances.
- xii) Suitable fixture with bearings shall be designed and fabricated for measuring concentricity and geometry of the component using dial comparators.
- xiii) All gauges, comparators, instruments and positional gauges shall be subject to approval from the purchaser before their actual use on the job.
- xiv) Part "CASING 3" found acceptable after the pre-dispatch inspection will be subjected to a helium leak which require vacuum  $\leq 1 \times 10^{-3}$  mbar inside the housing & testing using mass spectrometer at BARC. Acceptable Housings shall have bulk leak rate less than  $1 \times 10^{-9}$  mbar-lit/sec.

## 5. Reports

- i) The party shall prepare inspection reports for each component after their inspection, in suitable format acceptable to the purchaser.
- ii) The reports shall contain all dimensions and geometrical features as shown in the drawing. Where instruments are used for inspection, absolute values as measured may be indicated.
- iii) Party shall prepare three copies of inspection reports for submission to the purchaser.
- iv) Correspondence to components and reports shall be maintained.
- v) Contractor shall inform for purchaser's inspection after his inspection report is ready. Purchaser's representative shall cross check the inspection reports for their dimensional conformance to the drawings and correspondence to the components. In the case of satisfactory results, he shall issue necessary inspection memo authorizing the contractor to dispatch the item.

- vi) Purchaser shall be at their liberty to specify additional inspection procedures, or change the one being used, to ascertain the conformance with the specification
- vii) In addition to the pre-dispatch inspection at the party's factory, these components are also subjected to a final inspection by the purchaser at BARC, Mumbai including helium leak testing. The party shall rectify or replace free of cost, any rejections during this final inspection which shall be intimated as and when this final inspection is completed.

## 6. Guarantee:

The party shall guarantee these components for the materials, workmanship and geometry for a period of 18 months from the date of receipt by the purchaser or 12 months from the date of final acceptance, whichever is earlier. The party shall make free replacements for any rejections during the guarantee period due to reasons indicated above.

## 7. Preservation, Packaging and Delivery

### Preservation

- i. All the items shall be protected for the entire period of storage and dispatch against damage due to atmospheric factors and rough handling.
- ii. All surfaces marked N6 must be protected from damages with extra care.
- iii. Both ends of the component shall be capped using good quality rubber caps of adequate thickness and having sufficient length to cover the N6 area.
- iv. In the vendor's own interest they may preserve all the rejected items also, so that a review if required, could be made at the time of closing the P.O.

### Packaging

- i. **Part H10/RD/002-D** with proper protection covers and barriers shall be sealed in a thick polythene bag.
- ii. Individual wooden boxes of adequate sizes with, half round supports to hold the **Part H10/RD/002-D** shall be used for packing each **component** and suitable soft material shall be used to fill the gap. Sound packaging-material suitable to the size and weight of the contents shall be used.
- iii. All packages shall be clearly marked with (a) destination, (b) Purchase order No. & date, (c) dimensions, (d) gross weight, (e) handling instructions if any, in block letters with water proof paint.
- iv. A copy of the relevant inspection report must be available in each package.

### Delivery.

- i. Full quantity (4 nos.) shall be submitted within 90 days after the receipt of firm purchase order.
- ii. The components shall be delivered to CTD Stores, BARC, MUMBAI, 400085
- iii. **Any departure from the accepted delivery schedule, after placement of the purchase order would be viewed seriously and the same shall be**

**treated as sufficient reason for canceling the order at any stage without any liability to the purchaser.**

**8. Quotation**

Format shown below shall be followed for the following component:

**Part H10/RD/002-D**

- 1) **Please make sure that quotation is submitted for the Component in the Format shown**

<b>Description</b>	<b>Total for 4 Components Rs</b>
(i) Manufacturing cost including tooling, fixtures, inspection, Packing, etc.	
(iii) GST (5%)	
(iv) Delivery charges	
<b>Total</b>	

- a. Details of fabrication facilities including NDT.
- b. Details of technical men power, plant, quality control details, machinery available and **precision machining facilities suitable for machining large components**: Please list the details like type, make & model, size, year of purchasing, spindle run out and repeatability. Highlight CNC turning facilities if any.
- c. **Inspection facilities**: Please give list of inspection grade instruments and tools available with details such as type, make, model, range, least count etc.
- d. **Previous experience**: Highlight your experience in precision matching jobs involving comparable size, geometry and tolerances. Give details of purchase order reference, clients' name, address & telephone number, brief description of the job and date of completion. Have you done any precision machining job for BARC, IREL or any other DAE units? If so please give details.
- e. A brief outline of the fabrication, machining and inspection plan envisaged, for ensuring the specified requirements.
- f. State whether any part of the job would be subcontracted, if so, indicate the same and give details of the sub-contractor.
- g. Explicitly state whether the stipulated delivery schedule is acceptable and could be adhered to without slippage. If not please indicate the most realistic delivery schedule that can be maintained.
- h. **Party shall indicate their major jobs in similar type of machining/ fabrication of 304/304L material in past three years.**



- i. Order will be placed to **technically suitable** lowest price bidder. Evaluation of technical capability will be done by Purchaser.

**9. Confidentiality clause.**

- a. CONFIDENTIALITY: No party shall disclose any information to any third party concerning the matters under this tender 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.

This clause shall apply to their Sub-contractors, Consultants and Advisors or the employees engaged by the party with equal force.

- b. RESTRICTED INFORMATION CATEGORIES UNDER SECTION 18 OF THE ATOMIC ENERGY ACT-1962 AND OFFICIAL SECRETS UNDER SECTION-5 OF THE OFFICIAL SECRET ACT-1923;

Any contravention of the above mentioned provisions by any contactor, sub-contractor, consultant, advisor or the employees of the party will invite penal consequences under the aforesaid legislation

- c. PROHIBITION AGAINST USE OF BARC’S NAME WITHOUT PERMISSION FOR THE PUBLICITY PURPOSES :

The contractor or sub contractor ,consultant, advisors or the employees engaged by the Party shall not use BARC’S name for any publicity purposes through any media like press, Radio, T.V. or internet without the prior written approval of BARC.