



Government of India
Bhabha Atomic Research Centre
Chemical Technology Division

Phone no: 022-25591868
Mumbai- 400085
Date: 25/10/2017

Ref: - CTD/ PTS/SKS/2017/1166

TENDER ENQUIRY

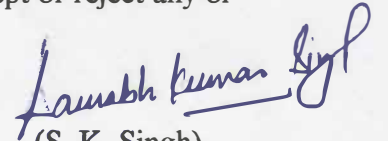
Sub: Invitation of quotation for "Fabrication, Inspection, testing, documentation, guarantee, transportation and safe delivery of heat exchanger, pipe fittings and flanges at CTD stores, BARC, Trombay, Mumbai as per enclosed drawing & technical specification. (Quantity: *As per annexure -1*)."

Dear Sir,

1. Quotations are invited for above said job as per the enclosed specifications.
2. Taxes should be quoted separately. Form "H" will be provided wherever necessary.
3. Quotation without PAN, TIN and GST no. will not be accepted.
4. Validity of the quotation should not be less than 90 days.
5. Quotations shall be properly sealed in an envelope. Open or stapled envelopes will not be accepted.
6. The Quotation must reach to Head, Chemical Technology Division by **15/11/2017** at 14.00 Hours and must be sent by *speed post* in the sealed envelope super scribed with the above reference number and the due date given above. Also the name of the work should be displayed on the envelope.
7. The address on the envelope should read: -

**Head, Chemical Technology Division,
Bhabha Atomic Research Centre,
CEL - 2, Trombay,
Mumbai - 400 085,
Attn: Mr. S. K. Singh, SO/E, CTD.**

8. Head, Chemical Technology Division, BARC reserves the right to accept or reject any or all the quotations without assigning any reason.


(S. K. Singh)
SO/E, PTS, CTD

Encl: -- Technical specification.

Technical Specification

1. Scope of supply:

- 1.1** The scope of supply is procurement of the raw materials & its testing, fabrication of heat exchanger, pipe fittings and forged flanges (detailed in enclosed drawing and annexure -1) as per approved QAP (quality assurance plan), inspection, testing, documentation, guarantee, forwarding, transportation, safe delivery at CTD stores, BARC, Trombay, Mumbai-400085.

Quantity: As per annexure -1

The heat exchanger 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.

- 1.2** 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.
- 1.3** The purchaser reserves the right to make minor changes in the process equipment in such a way that, this change will not affect the functional strength of the equipment.
- 1.4** Party should 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 and pipe fittings shall comply with the requirements of this specification with all its annexure, latest edition of codes and standards specified.

- 2.1** Applicable drawing: Process Equipment A2-PTS/CTD/014-Heat exchanger”.
- 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 Section-II.
 - 2.2.5. ASTM-E-94: Recommended practice for radiographic testing.
 - 2.2.6. ASTM-E-165: Liquid penetration inspection method
 - 2.2.7. ASTM-A-312: Seamless Stainless steel pipe.
 - 2.2.8. ASTM-A 182: Standard Specification for forged steel flanges.

- 2.2.9. 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.
- 2.2.10. ASME/ANSI B 16.5-Pipe flanges and fittings.
- 2.2.11. ASME Sec V: Non Destructive Examination.
- 2.2.12. ANSI B16.11: Socket welds & threaded steel fitting.
- 2.2.13. ANSI B16.9: SS pipe fitting (butt weld able).
- 2.2.14. ASTM-E-8: Test method for tension testing of metallic material.
- 2.2.15. ASTM-A-242: Detecting susceptibility to inter-granular attack in Austenitic stainless steel
- 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.
- 2.2.18. Note: Applicable standards other than above if any, to be specified by vendor while carrying out detailed design.

3. Service:

3.1 Heat Exchanger

- 3.1.1 Heat exchanger:
Design pressure: full vacuum to 10 bar, design temperature: up to 80⁰C, water and liquid nitrogen application.

