



Government of India
Bhabha Atomic Research Centre
Nuclear Recycle Group
Process Development Division

CDCFT, WIP Complex, Trombay

Ref: PSDD/PMDS/MF/SS/2019/OPN/59702

Date: March 29, 2019

Sub: Fabrication, Testing, Supply and Installation of a SS304L Sieve Plate Column with MS Support Structure, a Gas-Liquid Separator and a Horizontal Product Tank for Ozonation Test Loop at OTF, with free issue of material.

Dear,

You are requested to submit your quotation in sealed envelope for the above mentioned job. The material should confirm to our specifications. The reference no. given above should be clearly mentioned on the sealed envelope.

Quotations shall be complete in all respects with regard to specifications, validity of offer etc., and must reach the following address (**by Speed Post only**) on or before **April 29, 2019 by 14:00 hrs.** Received quotations will be opened by the tender opening committee of PSDD on the **same day at 15:00 hrs.**

Sukhdeep Singh
SO/D, PSDD,
Room No.: 204, CDCFT, WIP Complex,
BARC, Trombay, Mumbai-400 085
Phone: 022-2559-1431

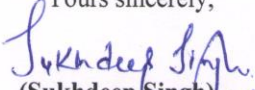
Due consideration shall be given to the following aspects while you submit your offer:

1. The contractor shall arrange all equipment and personnel required for the successful completion of the work and the department will not release any free-issue material except electricity and water.
2. The work shall be completed within **1 month** from the issue of work order.
3. The offer shall be valid for a period of 60 days and in case of placement of the work order, shall remain firm till the completion of the work.
4. Taxes, duties and other charges applicable, if any, shall be indicated separately.
5. Quotation is to be in printed letter head/quotation format which should consist of Sales Tax Registration Number registered with local ST authority/ CST authority, PAN Number of the firm, Service Tax Registration Number, etc. Computer generated forms are to be construed as invalid and rejected.

Security Rules and Regulations:

Rules and regulations of BARC Security have to be strictly followed by contractor. Contractor has to get photo passes issued from security for which Police Verification Certificate is a must. Police Verification Certificate is valid for only 6 months and need to be renewed after every 6 months. All persons working in BARC premises should have a Police Verification Certificate.

Yours sincerely,


(Sukhdeep Singh) 29/03/19
SO/D, PSDD

Technical Specifications

for

Fabrication, Testing, Supply and Installation of a SS304L Sieve Plate Column with MS Support Structure, a Gas-Liquid Separator and a Horizontal Product Tank for Ozonation Test Loop at OTF, with free issue of material.

1. Scope of Work

Scope of the work includes the following activities, involving the machining, fabrication and installation works:

S. No.	Item	Quantity (Nos.)	Reference Figure/Drawing/Section
1.	Machining of 168 mm diameter & 2 mm thick SS304L sieve plates to 112 mm	70	NA
2.	Fabrication of SS304L Sieve Plate Column with MS Support Structure	01	Annexure-I (A)
3.	Fabrication of SS304L Vertical Gas-Liquid Separator	01	Annexure-I (B)
4.	Fabrication of SS304L 120 L Horizontal Tank with Saddle Support	01	Annexure-I (C)
5.	Fabrication of the 40 NB SCH40 Flanged Connector for Column and Gas-Liquid Separator	01	Annexure-I (D)
6.	DP and Hydrotesting of Fabricated Equipment	1 Job	As described in Section 5
7.	Installation of the Loop at OTF, BARC	1 Job	NA

2. Materials

- 2.1 Some of the materials required for the work will be provided by BARC as Free Issue Materials (FIMs). Details of such materials are given in **Annexure-II**.
- 2.2 Charges towards the **transportation** of free issued material from BARC to fabricator's site, and the **insurance (Annexure-II)** of the same, shall be in the scope of the fabricator/vendor.
- 2.3 Unutilized free issued material, if any, shall be returned to BARC at the time of delivery of finished equipment, as per the applicable rules.
- 2.4 Except the free issued materials, all the other materials required for the fabrication, testing and installation of the equipment shall be in the scope of the vendor. No charges will be paid by BARC towards the scrap or unutilized materials.
- 2.5 The material being used shall be new, genuine quality and as per the relevant ASTM or equivalent international standards. The fabrication work shall commence only after obtaining due approval from BARC on the raw material/components procured by the fabricator.

