



GOVERNMENT OF INDIA
BHABHA ATOMIC RESEARCH CENTRE
REACTOR ENGINEERING DIVISION

Ref: RED/THS/GV/ /2BS/MF/ /2018

Date: 31 January, 2018

Dear Sirs,

Sub : Minor Fabrication – invitation to quote

1. The sealed quotations must reach Head, Thermal Hydraulics Section, RED, Engg. Hall No.7, Trombay, Mumbai-400 085 by Due Date 12.02.2018 through Speed Post by Indian postal service.
2. The quotation will be opened on 13.02.2018.
3. The envelope shall be super-scribed " Fabrication of Test Vessel, Reactor Vessel, Instrumentation, Commissioning and Supply of Core Catcher Test Facility as per details and specification., Kind Attn Mr Ganesh V" and indicate this letter Ref. No. and due date of opening clearly. The envelope shall be sealed.
- 4) Quotations must be submitted and reach to us through Indian postal services/speed post/ registered post only.
- 5) Please contact Shri. Ganesh V, SO/D, RED, BARC, Trombay, Mumbai 400085 on telephone number 022-25591577 for any technical clarifications.

Dear Sirs,

1. Sealed quotations are invited by Head, RED for and behalf of the President of India for "Fabrication of Test Vessel, Reactor Vessel, Instrumentation, Commissioning and Supply of Core Catcher Test Facility as per details and specification." as per annexure II enclosed.

2. The fabricator shall specify the total period required for completion of the work. **Since the work is urgent the total period should not exceed 8 weeks.**

Necessary safety precautions have to be taken by the contractor during work at site and he shall be fully responsible for the accidents or damages if any. The contractor shall provide safety shoes and helmets to all the staff working for him. Appropriate mechanical handling equipments shall be used for activities like loading, unloading and shifting of equipments and material.

The work shall be subjected to inspection from the purchaser or his authorized representative and the work shall be conducted under their supervision and to the full extent of their satisfaction. Their decision shall be final.

3. The taxes and transportation charges shall be quoted separately.

4. The above-mentioned Reference No., Date and Time of opening of bids must be clearly written on the sealed envelope containing the quotation.

5. The quotations must bear PAN No. and G. S.T. No. etc. The quotations not having these numbers are liable to be rejected.

6. The quotations must be submitted on printed letterheads. Quotations on computer-generated letterheads are liable to be rejected.

7. Quotations must have rubber stamp of the company. The quotations not having the rubber stamps will be rejected.

8. No Free Issue Material will be provided.

9. The work shall be subject to approval at bidder's works by our concerned Engineers. The final jobs shall not be dispatched without the approval of our Engineers. Necessary facilities shall be provided to our Engineers at bidder's premises.

10. The bidder shall deliver the finished job with documents to the concerned Engineer within 90 days from the date of issue of the work order.

11. Payment will be made as per rules after completion of the job satisfactorily. Part payments and Advance payments are not possible.

12. The offer shall be kept open for acceptance for a period of 60 days from the date of opening of the quotation.

13. A brief list of similar jobs executed if any, and name of the organisation for which such job was carried out should be furnished with the quotation. Also, a list of machine tools and inspection instruments available with the bidder should be provided.

14. Head, RED reserves the right to accept/reject any or all the quotations received without assigning any reason whatsoever.

15. Drawings/sketches must be returned along with quotation.

16. The bidder shall furnish the detailed information regarding whether an ex-employee of BARC is working in your organisation or whether any of your relative is working in DAE/BARC or you are an ex-employee of DAE/BARC. In case of absence of such information or wrong information, the quotation or contract is likely to be rejected or cancelled.

17. Confidentiality Clause: Restricted information categories under section 18 of the Atomic Energy Act, 1962 and "Official Secrets" under section 5 of the official secret act, 1923.

18a) 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.

18b) 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.

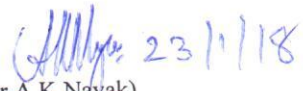
18c) The contractor or subcontractor, consultant, adviser or the employees engaged by the contractor shall not use BARC's name for any publicity purpose through any public media like Press, Radio, T.V. or Internet without the prior written approval of BARC.