3.2 Butt weld fittings and forged Flanges

- 3.2.2 Design as per ANSI B-16.9, all fittings shall be concentric.

4. Quality Assurance Plan (QAP)

4.1 Pre-fabrication:

- 4.1.1. Raw material clearance
Chemical, Physical, Mechanical and Corrosion testing as per SA-262 practice A and E.
- 4.1.2. Consumable clearance
Chemical analysis shall be submitted to purchaser and mechanical shall be done (if required).
- 4.1.3. Approval of manufacturing engineering Instructions and QA plans.
- 4.1.4. Welders and welding procedure qualification

4.2 In process clearance:

- 4.2.1. Fit-up at all assembly stages.
- 4.2.2. Final inspection of all welds including DPT and Dimensions.

4.3 Documentation:

- 4.3.1. At Pre-fabrication stage
- 4.3.2. In process
- 4.3.3. Post fabrication

Note: The points are only indicative. The actual hold 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.

5. Material Testing:

- 5.1** All material tests, physical and chemical, shall be carried out in reputed govt. approved test laboratories. Tests will be witnessed by purchaser's representative. Supplier should intimate 15 days in advance for witnessing the material testing. Supplier must ensure that the material being used is new and conforms to relevant standard mentioned in this specification.
- 5.2** All the fitting/flange required for fabrication of process equipment should be of "reputed" make and should come with all necessary certificates like material testing certificates, physical test certificates etc.

6. Fabrication drawing:

- 6.1** After the award of the contract, vendor within a period of 15 days shall submit the detailed fabrication drawing along with QAP for approval. Vendor shall start the fabrication only with approved drawings. Fabrication of equipments prior to approval of the drawing is at vendor risk. In case of any revision, revised drawing to be submitted for approval. As built drawing shall be submitted to purchaser at the time of delivery. Detailed drawing must have following information:

- 6.1.1. Bill of materials with size, quantity and relevant codes and standards.
- 6.1.2. Nozzle orientation plan, Nozzles reinforcement details.
- 6.1.3. All the dimensions and sizes in metric unit
- 6.1.4. Flanges & Compression Tube fittings details
- 6.1.5. Design condition
- 6.1.6. Test and test conditions
- 6.1.7. Vendor name and address
- 6.1.8. Purchase Name and Purchase order No.
- 6.1.9. Drawing Number, Scale of drawing & revision no, revision details and revision date.
- 6.1.10. General fabrication details and practice
- 6.1.11. Welding method used
- 6.1.12. Drawing Format: Any

- 6.2** Vendor shall submit the soft copies of all test report duly signed by purchaser-representative and drawing in as built condition in CD at the time of delivery.

7. Material requirements:

- 7.1** Material, process of manufacture & workman ship shall be of high quality & in accordance with good practises to the manufacture of steel components.

Procurement of all the material & consumables required for fabrication & testing shall be in the scope of the vender.

- 7.2** Material of construction :
Process equipment: SS 304L
Butt weld fittings and forged Flanges: SS 304L
- 7.3** 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.
- 7.4** Test certificate for welding filler material shall be submitted to purchaser for approval, prior to fabrication of equipment.
- 7.5** Inspection report of all bought out materials shall be submitted to purchaser for approval.
- 7.6** Material & consumables not specifically mentioned here shall be of good commercial quality and in accordance with the practice pertinent to manufacture of pressure vessels.
- 7.7** Wherever the use of a material to an alternative specification is proposed, the alternative shall be subject to prior approval by the purchaser.
- 7.8** Materials which do not conform to any standard shall be subjected to approval by the purchaser before start of manufacture.

8. Equipment fabrication:

- 8.1** 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.
- 8.2** 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. Welder qualification shall be witnessed by the purchaser's representative. Procedure report (PQR) shall be approved from the purchase representative.
- 8.3** Welding consumable electrodes shall be of standard make like Advani, L&T, D&H and ESAB.
- 8.4** 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.
- 8.5** Stamp transfer for each and every part is must to establish the traceability.
- 8.6** In case of hot forming during fabrication, full care shall be taken so that physical & chemical properties of the material are not changed.
- 8.7** 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.
- 8.8** Before the equipment are closed/welded with second head, 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.