- 2.6 All materials including welding consumables procured by the fabricator for manufacturing of equipment under this specification shall be inspected and check-tested by BARC to the requirement of appropriate material specifications/standard and approved quality assurance plan (QAP).
- 2.7 MOC shall be as:
- SS: ANSI 304L (for sieve plate column, vertical gas-liquid separator, Horizontal Product Tank and the Connector between Column & Separator)
 - MS: IS2062 E250 GR BR (for structural support to column).
 - Teflon: (for gaskets of sieve plate column and gas-liquid separator flanged joints)

3. Fabrication Requirements:

3.1 General

- a) Fabricator shall prepare fabrication drawings, bill of materials, manufacture, inspect, test, pack and deliver the equipment as per details given in this specification. Fabricator's scope of work shall terminate only when the equipment with attachments and supports are delivered in good condition, without any damage, and installed at the Project Site (OTF, BARC).
- b) Detailed QA plan shall be submitted for approval of the Purchaser prior to start of fabrication.
- c) Each weld joint (viz., butt, fillet, etc.) shall be uniquely identified/ designated and shall be referred to, in all the documents of interest (viz. fabrication drawings, NDE tables, inspection reports etc.).
- d) Fabricator shall maintain a system of identification for the materials so that all materials used can be identified with respect to test certificates.
- e) All material should be cut preferably by mechanical cutting process like shearing/hacksaw etc.
- f) All shop floor staff, technicians, supervisors, engineers, etc., deployed for the above work shall be familiar & experienced in handling and fabrication of required materials.
- g) An exclusive and adequate stock of tools, tackles, consumables, grinding wheels, sanding discs etc., shall be made available exclusively for the fabrication.
- h) Stainless steel wire brushes, wire brush wheels, acetone, etc., shall be provided to the welders for proper pass-by-pass cleaning.
- i) All filler wires shall be stored in dry and enclosed area. All filler wires shall be kept in clean dispensers and cleaned with proper cleaning medium prior to use.
- j) Raw material procured shall be stored in dry enclosed area as per standard practice for such materials ensuring safety from cross contamination and damage.
- k) The raw materials shall be properly cleaned and degreased prior to taking up any manufacturing operation. All rollers etc. used for forming shall also be thoroughly cleaned and degreased prior to commencement of rolling operation. Suitable liners shall be used on the forming tools to avoid direct contact of metal sheets with the roll material.
- l) All material shall be properly cleaned after any forming process.
- m) All temporary fixtures in direct contact with the job shall be preferably made from the same material.
- n) The internal & external surfaces shall be free from surface irregularities.
- o) All welds shall be carried out by providing suitable arrangement for purging (back, front and trailing).
- p) Weld surfaces shall be ground smooth before carrying out the plating.

3.2 Drawings, Codes and Standards:

3.2.1 Applicable Scope Drawing:

Following drawing shall be used for fabrication of the equipment.

Drawing Number (Annexure-I): A4/PSDD/PMDS/OZONELOOP/OTF/2019

This drawing/sketch provides the general construction details and few basic dimensions only. The fabricator is required to prepare their own fabrication drawing for the equipment and submit to the purchaser for approval, within 1 week of receiving the work order. Fabrication of equipment shall commence only after the approval of fabrication drawing(s) by the purchaser.

3.2.2 The work shall be carried out strictly in accordance with the approved fabrication drawings and the documents/codes/standards of issue in effect on the date of the pertinent tender documents as specified in Technical Specifications. In the event of any conflict between any requirement as given in this specification and that of the applicable codes and standards, governing requirement shall be the more stringent of the two at the discretion of the Purchaser.

