

Government of India
Bhabha Atomic Research Centre
Chemical Technology Division

Trombay
Mumbai-85

Ref. ChTD/NA/WO/97933

Sub: Minor fabrication of Agitated equipment

2) The quotation must reach Head, Chemical Technology Division by 02nd December 2020 as per attached scope of work in annexure-1 and must be sent in sealed envelope superscribed with the above reference number and due date given above by SPEED POST only. Also the name of work should be displayed on the envelope

3) The address on the envelope should read

The Head, Chemical Technology Division

Bhabha Atomic Research Centre,

CEL-2, Trombay

Mumbai-85

Attn: V Nafees, SO/F

4) The fabrication / repairs work shall be subject to inspection by our engineer. The finished components / equipment shall not be dispatched prior to approval by our engineer, at bidder's works. Necessary inspection facilities should be provided to our engineers during fabrication / repairs at bidder's premises.

5) Head, Chemical Technology Division, BARC reserves the right to accept or reject any or all quotation without assigning any reason.

6) The bidder should quote their PAN and GST registration number in their offer.

Annexure-1

Technical specification for fabrication of Agitated equipment assembly

1. Scope of supply:

1.1. The scope of supply is preparation of fabrication drawings, fabrication of Agitated equipment assembly detailed in enclosed drawing as per approved QAP (quality assurance plan), inspection, testing, documentation, guarantee, forwarding, transportation, safe delivery at CTDstores, BARC, Trombay, Mumbai-400085.

Quantity: 01 nos.

1.2. The equipment shall conform in all respect to high standards of engineering practices and be capable of performing trouble free operation with vendor's guarantee in a manner acceptable to the purchaser.

1.3. In the event of any conflict between or within the various sections of these specifications or in case of any doubt, vendor is supposed to get it clarified the same well before the quotation is submitted. In case the vendor fails, the interpretations of the purchaser shall be final and binding on both the parties.

1.4. The purchaser reserves the right to make minor changes in the equipment in such a way that, this change will not affect the functional strength of the equipment.

1.5. Party shall submit the details of fabrication plan at the time of quotation. Details given shall be considered and verified at the time of offer evaluation.

2. **Applicable Documents:** The fabrication, inspection, testing of process equipment shall comply with the requirements of this specification with all its annexure, latest edition of codes and standards specified.

2.1. Applicable drawing: *MDS/CTD/001*- "Agitated equipment assembly".

2.2. Applicable code and standard:

2.2.1. ASME Boiler and pressure vessel code Section VIII div.1.

2.2.2. ASME Boiler and pressure vessel code Section-IX for welder and welding procedure qualification

2.2.3. ASME Boiler and pressure vessel code Section-V for inspection &testing standards

2.2.4. ASME Boiler and pressure vessel code

2.2.5. ASTM-E-165: Liquid penetration inspectionmethod

2.2.6. ASTM B521 - 12 Standard Specification for Tantalum and Tantalum Alloy Seamless and Welded Tubes

2.2.7. ASTM B365-12 Standard Specification for Tantalum and Tantalum Alloy Rod and Wire

2.2.8. ASTM B364 - 96(2009) Standard Specification for Tantalum and Tantalum Alloy Ingots

2.2.9. ASTM B708 - 12 Standard Specification for Tantalum and Tantalum Alloy Plate, Sheet, and Strip

2.2.10. ASTM-A 182: Standard Specification for forged steel flanges.

2.2.11. ASTM-A 193: Standard Specification for Alloy-Steel and Stainless-Steel Bolting Materials for High Temperature or High-Pressure Service and Other Special Purpose Applications.