8.9 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.

8.10 Cleaning, pickling and passivation details shall be given to the purchaser for approval well before the start of the work.

9. Inspection, testing and reports:

9.1 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.

9.2 The party shall prepare inspection reports for each component after their inspection, in suitable format acceptable to the purchaser.

9.3 Party shall inform the purchaser for inspection after his internal inspection report is ready.

9.4 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.

9.5 Chemical analysis of materials used for fabrication of items for following elements e.g. C, Cr, Ni, Fe, Mo, Mn, S, N and Si is required.

9.6 Hydro and pneumatic tests will be conducted for the vessels at party's works and the party should make the arrangement for the same.

9.7 Mechanical & IGC A/E test as per ASTM is required.

9.8 DP test of root pass and final pass is must.

9.9 A radiography acceptance criterion for finished equipment will be ASME section-VIII div. 1.

9.10 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.

9.11 Purchaser shall be at their liberty to specify additional inspection procedures, or change the one being used, to ascertain the conformance with the specification.

9.12 Purchaser or his representative shall be given full assistance in the form of tools, gauges, instruments, skilled manpower, etc. to facilitate inspection.

9.13 Leak rate of heat exchanger shall be tested by BARC (**in BARC scope**) through Helium mass spectrometer leak detector (He-MSLD). The maximum permissible limit of leak rate shall not be more than 5×10^{-9} mbar lit/sec (in Vacuum mode).

9.14 In case of butt weld fitting and forged flanges, party shall submit test certificate of raw material used for fabrication of fittings and flanges (chemical composition, mechanical properties and IGC A/E).

9.15 Dimensional check of fitting and flanges shall be carried out as per the standard mentioned in the specification.

9.16 Party shall provide the testing (Chemical, Mechanical & IGC A/E) of fittings and flanges (selected on random basis and also depend upon the product heat no/lot no) the lot will be rejected if the sample fails in the test.

- 9.17** Party shall provide the ultra sonic testing of butt weld fittings and forged flanges (5 % selected by purchaser).
- 9.18** All butt weld fitting and forged flanged shall be clearly marked on make, size, pressure class and material of construction.

10. Guarantee:

- 10.1** The vendor shall guarantee that the equipment and materials mentioned in the scope of supply are new and they conform to high quality such that the equipment and material are free from defects in material fabrication and workmanship as per the requirement of this technical specification for a period of **eighteen month** after the completion of all delivery or **twelve months** from the date of commissioning, whichever is earlier.
- 10.2** If within the guarantee period stipulated above, the equipments and materials, mentioned in the scope of supply or any part of the same are found defective because of bad materials, improper fabrication or any deviation in the operation carried out from standard manufacturing practices (QAP) by the vendor in the scope of supply, then the vendor at his own expense either repair them, preferably on the site or transport them to their workshop and repair/replace them and deliver back at site again. The decision of repair and replacement will be taken in consideration with the function, end use and life of that equipment.

11. Documentation

- 11.1** Three copies of following documents in bound form shall, be handed over to purchaser at the time of delivery of these equipment. The entire document should be approved by the purchaser's representative.
- 11.1.1. As built drawing
 - 11.1.2. Test certificate from lab.
 - 11.1.3. Inspection report
 - 11.1.4. Mill test certificate
 - 11.1.5. Brochures & guarantee certificates of bought out components.
 - 11.1.6. Welder's performance test reports
 - 11.1.7. Welding procedure test reports
 - 11.1.8. Weight of each equipment
 - 11.1.9. Heat treatment records.
 - 11.1.10. Reports of all test certificates
 - 11.1.11. Quality compliance report.
 - 11.1.12. Any other relevant documents

- 11.2** All above documents in scanned form in CD-2 Nos.