3.2.3 The fabrication drawings PDF copy shall be submitted to Purchaser for approval prior to fabrication by the fabricator/vendor. **The Purchaser reserves the right to make, wherever found necessary, minor changes including changes in the fabrication drawings and such changes shall be considered as within the scope of the specified work and shall not be considered as extra work. After approval of the drawings and during the course of fabrication, changes such as addition/deletion of nozzles, modification internal/external supports, etc., which does not substantially increase the scope of works may be introduced by the Purchaser, and these shall not be considered as extra work.**

3.2.4 Applicable codes and standards:

S. No.	Standard/Code	Details
a.	ASME Section II, Part A, B, C	- Ferrous materials (Part A) - Non-ferrous materials (Part B)
b.	ASME Section VIII	Fabrication and Design
c.	ASME Section V	Non-destructive tests
d.	ASME Section IX	Welding/welder qualification
e.	ASTM - E -165	Liquid penetrant test
f.	ASTM E84	Test Methods for Tension Testing of Metallic Materials
g.	ASTM E390	Test Methods for Bend Testing of Material for ductility
h.	IS 2102	Dimensional Tolerances (for dimensions without specific tolerance covered by ASME Section – III Subsection ND)
i.	ASTM - E -1003	Hydrostatic test
j.	ANSI - B - 16.25	Butt welded ends

If the standard of any of the component or material is not listed here, then the relevant international standard for the same will be applicable which shall be communicated to the Purchaser for acceptance.

3.3 Welding:

- a) The GTAW welding process shall be employed for the fabrication.
- b) Argon Gas used shall be of ultra-purity type (min. 99.999%).
- c) Only qualified welders shall be employed for all welding jobs on the same grade(s) of metals (SS304L) to be used in actual production.
- d) No production welding shall commence until welding procedure qualification is completed and approved by the Purchaser / Quality surveyor. **Fabricator shall submit to the Purchaser copies of the approved procedure and performance qualification reports. In case the fabricator has previously approved procedure & performance records, the same shall be submitted to BARC for review and acceptance before start-up of the fabrication.** Tests for welding procedure & performance qualification shall be carried out in conformity with requirements of relevant codes.
- e) Cost of conducting all the tests shall be borne by the fabricator. Purchaser shall have the right to call further qualification tests from time to time for any welder who is not producing finished welds of required quality or who has discontinued welding by the particular process for more than three months.
- f) Surfaces to be welded shall be free from paint, oil, grease, dust or any other contamination. Cleaning of surfaces/weld edge preparations/ completed weld shall be done only by use of appropriate solvents.
- g) Haphazard striking of electrode on base metal for establishment of arc shall not be permitted. High Frequency unit shall always be used for arc starting.
- h) Heat input to the job shall be minimized by suitable techniques.
- i) Suitable welding fixtures shall be used in achieving the requisite fit-ups for welding.
- j) The fabricator shall apply the best suitable fabrication and welding practices to achieve the basic intent of quality. The defective areas, as revealed by visual or applicable NDT method, shall be repaired as per the approved procedure and re-inspected as per the original NDT method.
- k) **Welding Documentation:** Fabricator shall maintain a proper record of the welding being performed by the welder. It is required to maintain the traceability of a particular weld to the welder responsible for its production, together with the heat / batch number(s) of the filler wires used and the welding technique adopted.

3.4 Sub-contracting:

- 3.4.1 Sub-contracting of the entire work shall not be permitted. However, for any part works, the fabricator shall provide details of the sub-vendors whom they propose to employ.
- 3.4.2 The fabricator shall also ensure that the sub-contractor/ sub-vendor maintains the specified quality for fabrication, inspection, QC, etc. of the part / component / product as mentioned in this technical specification.
- 3.4.3 The fabricator shall not try to develop any sub-contractor / sub-vendor, who does not have the experience in required jobs.
- 3.4.4 The facilities of the sub-vendors shall be subject to inspection and approval of the Purchaser before start of fabrication. Written procedures with regard to the work to be carried out by the sub-vendor shall be submitted by the fabricator for approval of the purchase.

4. Cleanliness & Surface Finish:

- 4.1 All welds shall have smooth contour and merge smoothly into the parent metal. The welds on the inside surfaces are to be ground smooth and flush with the parent metal. The general surface finish shall be equal to or better than a standard pickle and passivated finish.
- 4.2 All scales, dents, burrs, weld spatter, oxide, oil and other foreign materials shall be completely removed from inside and outside of the component. Items that will not permit their cleaning after complete fabrication shall be cleaned prior to assembly.
- 4.3 Fabricator shall take care to see that all chemicals/materials used for cleaning, marking and degreasing etc. are iron, halogen and sulphur free.
- 4.4 Hammering on weld is not permitted. Removal of undercut when carried out shall not result in under flushing of the parent plate.
- 4.5 Handling: Care shall be taken in handling of the equipment at all stages of manufacture, testing, inspection and shipping. All necessary precautions shall be taken to prevent from any kind of damage.