- 2.2.12. ASME/ANSI B 16.5-Pipe flanges and fittings.
- 2.2.13. ANSI B16.11: Socket welds & threaded steel fitting.
- 2.2.14. ANSI B16.9: SS pipe fitting.**
- 2.2.15. ASTM-E-8: Test method for tension testing of metallic material.
- 2.2.16. ASTM-E-142: Method for controlling quality for radiographic testing.
- 2.2.17. ASTM-A 194: Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
Note: Applicable standards other than above if any, to be specified by vendor while carrying out detailed fabrication drawing.
- 2.2.18. AWS A5.12 Specification for Tungsten and Tungsten Alloy Electrodes for Arc Welding and Cutting

3. Quality Assurance Plan (QAP)

3.1. Pre-fabrication:

- 3.1.1. Raw material (other than free issue material) clearance: Chemical, Physical and Mechanical
- 3.1.2. Consumable clearance: Chemical analysis. is must and mechanical test shall be done (if required).
- 3.1.3. Welders and welding procedure

qualification

3.2. In process clearance:

- 3.2.1. Fit-up at all assembly stages.
- 3.2.2. Final inspection of all welds including DPT and

Dimensions

3.3. Post fabrication:

- 3.3.1. Hydro testing as per ASTM standards.
- 3.3.2. Dimensions

Note: The points are only indicative. The actual points shall be as per the QA plan submitted by the Vendors and approved by the purchaser. Any deviation from the approved QAP is not acceptable.

4. Material Testing:

- 4.1. All material tests (other than free issue material), physical and chemical, shall be carried out in reputed govt. approved test laboratories.
- 4.2. Supplier must ensure that the material being used is new and conforms to relevant standard mentioned in this specification.

5. Fabrication drawing:

- 5.1. After the award of the contract, vendor within a period of 10 days shall submit the detailed fabrication drawing along with QAP for approval. Vendor shall start the fabrication only with approved drawings.
- 5.2. In case of any revision, revised drawing to be submitted for approval.
- 5.3. As built drawing shall be submitted to purchaser at the time of delivery.
- 5.4. Detailed drawing must have following information,
 - 5.4.1. Bill of materials with size, quantity and relevant codes and standards.
 - 5.4.2. Nozzle orientation plan, Nozzles reinforcement details
 - 5.4.3. All the dimensions and sizes in metric unit
 - 5.4.4. Flanges & fittings details
 - 5.4.5. Test conditions
 - 5.4.6. Vendor name and address

5.4.8. Drawing Number, Scale of drawing & revision no. and revision date.

5.4.9. General fabrication details and practice

5.4.10. Welding methods used.

6. Material requirements:

6.1. Material processing & workman ship shall be of high quality & in accordance with good practices to the manufacture.

6.2. Procurement of all the material (other than free issue material) & consumables required for fabrication & testing shall be in the scope of the vender.

6.3. Welding consumables: All the welding is required to be done using Gas Tungsten Arc Welding (GTAW) process with Argon as shielding gas for all full penetration welds as well as for those welds which are exposed to internal of equipment. Other suitable welding techniques can be suggested by vendor. Final implementation is subject to purchaser's approval.

6.4. Filler metal shall be pure unalloyed tantalum in compliance with ASTM

B365 6.5. Electrode shall be in compliance with AWS A5.12 or equivalent specification.

6.6. Test certificate for welding filler material shall be submitted to purchaser for approval, prior to fabrication of equipment.

6.7. Inspection report of all bought out materials shall be submitted to purchaser for approval.

6.8. Material & consumables not specifically mentioned here shall be of good commercial quality and in accordance with the practice pertinent to manufacture of pressure vessels.

6.9. Wherever the use of a material to an alternative specification is proposed, the alternative shall be subject to prior approval by the purchaser.

6.10. Materials which do not conform to any standard shall be subjected to approval by the purchaser before start of manufacture.

7. Equipment fabrication:

7.1. Absolute cleanliness must be ensured and it is essential for good tantalum welding.

Cleanliness pertains to porosity, micro fissuring, and cracking of the joint or heat-affected zone or both. Cleaning should be done both internally as well as externally for tubes.

7.2. Removal all traces of oil film and handling stains to be done. Use of rubber, lint-free cotton, or nylon gloves when handling the part from the rinse. Lint-free cloths may be used for wiping.

7.3. Abrade all surfaces, including edges that will be subject to welding heat to remove the naturally occurring oxide film. Preferably use nylon or lint-free cotton gloves during this cleaning operation. Inspection of gloves frequently for cleanliness is necessary.