12. Packaging:

- 12.1** After obtaining written dispatch clearance from purchaser's representative, the equipments shall be delivered, safely, at BARC, Trombay, Mumbai, in good condition.

- 12.2 The items shall be properly packed in wooden case and nozzles shall be protected from damage during transit.
- 12.3 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.
- 12.4 Sound packing material of suitable size and weight of the contents shall be used.
- 12.5 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.
- 12.6 A copy of the inspection report must be sent along with the consignment.

13. Delivery:

- 13.1 The items after inspection and acceptance shall be delivered to CTD Stores, BARC, Trombay 400 085.
- 13.2 Supply shall be completed within Three months from the date of placement of the purchase order.
- 13.3 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.
- 13.4 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.

14. Quotation:

- 14.1 Quotation shall be submitted giving due breakup as per table in given format, failing which it shall be considered incomplete and rejected.

Description		Value (Rs.)
A	Material Cost	
B	Cost fabrication and machining	
C	Packing Forwarding charges	
D	Delivery charges	
E	GST	
F	Any other cost	
G	Total	

14.1.1 Indicate clearly all taxes, duties.

14.1.2 No separate insurance charge will be provided. Supplier can quote it with manufacturing cost.

14.2 The following information shall be furnished along with quotation positively but for which the offer is liable to be treated as incomplete and rejected.

14.2.1 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. Please list the details like type, make & model, size, year of purchasing, spindle run out and repeatability.

14.2.2 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.

14.2.3 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, brief description of the job with sketch, and date of completion. Submit the details regarding similar job done for BARC or any other DAE units.

14.3 Explicitly state your proposed delivery schedule at the time of quotation.

15. G.A. Drawing

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

16. Special notes

16.1 Any delay which is attributable to the contractor is liable for a penalty @ 0.5 % of the work order value per week (max 5%) to be levied on the contractor.

16.2 No advance payment shall be made.

16.3 Sample fittings shall be submitted by the party for evaluation (if asked).

16.4 Income tax @2% and any other charges such as education cess etc., if applicable, shall be deducted from the party's bill.

16.5 The payment shall be made through Accounts Division, BARC, only on satisfactory completion of the work and on production of the invoice, the advanced stamp receipt, the completion certificate and the Guarantee Certificate. The prices quoted will be firm and final.

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

Item No.1: Heat exchanger

Quantity: 2 no.

As per drawing no.: A2-PTS/CTD/014

Item no.2: Butt weldable Fittings and Forged flanges:

Item 2a. Weld able fittings Pipe.

Material of construction – SS-304L (SA312 TP 304 L)

Sr. No.	Description of fittings	Quantity (No.)	Remarks (Fittings ANSI B 16.9)
1	Pipe Elbow (Long radius) size: 1/2" NB x 1/2" NB	30	Butt Weld able Sch 40 pipe
2	Pipe Elbow (Long radius) size: 1" NB x 1" NB	20	
3	Pipe Elbow (Long radius) size: 2" NB x 2" NB	20	
4	Return bend (180° long radius) size: 1/2" NB x 1/2" NB	10	
5	Return bend (180° long radius) size: 1" NB x 1" NB	10	
6	Return bend (180° long radius) size: 2" NB x 2" NB	10	
7	Equal Tee size: 1/2" NB x 1/2" NB	30	
8	Equal Tee size: 2" NB x 2" NB	10	
9	Equal Tee size: 1" NB x 1" NB	15	
10	Reducing tee size: 2" NB x 1" NB	10	
11	Reducing tee size: 1" NB x 1/2" NB	10	
12	Coupling/ Adaptor Size, 1/2" NB x 1/2" NB (F) NPT	20	
13	Coupling/ Adaptor Size, 1/2" NB x 1/2" NB (M) NPT	20	
14	Concentric Reducer, 1" NB x 1/2" NB	30	
15	Pipe Caps, 1/2" NB	10	
16	Pipe Caps, 1" NB	10	
17	Pipe Caps, 2" NB	10	