19. Kindly acknowledge the receipt of this enquiry by return post.

Encl.: 1) Annexure II

Thanking you,

Yours faithfully,

 23/1/18
(Dr A K Nayak)
Head, THS, RED

- Copy to 1) Asstt. Accounts Officer (Works), CC
2) RED Office
3) REZ Stores, RED, Hall-7
4) Shri Ganesh V, SO/D, RED/THS
5) Shri A. K. Lal, SO/H, for record

ANNEXURE I
FABRICATION OF TEST VESSEL, REACTOR VESSEL,
INSTRUMENTATION, COMMISSIONING AND SUPPLY OF CORE CATCHER
TEST FACILITY AS PER DETAILS AND SPECIFICATION

Part-1

SCOPE

This Specification establishes the technical requirements for the procurement of raw material and standard component, manufacture/fabrication of the reactor and test vessel, supply, instrumentation and the testing at MNIT, Jaipur, Rajasthan. All raw materials and Proprietary Items/Standard Components required for the manufacture of above equipment shall be in the Supplier's scope of work. The Supplier shall be responsible for all the inspection and testing of the materials and Proprietary Items / Standard Components procured by him.

SCOPE OF WORK

1. Fabrication of test vessel:

The test vessel consists of 30 mm thick carbon steel plates welded at an angle of 10 degrees. The downcomer pipes are 25 NB sch 40 pipes made of carbon steel. The details can be obtained from Drg No: D1.

2. Fabrication of reactor vessel:

Fabrication of reactor vessel is to be done according to drawing D2. The gap between the outer vessel wall and inner wall (36 mm) is to be filled with MgO powder.

3. Instrumentation:

60 thermocouples provided to the supplier have to be spot welded to the test section. The thermocouples should not be damaged during spot welding process. In addition, C-type thermocouple wire (5 metre) (Tempsons make or equivalent) and beads have to be procured by the vendor, supplied and instrumented. Turbine flow meter corresponding to draft range has to be procured and installed in the downcomer tube. The output of the turbine flow meter has to be made available outside the bounding box to be connected to the recorder.

4. Insulation:

The test vessel and reactor vessel outer bounding box is to be insulated with two layers of 25 mm ceramic wool insulation.

The entire assembly is to be done outside BARC and is to be installed and delivered directly at Jaipur. The supplier therefore has to have a well-equipped workshop outside BARC to fabricate and test the set-up.

Part-II

TECHNICAL SPECIFICATION

1.0 APPLICABLE DOCUMENTS

The raw material, inspection and testing of the test section shall comply with the requirement of the latest edition of codes and standards, the specification and the applicable drawings.

2.0 APPLICABLE SPECIFICATIONS

ASTM Standards	
ASME Section-II	Material specifications

ASME Section - V	Non-destructive examination
ASME Section - VIII Div.1	Unfired pressure vessels code
ASME Section-IX	Welding and brazing qualifications
ANSI	
ANSI B16.5	Pipe flanges and flanged fittings
ANSI B16.10	Face-to-face and end-to-end dimensions of valves
ANSI B16.34	Valves - Flanged, threaded and welded end
ANSI B 1.20.1	Taper Pipe thread
ANSI B31.1	Code for power piping
ANSI B16.5	Pipe flanges and flanged fittings
ANSI B16.10	Face-to-face and end-to-end dimensions of valves
Manufacturers Standardisation Society	
MSS-SP25	Standard marking systems for valves, fittings, flanges & unions.
American standard for Testing of materials	
ASTM A – 182	Standard Specification for Forged or Rolled Alloy Steel Pipe Flanges, Forged Fittings and Valves and Parts for High Temperature
ASTM A – 193	Standard Specification for Alloy Steel & Stainless Steel Bolting Material for High Temperature Service.
ASTM A – 194	Standard Specification for Carbon & Alloy Steel Nuts for Bolts for High Pressure & High Temperature Service
ASTM A – 240	Standard Specification for Heat Resisting Chromium & Chromium –Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels
ASTM A – 312	Standard Specification for Seamless & Welded Austenitic Stainless Steel Pipes
Bureau of Indian Standards	
IS: 816	Code of practice for use of metal arc welding for general construction of mild steel.
IS : 817	Code for practice for training & testing of metal arc welders.
IS: 822	Code of practice for inspection of welds..
IS-1893	Criteria for earthquake resistant design of structures
IS-2062	Steel for general structural purposes