7.4. Welding Locations and work area shall be free of air drafts. The area shall have conditioned air, for personnel to remove dust and dirt for maintaining a clean area and to provide low relative humidity. All tools shall be extremely clean and oil free.

7.5. No part of the work shall be subcontracted without written consent from the purchaser. The manufacturer shall be responsible for the execution of the subcontracted work, necessary inspection and quality control measures shall be taken to ensure compliance of the work to these specifications.

7.6. Welder qualification and procedure qualification confirms to ASME section IX. The welding procedure (WPS) shall be submitted to user for approval prior to equipment fabrication. Procedure report shall be approved from the purchaser.

7.7. Welding consumable electrodes shall be of standard make.

5.4.7; Purchaser Name and Purchase order No.

- 7.8. After the first pass, weld is to be D.P. tested carefully for cracks, craters, & pinholes etc. Crater, cracks and rough spot are to be removed by suitable mechanical means; no penning will be allowed. If any weld repair is required, vendor shall qualify the repair procedure and take written approval from purchaser for repair work.
- 7.9. In case of hot forming during fabrication, full care shall be taken so that physical & chemical properties of the material are not changed.
- 7.10. All equipment shall be neatly finished in a good workmanship manner. All exposed metal surface shall be smooth and free from burrs and sharp corners etc.
- 7.11. Before the equipment are closed/welded with another part, they shall be carefully be checked to be sure that all extraneous matter such as rags, tools, rubbish, foreign matter, loose scale, dirt and welded rod stub etc. have removed and the surface pickled and dried. All the opening shall be closed with stainless steel counter blind flanges.
- 7.12. Residual stress shall be kept to minimum to ensure dimensional stability and minimum stress corrosion. Excessive force shall not be used to achieve a fit. Welding and fitting shall be performed in such a manner as to control and minimize distortion and locked in stresses.
- 7.13. Cleaning, pickling and passivation details shall be given to the purchaser for approval well before the start of the work.

8. Inspection, testing and reports:

- 8.1. All the tests and inspections shall be carried out in conformation with the performance as specified in this document at supplier's works. No deviation shall be acceptable. The party shall prepare inspection reports for each component after their inspection, in suitable format acceptable to the purchaser.
- 8.2. Party shall inform the purchaser for inspection after his internal inspection report is ready.
- 8.3. Purchaser or his representative shall be permitted free access to the party's or his subcontractor's premises at all reasonable times for the purpose of inspection at all stages of fabrication.
- 8.4. Hydro test will be conducted as per ASTM standards for the equipment at party's works and the party should make the arrangement for the same.
- 8.5. DP test of root pass and final pass is must.
- 8.6. DM water shall be used for cleaning, hydro-test of the equipment. Equipment should be thoroughly cleaned after hydro test and dried with hot air.
- 8.7. Purchaser shall be at their liberty to specify additional inspection procedures, or change the one being used, to ascertain the conformance with the specification.
- 8.8.** Purchaser or his representative shall be given full assistance in the form of tools, gauges, instruments, skilled manpower, etc. to facilitate inspection.

9. Documentation

- 9.1. The entire document should be approved by the purchaser's representative.
- 9.1.1. As built drawing
 - 9.1.2. Test certificate from lab.
 - 9.1.3. Inspection report
 - 9.1.4. Mill test certificate
 - 9.1.5. Welder's performance test reports
 - 9.1.6. Welding procedure test reports
 - 9.1.7. Reports of all test certificates

- 9.1.8. Quality compliance report.
- 9.1.9. Any other relevant documents

10. Packaging:

- 10.1. After obtaining written dispatch clearance from purchaser's representative, the equipment shall be delivered, safely, at BARC, Trombay, Mumbai, in good condition.
- 10.2. The items shall be properly packed in wooden case and nozzles shall be protected from damage during transit.
- 10.3. Size of the wooden box shall be convenient to handle. Gaps inside the box shall be filled with suitable soft packing to prevent rattling of these components.
- 10.4. Sound packing material of suitable size and weight of the contents shall be used.
- 10.5. All packages shall be clearly marked on with (a) destination, (b) Purchase order No. and date, (c) dimensions, (d) gross weight, (e) handling instructions if any, in block letters with water proof paint.
- 10.6. A copy of the inspection report must be sent along with the consignment.