5. Inspection & Testing:

5.1 Certificate of Manufacture & Inspection:

The case history of manufacture, certification and inspection shall be prepared concurrently with the manufacturing activities. The fabricator shall, upon completion of each stage of the fabrication, certify that it has been manufactured inspected & tested in accordance with these specifications, relevant drawings and applicable documents. If any deviations have been made during manufacture these shall be clearly stated and covered by authorized documents. This certificate shall form part of the completed documentation for the fabricated item.

5.2 Dye Penetrant Examination:

- a. Acceptance of the Dye Penetrant (DP) examination method shall conform to ASME Sec. III Div. 1 ND, together with the requirements given in relevant clauses of this specification.
- b. Dye penetrant examination shall be carried out on all the weld layers together with their HAZ (minimum ½ inch on either side of the weld) as well as other areas wherever specified.
- c. Only visible dye-penetrant solvent (removable type) method shall be employed for all welds and other metallic surfaces. The residual amount of total sulphur in the penetrant, developer and cleaner used shall not exceed 1% by weight and halogens shall not exceed 25 ppm. **Fabricator shall obtain certification of these tests for the penetrant materials used giving batch numbers and test results.**
- d. Acceptance Standards:
 - Any linear indication is not acceptable.
 - Single rounded indications more than 0.8 mm diameter on the outside surface or any cluster of indications are not acceptable.

5.3 Hydrostatic Test:

- a. Hydrostatic test of the fabricated and DP tested equipment viz. sieve plate column, gas-liquid separator, horizontal product tank and connector shall be done at **1 kg/cm² (g)** pressure.
- b. The test procedure shall be submitted by fabricator for **Purchaser's approval**. Clean demineralized (DM) water, with total halogen content < 25 ppm (with neutral pH) shall only be used.
- c. The joints used shall, unless otherwise specified in the contract, be identical with those specified for operational duty. No leakage from temporary fittings shall be allowed during testing.
- d. After completion of the hydrostatic test, the equipment shall be fully drained/cleaned and dried by passing clean, oil free air in a satisfactory manner.

5.4 Final Inspection of Finished Equipment:

An external and internal examination of the completed equipment shall be made by the Inspector. The finished dimensions and cleanliness of the fabrication shall comply with the relevant drawings to the satisfaction of the inspector after completion of all the required tests.

6. Drawings and Documents to be provided:

- 6.1 Test certificate for all materials used (MS, SS304L, Teflon etc.)
- 6.2 All inspection and test reports for in respect of materials/ components/ complete equipment
- 6.3 4 (four) prints of the approved fabrication drawing.
- 6.4 4 (four) prints of the 'As built' drawing (after completion of fabrication)
- 6.5 One set of the following duly approved Documents/ Procedures/ Reports:
 - Detailed manufacturing plan.
 - Detailed inspection and Q.A. Plan.
 - Detailed procedure for fabrication of formed components.
 - Detailed procedure for other tests such as D.P. Test, hydrostatic test, weld repair etc.
 - WPS, PQR, WPQ etc.
 - Details of stage-inspections carried out by the Purchaser.

7. Packaging & Delivery:

- 7.1 The finished product shall be thoroughly cleaned and dried before packaging for shipment. It shall be packed in wooden crate with weather proof packaging and shall be properly secured inside the packaging by soft material like foam or thermocol to prevent transit damages. Necessary indicators such as "Fragile", "This side up" etc. shall be marked in bold fonts on the package. The package shall have provisions for handling by fork lift and also it should have hooks provision. Any additional method/component required for the safe transport of the product may be provided.
- 7.2 A nameplate shall be affixed on the cell at a suitable location containing relevant information of the cell as provided by Purchaser.