Item 2b. Forged Flanges
Material of construction: SS 304 L

Sr No.	Forged Flanges Size - Rating	Material	Quantity	Type of flanges (ANSI B16.5)
1	½"NB – 150 #	SA162 F TP 304L	30	SORF
2	½"NB – 150 #	SA162 F TP 304L	10	RF(Blind)
3	1"NB – 150 #	SA162 F TP 304L	10	SORF
4	1"NB – 150 #	SA162 F TP 304L	6	RF(Blind)
5	2"NB -150 #	SA162 F TP 304L	10	SORF
6	2"NB -150 #	SA162 F TP 304L	10	RF(Blind)

6

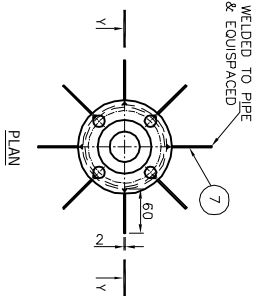
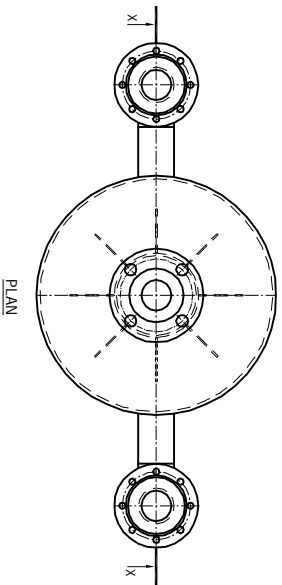
5

4

3

2

1



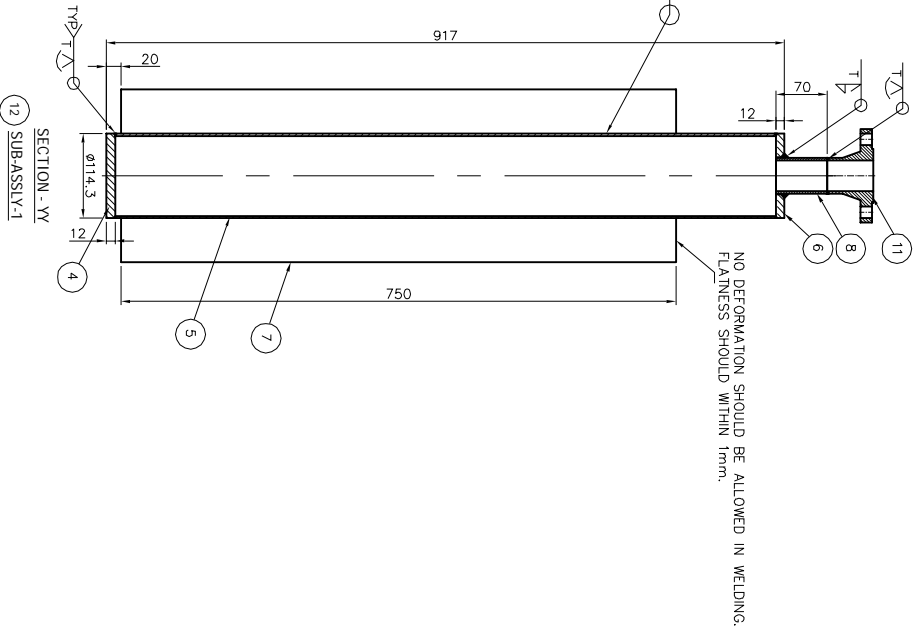
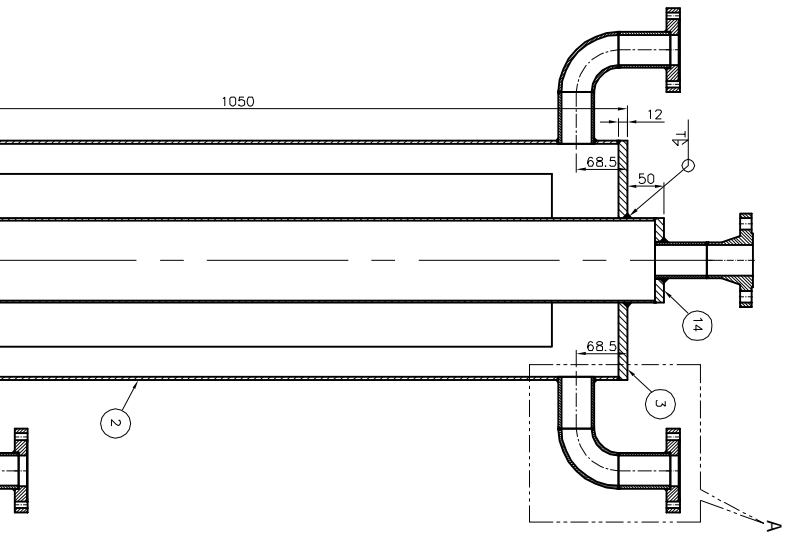
8 NOS. FIN WELDED TO PIPE AS SHOWN & EQUISPACED