11. Delivery:

- 11.1. The items after inspection and acceptance shall be delivered to CTD Stores, BARC, Trombay- 400 085.
- 11.2. Supply shall be completed within Two months from the date of placement of the purchase order.
- 11.3. In case the party is not able to meet the above delivery schedule, they may state in their quotation, the delivery schedule that they would be able to adhere too, realistically. The purchaser reserves their right to adjust the order quantity in the manner that will suit the delivery requirement.
- 11.4. Any departure from the accepted delivery schedule, after placement of the purchase order would be viewed very seriously and the same shall be treated as sufficient reason for cancelling the order at any stage without any liability to the purchaser. In such case, the materials shall be procured from alternate sources at supplier's cost and risk to fulfill the purchaser's requirement.

12. Quotation:

- 12.1. Quotation shall be submitted giving due breakup of all the fabrication steps, failing which it shall be considered incomplete and rejected.
- 12.2. The following information shall be furnished along with quotation positively but for which the offer is liable to be treated as incomplete and rejected.
 - 12.2.1. Machining facilities: Explicitly state the machining procedure adopted and list out machining facilities relevant to this item, this is mandatory to submit at the time of quotation. Details shown shall be subjected to evaluation for the technical qualification.
 - 12.2.2. Inspection facilities: Please give list of inspection grade instruments and tools available with details such as type, make, model, range, least count etc. Clearly state the inspection procedure to be followed for this component and submit the same at the time of quotation.
 - 12.2.3. Previous experience: Highlight your experience in precision machining jobs involving comparable size and tolerances and similar type of alloys. Give details of purchase order reference, clients' name, address & telephone number.

13. Free Issue material:

13.1. Tantalum tubes, sheets, rods shall be supplied for fabrication of the equipment. The cost of free issue material in Indian Rupees is as follows.

S. No.	Description of	Size	Drawing no. of FIM	Value of FIM-
1.	Tantalum Tube	3Inch	MDS/CTD/001- "Agitated equipment	5,45,000/-
2.	Tantalum Tube	1/2Inch	MDS/CTD/001- "Agitated equipment	3,22,500/-
3.	Tantalum Rod	20mm	MDS/CTD/001- "Agitated equipment	7,00,000/-
4.	Tantalum Rod	10mm	MDS/CTD/001- "Agitated equipment	7,10,000/-
5.	Tantalum Rod	2mm	MDS/CTD/001- "Agitated equipment	70,000/-
6.	Tantalum Sheet	1700 X X2mm	MDS/CTD/001- "Agitated equipment	7,20,000/-
7.	Tantalum Strip-	2250 X X2mm	MDS/CTD/001- "Agitated equipment	7,05,000/-

13.2. The free issue materials will be issued against submission of insurance policy and indemnity bond.

13.2.1. The vendor shall arrange to collect free issue material from purchaser's Stores, Mumbai.

13.2.2. The insurance policy

13.2.2.1. Shall cover the full value of free issue material i.e., 37, 72, 500/-(Rupees).

13.2.2.2. Shall cover losses, damages to purchaser's material due to fire, theft, burglary, riot, strike, civil commotion etc. and any damage arising out of other causes such as other material falling on purchaser's material or purchaser's material falling through a height etc.

13.2.2.3. Shall include the purchase order number and date as well as the description of FIM in the policy document.

13.2.2.4. Shall be valid till the date of final delivery of finished components.

13.3. Shall include purchaser's (President of India acting through Accounts Officer BARC) name as beneficiary.

13.4. The contractor shall arrange to collect the first batch of free issue materials within two weeks from the date of receipt of purchase order.

13.5. The FIM supplied is very expensive and not easily available. The cost of any rejection exceeding one out of 10 Numbers shall be recovered from the vendor at the rate equal to value of FIM as mentioned in table given in clause 14.1.