7.3 The cell shall be dispatched to ASO, WMZ Stores, BARC, Trombay after obtaining a Shipping clearance from the Purchaser. The fabricator shall be fully responsible for the safe delivery at their destination and fabricator shall satisfy the Purchaser that adequate measures have been taken for the same.

8. General Conditions of Contract

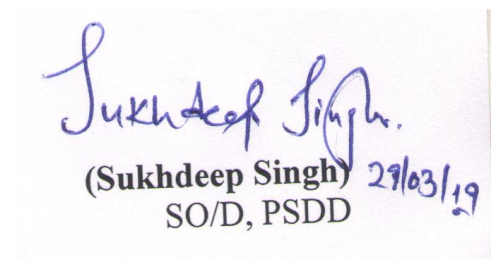
8.1 The work shall be completed within **1 month** after the award of the contract.

9. Guarantee

9.1 The job covered under this work order shall be guaranteed for a period of 1 year, from the date of completion, for its effective functioning & integrity. The contractor/supplier shall rectify the defects/faults detected from time to time at no extra cost to the purchaser, during the guarantee period.

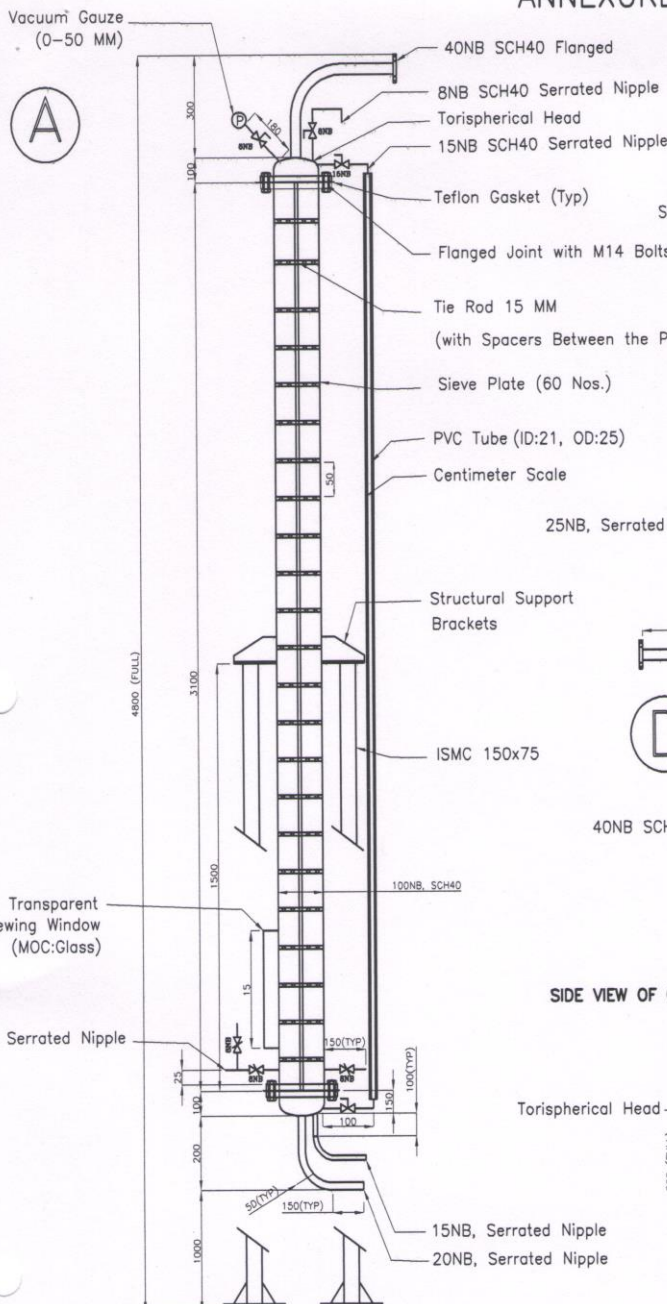
Annexure-I: Fabrication Sketch for a Sieve Plate Column with MS Support Structure, a Vertical Gas-Liquid Separator , a Horizontal Product Tank and a Flanged Connector.

Annexure-II: List of Free Issue Materials to be Supplied by the Department.