4.0 RAW MATERIALS

- 4.1 No free issue materials provided.
- 4.2 All materials to be used shall be of tested quality. The material test certificates clearly indicating chemical composition & mechanical properties shall be submitted to the Purchaser for approval.
- 4.3 The materials of construction as indicated in this specification are the minimum acceptable. The vendor may offer equivalent or better materials provided the purchaser approve the material.
- 4.3 All the material shall conform to relevant ASME section IX specification suitable for the service mentioned in this specification & shall meet all the requirements stated there in. However material test certificates are acceptable only if the purchases are from reputed manufacturers & co-relatable.
- 4.4 All the materials used for manufacturing shall be properly stamped / marked & the identification on each part goes in to assembly that shall be easily assessable for verification. The identification marking shall not be punched or scribed on the internal surface of the test section.
- 4.5 INSPECTION AND MATERIAL TESTING REQUIREMENT:**
All the test shall be carried out by the Government Approved Test laboratory as approved and selected by the purchaser or his authorized representative. 10% sample will be randomly selected by the purchaser from the lot of fittings, flanges and studs and same shall be tested by supplier from government approved test laboratory for following tests: Chemical composition, mechanical testing (Yield Strength, UTS, % reduction in cross section and % elongation and hardness test), Macro and Micro test, Etching test as per ASTM E-381, Inter-granular corrosion test in accordance with the requirement of ASTM-A-262 Practice 'B'.

4.6 WELDING MATERIALS

- 4.6.1 Welding Materials shall be from reputed manufacturers.
- 4.6.2 Proper identification & inventory control of all accepted/approved welding material shall be maintained throughout the process of fabrication.

5.0 WELDING PROCEDURE

It is the responsibility of the supplier to develop the best welding procedure to meet the end requirement. All welding procedures & performance test required for this job are to be established as per IS 816.

- 5.1 Each layer of weld metal in a multi-layer welding shall be cleaned before applying the next.
- 5.2 All welds shall be checked by dye penetration after root pass as well as final pass.
- 5.3 The methods used to prepare the base metal shall leave the weld preparation with reasonable smooth surfaces. The surfaces for welding shall be free of cracks, deep indentations, scale, rust, oil, grease & other deleterious material. The work shall be protected from deleterious contamination, from rain & wind during welding. The welding shall not be performed on wet surfaces.
- 5.4 The specification of electrodes, voltages, welding speed, current & polarity should be as specified in approved welding procedure. Any deviation from the welding procedure will be treated as objectionable & may disqualify the procedure & the welder or welding operator.
- 5.5 The inspector/ purchaser’s representative has the authority to reject any unsatisfactory process or operation or workmanship at any stage of fabrication.

6.0 FABRICATION DRAWINGS

- 6.1 The components shall be fabricated as per the drawings supplied by the purchaser. However, fabricator can make minor changes in the drawings with the prior approval of purchaser for the ease of fabrication.
- 6.2 Drawings submitted by vendor for approval will be checked / reviewed by purchaser and comments, if any, on the same will be conveyed to vendor. It is the responsibility of vendor to incorporate correctly all the comments conveyed by purchaser on vendor’s drawings. The drawings, which are approved with comments, are resubmitted to purchaser for purpose of records. Such drawings will not be checked/ reviewed by purchaser to verify whether vendor has incorporated all the comments. If the vendor is unable to incorporate certain comments in his drawings, he shall clearly state in his forwarding letter such non-compliance along with valid reasons. He shall proceed for the job only after receiving written approval of purchaser for non-compliance.
- 6.3 Any work performed or material ordered by vendor prior to receipt of drawings stamped or “approved” or “approved with comments as noted” by purchaser shall at the risk of vendor. After a print drawing has been returned “approved” vendor may release all parts covered by drawing for the production.
- 6.4 The purchaser’s approval of the fabricator’s drawings does not relieve the fabricator for any responsibility with respect to the fabrication of the equipments in accordance with the code requirements.

7.0 THERMAL INSULATION

7.1 INSULATION MATERIAL

- a. Resin bonded mineral wool mattresses confirming to IS: 8183 having normal density of 100 kg/m³ shall be used for hot insulation.
- b. These mattresses shall have thermal conductivity as under:

Mean Temperature(⁰ C)	Thermal conductivity in W/m - K
100	0.052

200	0.068
300	0.090

- c. The bonded mineral wool mattresses shall not have chloride content more than 20 ppm.
- d. It shall be supplied in the form of mats which is enclosed on one side with G.I. wire netting of specification 12.5 mm x 0.71 mm hexagonal construction.
- e. The resin bonded mineral wool shall be incombustible, fire retardant, odorless and easy to cut.

7.2 INSULATION THICKNESS

The insulation thickness required in terms of thickness of mineral wool to be provided, for the Receiver system is given in table 1.