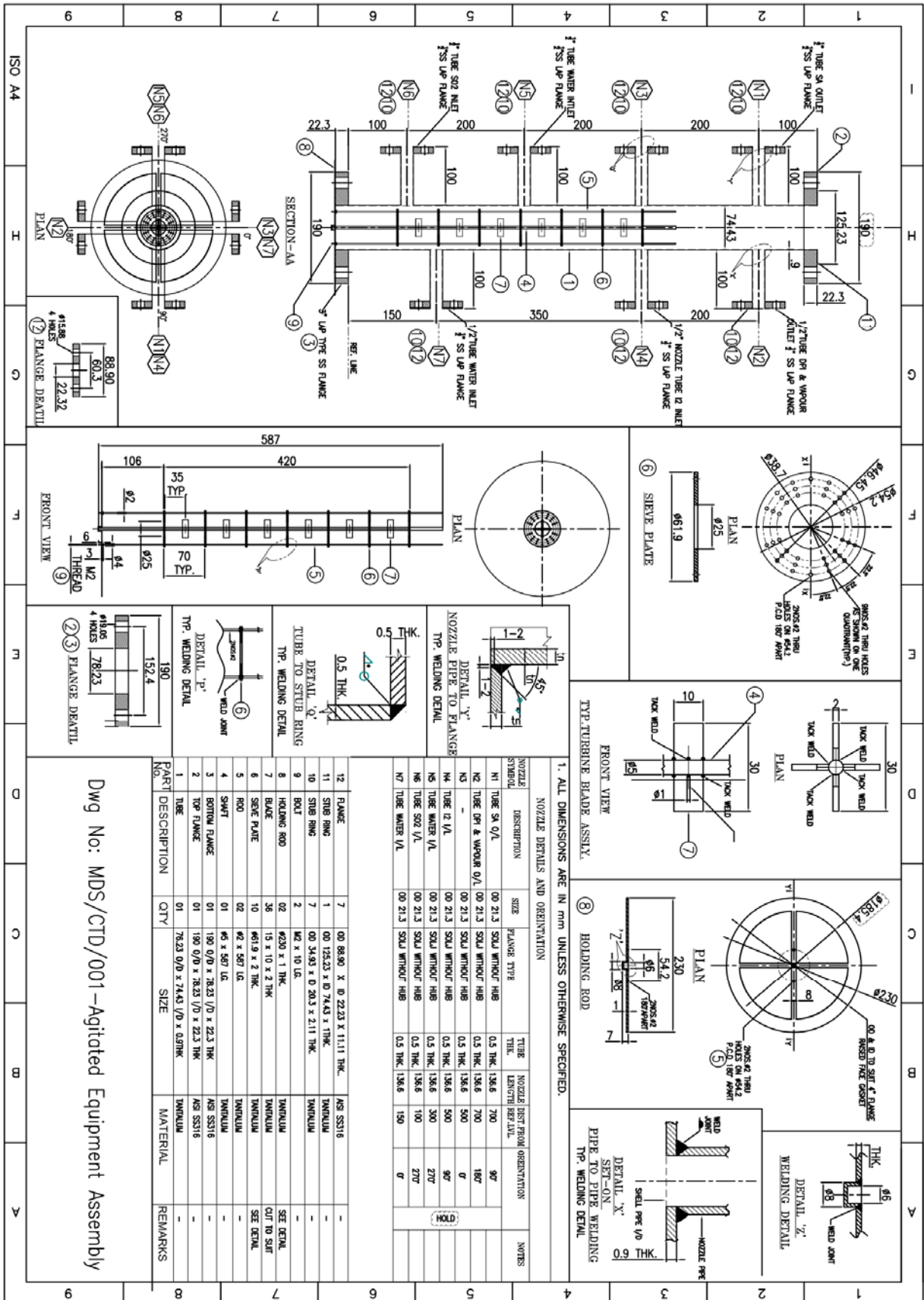
13.6. Account of free issue material shall be submitted by the contractor (FIM statement) and return the balance material in the form of tubes, rods, sheets, strips and cut pieces.

14. G.A. Drawing

14.1. Party should submit the General arrangement drawing along with the quotation clearly showing the basic details.

*****End of the Specifications*****

Fabrication Drawing of Agitated Equipment Assembly



Dwg No: MDS/CTD/001-Agitated Equipment Assembly