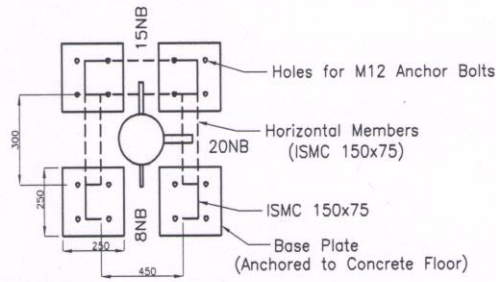


Sukhdeep Singh.
(Sukhdeep Singh) 29/03/19
SO/D, PSDD

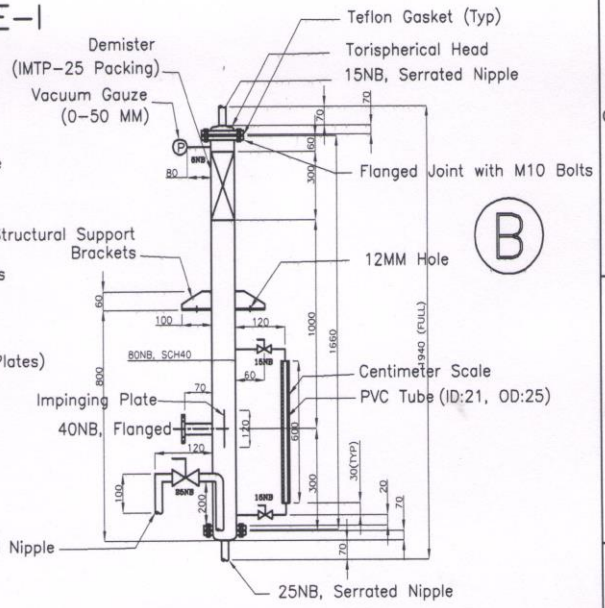
ANNEXURE-I



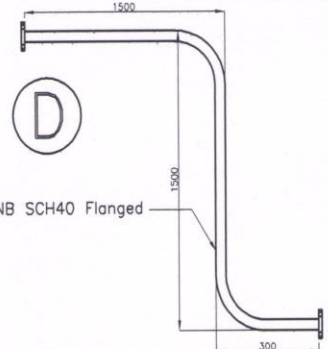
**SIDE VIEW OF SIEVE PLATE COLUMN
(WITH MS SUPPORT STRUCTURE)**



**TOP VIEW OF SIEVE PLATE COLUMN
(WITH MS SUPPORT STRUCTURE & BOTTOM NOZZELS)**

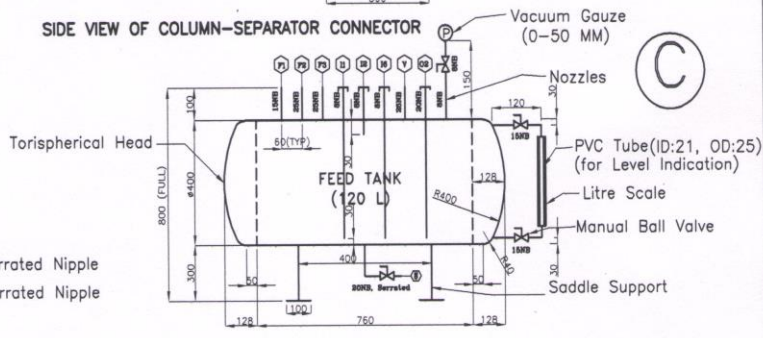


SIDE VIEW OF VERTICAL GAS-LIQUID SEPARATOR



SIDE VIEW OF COLUMN-SEPARATOR CONNECTOR

NOZZLE LEGEND FOR (C)	
	Threaded Male (with Cap)
	Flanged
	Serrated Nipple



SIDE VIEW OF HORIZONTAL FEED TANK

NOTE: ALL DIMENSIONS ARE IN MM, UNLESS OTHERWISE STATED.