Table1: Insulation thickness requirements for Receiver System

S.No.	Description	Insulation thickness	Remarks
1	Test and reactor vessel	50 mm	Entire vessel bounding box

7.3 OTHER MATERIALS

- a. Jacketing Material: Jacketing material on hot insulation on equipment shall be of Aluminum sheet of minimum thickness 0.71 mm.
- b. Painting: Application of two coats of heat resistant aluminum paint of approved make shall be applied to the surface of all carbon steel equipments having a surface temperature greater than 100oC before application of insulation.
- c. Wire Netting: Galvanized chicken wire netting of 12.5 mm x 0.71 mm hexagonal construction shall be used.
- d. Lacing wire: Soft, annealed G.I. lacing wire of minimum diameter of 0.80 mm shall be used.
- e. Screws: Self tapping, rust proof screws shall be used for lap joints along with G.I. washers if needed.
- f. Steel bands: Galvanized steel bands of minimum 12 mm wide x 0.6 mm thick shall be used.
- g. Only approved water proofing compound (MAS 94 OR EQV) shall be used for sealing the GI jacketing at the outdoor locations.
- h. For cleaning SS surfaces, only acetone or superior kerosene with a free chloride not exceeding 25 ppm shall be used.
- i. Aluminum jacket (as specified above) must be fastened to the surface of all stainless steel vessels which are to be insulated. Only after this must the mineral wool be wrapped over the vessel.
- j. The Aluminum jacket must be wrapped over the mineral wool insulation in all the equipments on which insulation is provided.

PART-III GENERAL REQUIREMENTS

- 1.0 **Fabrication of components:** - The fabricator has the freedom to decide the sequence of machining & welding to achieve the final machined dimensions given in the drawing. However, a procedure including shop drawings shall be submitted and got approved by the bidder or his representative before proceeding with the work. The procedure shall include sequence of fabrication/machining, welding, inspection & testing.
- 2.0 **Inspection Facility:** - Most of the important dimensions, length, orientation & relative locations of the features of the components shall be inspected by the calibrated gauges. Supplier shall provide all necessary tools, facilities & services for the inspection & related jobs. Inspection shall be carried out in a manner satisfactory to & shall be subject to approval by the purchaser. Purchaser shall have access to the premises of the fabricator for carrying out or witnessing the inspection of the job. The supplier shall provide all the equipment & consumable required for carrying out inspection.

- 3.0 All non-destructive examination, like dye penetrant shall be done in accordance with a detailed written procedure.
- a) **Preliminary Inspection**
A preliminary inspection will be made prior to fabrication of the all components, to check materials, welding procedures, welding qualifications & testing of materials.
- b) **Final inspection**
After fabrication is complete, a final inspection will be made to insure completeness of Fabrication & assembly.
- 4.0 **Inspection plan:-** The fabricator shall prepare detailed inspection plan for the job & get approved before the commencement of the work.
- 5.0 **Inspection Report:-** Two copies of the inspection report, covering all inspections duly signed by the manufacturer, shall be submitted to the purchaser at the time of delivering the item.

PART IV

NOTES TO BIDDERS

- 1.0 **Drawings:** All the drawings shall be returned to the purchaser along with the quotation.
- 2.0 **Sub-Contracting:** No part of the job shall be contracted to any other party without the consent and prior written permission from the purchaser. In the event of sub-contracting the sub-contractor shall provide the inspection facilities and shall agree to the quality surveillance by the purchaser as mentioned above.
- 3.0 **Shipping Release:** The finished material shall not be dispatched before getting the written shipping release from the purchaser.
- 4.0 **Minor changes:** The purchaser reserves the right to make minor changes in the shape dimensions of the finished product, which may not seriously affect the fabrication requirements. Such changes shall be intimated to the bidder at the time of placement of purchaser order or before starting fabrication. However, such changes shall not lead to increase in the quoted amount.
- 5.0 **Facilities:** The bidders having adequate experience and facilities to execute the work only need to quote. The bidder shall submit along with quotation, details of machining, fabrication, testing and inspection facilities available with him and/or the sub-contractor for executing the work. The bidder shall arrange to show and explain these facilities to the purchaser or his representative before placing the purchase order to establish the capability to execute the job.
- 6.0 **Proof of Ability:** The bidder shall submit along with their quotation a list of similar jobs, executed in the past as a proof of their ability.
- 7.0 **Post supply inspection:** Post supply inspection in respect of supplies made is not permitted. Any offer containing the condition of post supply inspection will be out rightly rejected. It is therefore, mandatory for the bidders, while quoting, to indicate in clear terms the requirement of post supply inspection by any outside agency.
- 8.0 **Guarantee:** The bidder should guarantee the fabrication work for a period of one year from date of installation.