- NOTES:-**
01. ALL DIMENSIONS ARE IN mm.
 02. DM WATER SHALL BE USED FOR CLEANING & HYDROTEST OF THE EQUIPMENT.
 03. ALL SS SURFACES SHALL BE PICKLED & PASSIVATED AS PER RELATED ASTM STANDARD.
 04. ALL WELD JOINTS SHALL BE BUTT WELD WHERE EVER POSSIBLE.
 05. AFTER HYDROTEST THE EQUIPMENT SHALL BE THOROUGHLY CLEANED.
 06. NECESSARY CARE TO BE TAKEN DURING HANDLING, WELDING & FABRICATION OF EQUIPMENT. TO AVOID THE SCRATCHES, PIN HOLES, BLOW HOLES, DENT MARKS FROM INSIDE & OUTSIDE OF EQUIP.
 07. ALL SHARP CORNERS TO BE ROUNDED OFF.
 08. ALL TEST i.e HYDRO TEST & PNEUMATIC TEST WILL BE PERFORMED AS PER BARRC SPECIFICATION.
 09. OHFC GASKET & PTFE GASKET SHALL BE USED WITH THE BLIND FLANGES WHILE TESTING EQUIPMENT.
 10. CLEANLINESS:- ONLY POTABLE WATER OF TDS NOT MORE THAN 50 ppm SHALL BE USED FOR CLEANING OPERATION. FINALLY ALL TRACES OF WATER SHALL BE REMOVED BY USING WARM AIR OR OTHER ACCEPTABLE METHOD.
 11. LEAK TIGHTNESS SHALL BE ASSESSED USING SOAP BUBBLE TEST AND PRESSURE RETAINED IN THE SHELL FOR 30 Mins.
 12. BESIDE TEST AS PER RELEVANT ASTM SPECIFICATIONS, IGC A-262 PRACTICE ARE FOR ALL MATERIAL THAT IS GOING TO BE USED TO FABRICATE THE EQUIPMENT SHALL BE CONDUCTED.
 13. ALL THE WELDS SHALL BE FINISHED SMOOTHLY & MERGE WITH THE PARENT METAL WITHOUT RIDGES OR UNDERCUTTING. ANY GAUGING MARKS, SCRATCHES ETC. WHICH OCCUR DURING FABRICATION, TESTING & SHIPMENT SHALL BE REPAIRED.
 14. GEN. TOL. IS-2102(M).
 15. L SHOULD BE 'K' CLASS.
 16. D.P CHECKED ALL WELD JOINT AT PRESSURE SIDE & NON PRESSURE SIDE WELDING BY SMAW.
 17. ALL OUTSIDE WELD JOINT TO BE DRESSED PROPERLY.