GOVERNMENT OF INDIA BHABHA ATOMIC RESEARCH CENTRE NUCLEAR RECYCLE GROUP PROCESS DEVELOPMENT DIVISION	
PROJECT TITLE: OZONE TEST LOOP, OTF	
DRAWING TITLE: FABRICATION SKETCH FOR A SIEVE PLATE COLUMN WITH MS SUPPORT, A VERTICAL GAS-LIQUID SEPARATOR & A HORIZONTAL FEED TANK	
DRAWN:	DESIGNED:
REVIEWED:	APPROVED:
SCALE: NTS	DATE: 29.03.2019
DRAWING NO.: A4/PSDD/PMDS/OZONELoop/OTF/2019	REVISION: RO

Annexure-II

LIST OF FREE ISSUE MATERIALS TO BE SUPPLIED BY THE DEPARTMENT

S. No.	Item Description	Quantity	Purpose
1.	SS304L, 80 NB, SCH 40, Seamless Pipe	8 m	Fabrication of Vertical Gas-Liquid Separator
2.	40 NB, SCH 40, Seamless Pipe	8 m	Fabrication of Flanged Connector for Sieve Plate Column and Vertical Gas-Liquid Separator
3.	Perforated Sieve Plates	70 Nos.	For the fabrication of Sieve Plate Column
4.	IMTP-25 Ceramic Saddle Random Packings	10 kg	For making the Demister portion of Vertical Gas-Liquid Separator

The contractor shall submit an **Insurance Policy** of value not less than the estimated value of FIM, as calculated below:

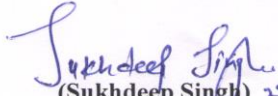
S. No.	Item Description	Quantity	Approximate Rates from the Internet (in Rs.)	Approximate Value (in Rs.)
1.	SS304L, 80 NB, SCH 40, Seamless Pipe	8 m	2,600 per m	20,800
2.	40 NB, SCH 40, Seamless Pipe	8 m	932 per m	7,456
3.	Perforated Sieve Plates	70 Nos.	500 per plate	35,000
4.	IMTP-25 Ceramic Saddle Random Packings	10 kg	500 per kg	5,000
Total Estimated Value of FIM				68,256

VALUE OF INSURANCE POLICY: Rs. 69,000/- (Rupees Sixty Nine Thousand Only).

BENEFICIARY NAME: The President of India, acting through Head, PSDD, BARC.

Following instructions shall be referred for furnishing the insurance policy:

1. The free issue materials (FIMs) to be issued by the purchaser to the fabricator shall be covered by an insurance policy to be taken by the fabricator at his own cost for its full value. The insurance policy shall cover any loss or damage to the purchaser's materials due to fire, theft, burglary, riot, civil commotion, strike etc. The insurance policy shall also cover any damage arising out of external sources, such as damages due to other materials falling on purchaser's materials. The insurance policy shall be valid till the delivery period of all the items covered by this tender. The insurance policy shall include beneficiary name as given above.
2. The fabricator shall be responsible for the safety of the free issue materials after it is received by them and all through the period during which the material will remain in their possession. They shall take all necessary precautions against any loss, deterioration or destruction of the free issue material from whatever cause arising whilst the said material remains in their possession and/or custody or control.
3. The Fabricator shall also not mix-up the material in question with any of their materials and shall render true and proper account of the materials and shall render true and proper account of the materials actually used and return the balance remaining on hand unused along with the scrap materials, if any, within a period of three months from the date of delivery of materials covered by the purchase order.
4. The decision of the Competent Authority to whether the fabricator have occasioned any loss, deterioration or destruction of the free issue materials, while in their possession, custody or control from whatever cause arising as also the decision regarding quantum of the damage suffered by the Government shall be final and binding on the fabricator.
5. FIM shall be stored inside a building with concrete flooring. Material shall be stacked on wooden logs and shall be covered with PVC sheets to avoid contamination. Material shall be stored without any contact with moisture, dust or any other type of contamination.
6. The fabricator shall indemnify the purchaser and keep the purchaser indemnified to the extent of the cost of the free issue materials till such time the entire contract is executed and proper account and return of balance free issue materials rendered.
7. The Fabricator shall make arrangements for the collection of free issue material and return of balance FIM at his own expense, from the **WMZ Stores, WIP Site, BARC, Trombay-400085.**


(Sukhdeep Singh) 29/08/19.
SO/D, PSDD