DESIGN DATA:-

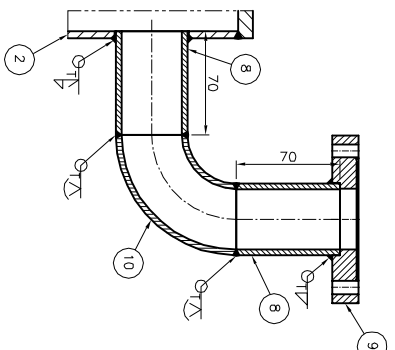
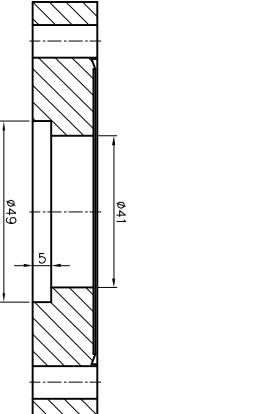
01. PRESSURE VESSEL AS PER ASME CODE SECTION -1 (POWER BOILER CODE)
02. ALL WELDING AS PER ASME CODE SECTION IX.
03. PNEUMATIC PRESSURE TESTING OF INNER & OUTER SHELL = 13 kg/cm² (g) @ ROOM TEMP.
04. HYDRO TESTING OF INNER & OUTER SHELL = 15 kg/cm² (g) @ ROOM TEMP.

DESIGN CONDITIONS	
SHELL	INNER SHELL PR = 10 BAR(g) & OUTER SHELL PR = 10 BAR(g).
DESIGN PRESSURE	
DESIGN TEMP.	80° C



NO DEFORMATION SHOULD BE ALLOWED IN WELDING. FLAKINESS SHOULD WITHIN 1mm.

NOTES:- THESE FEATURES ARE TO BE MACHINED FROM BLIND OF-63 BLIND FLANGE



DETAIL - A (TYP. NOZZLE ASS'Y)

SL. NO.	DESCRIPTION	MATERIAL	QTY	REMARK
1	BASE PLATE (OUTER SHELL)		01	
2	12" NB X SCH 10 PIPE AS PER ANSI B 36.10		01	
3	TOP PLATE (OUTER SHELL)		01	
4	BASE PLATE (INNER SHELL)		01	
5	4" NB X SCH 10 PIPE AS PER ANSI B 36.10		01	
6	TOP PLATE (INNER SHELL)		01	
7	FIN PLATE		08	
8	1 1/2" NB X SCH 40 PIPE AS PER ANSI B 36.10		07	
9	CF-63 BLIND FLANGE.		03	TO BE MACHINED AS SHOWN IN DRAWING
10	1 1/2" NB X SCH 40 X 90° LR ELBOW AS PER ANSI B 16.9		03	
11	1 1/2" NB CLASS 150 WELDNCK FLANGE AS PER ANSI B 16.5		01	
12	CF-63 BLANK FLANGE WITH SUITABLE OHFC GASKET, NUT, BOLT AND WASHER		03 SETS	
13	1 1/2" NB CLASS 150 BLIND FLANGE AS PER ANSI B 16.5 WITH SUITABLE PTFE GASKET, NUT, BOLT AND WASHER		01 SET	
14	SUB-ASS'LY-1		01	

PROJECT OR SECTION

MTS

HEAT EXCHANGER

APP'D:-
PROJECTION:-
SCALE:- 1:10



A2-PTS/CTD/014

THIS DESIGN AND DRAWING IS THE PROPERTY OF BHABHA ATOMIC RESEARCH CENTRE. IT MUST BE RETURNED WITH QUOTATION OR UPON THE DELIVERY OF MATERIAL AND EQUIPMENT AND MUST NOT BE USED EXCEPT BY PERMISSION OF THE OWNER.

NO.	LOC.	DESCRIPTION	DR'N DATE	APP'D	DR'N DATE
		REVISION <td></td> <td></td> <td></td>			

GOVERNMENT OF INDIA
BHABHA ATOMIC RESEARCH CENTRE
CHEMICAL TECHNOLOGY DIVISION

DRG. NO:-
A2-PTS/CTD/014
SHEET NO:-
OF

6

5

4

3

2

1

PS / 429