

<b>Section-1: Name of Work</b>	: Supply, Installation & Commissioning of SS tube, fittings and its accessories for Metallic Closed Loop (MCL) Process Plant at CEL-III, BARC, Mumbai.
<b>1.</b>	<p><b>INTRODUCTION</b></p> <p>The intent of this specification is to enter into a competent contract with qualified bidder to cover all aspects of Material Supply, Transportation, Safe Delivery, Installation, Testing and Commissioning of SS tube and fittings at Purchaser's site and handing over the System as per Tender Specification. Specifications of Supply Items is given in this specification in section-2.</p>
<b>2.</b>	<p><b>GENERAL INSTRUCTION TO BIDDER</b></p> <ol style="list-style-type: none"> <li>1. Bidder should <b>submit offer for all Material and Quantity</b>. Offer for supply of material and quantity partially will not be considered for evaluation.</li> <li>2. <b>The bidder and his representative must have police verification certificate (PVC) in a BARC prescribed format.</b></li> <li>3. Bidder should submit at least two references of similar type of job executed in any Public Sector Unit/ Laboratory in last Four years, with Copies of Purchase Order, Completion Certificate and Performance Report obtained from purchaser along with complete contact details of the Purchaser, such as phone No: and email id along with their original bid.</li> <li>4. Established Manufacturer / Supplier with Quality Assurance &amp; Testing facilities for Supply Items shall only be considered. Manufacturer should have sufficient infrastructure for manufacturing and testing of Supply Item.</li> <li>5. The work under this specification is sophisticated in nature requiring best quality precision workmanship, engineering and construction management. <b>Contractor should depute qualified Engineer with sufficient experience in executing job at site to interact with purchaser.</b></li> <li>6. Qualified bidder should submit Time Line for execution job and Quality Assurance Plan (QAP) within 7 working days after placement of purchase order.</li> <li>7. Compliance sheet giving deviations from specification to be uploaded along with original Bid. All points mentioned in specification shall be adequately filled. In case, there is no deviation, a statement to that effect in reference to the Tender No: shall be uploaded along with the offer.</li> <li>8. Final acceptance will be given only after successful commissioning and Site acceptance Test at BARC, Trombay, Mumbai.</li> <li>9. The documents mentioned above shall be uploaded while submitting the offer online, without which the offer will be treated as incomplete and liable for rejection without any correspondence.</li> <li>10. 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.</li> </ol>
<b>3</b>	<p><b>SCOPE OF THE WORK</b></p> <p>The Contractor shall consider the following jobs in his scope for quoting the tender.</p> <ol style="list-style-type: none"> <li>1. Supply of Material, erection and installation of tubing and fittings by vendor along with erection accessories.</li> <li>2. Supply &amp; Installation of SS tubes and Fitting. These items to be supplied by</li> </ol>

	<p>Contractor as per Specifications given below in this sheet. Installation shall be done as per the approved drawing for air distribution.</p> <p>3. Perforated GI Trays to be used for laying Tubes. These trays are available at site which needs to be installed.</p> <p>4. All the support, clamping, bolting for tubes and fittings are in the scope of work.</p>
<b>4.</b>	<b>SUPPLY OF MATERIALS</b>
	1. The Contractor shall strictly follow the specification of the materials given along with the schedule of quantities. No deviation will be allowed. The purchaser may be involved in stage/final inspection of materials to be supplied by vendor.
	2. The Contractor shall depute his authorized representative to receive the equipment and materials by signing on standard form at Site. The detail auditing of materials received by the Contractor shall be submitted to the department.
	3. The Contractor shall be fully responsible for safe transportation and handling of materials, equipment and consumables from place of delivery to the erection site and complete the erection work.
	4. The Contractor shall supply erection consumables and other erection materials, tools, tackles and testing instruments.
	5. The Contractor shall be responsible for complete erection and satisfactory testing and commissioning of the materials which are in his scope.
	6. The Contractor shall be responsible to complete the work within the stipulated time satisfactorily in accordance with the drawings and specification issued.
	7. Items issued shall be tested in the presence of the departmental representative for its integrity and if any damages found, the Contractor shall report in writing to the department immediately.
	8. The Contractor shall arrange for necessary crane / tractor, trailer or trucks / slings / tools and tackles / labour / including operators for loading and unloading of the material issued to him at site
	9. Preservation of all materials/equipment with the Contractor during storage, pre-assembly & erection, commissioning etc., shall be the responsibility of the Contractor. All necessary preservatives and consumable material like paints, etc. shall be arranged by the Contractor. Necessary touch up painting, periodic application of preservatives, paints on equipment even after erection until completion of work shall be carried out by the Contractor.
<b>5</b>	<b>SAFETY</b>
	1. The Contractor shall be responsible for taking all safety precautions during the work and leaving the site safe at all times and at the end of each working day. When the work is temporarily suspended he shall protect all construction materials, equipment and facilities from casing damage to existing property and personnel.
	2. All Personnel of Contractor working/ present in Site shall wear safety helmets, safety boots and safety belts. The Contractor shall adhere to all the safety precautions necessary at site.
	3. All surplus, damaged, unused materials supplied by the department shall be returned to the purchaser by the Contractor.
<b>6</b>	<b>EXECUTION OF WORK</b>

	1. All works such as cleaning, checking, leveling, aligning, assembling temporary erection for alignment, opening, dismantling of certain equipment for checking and cleaning, surface preparation, edge preparation, fabrication of structural steel components at site, cutting, grinding, straightening, chamfering, drilling, shaping, fitting-up, bolting/welding, etc. as may be applicable in such erection and are necessary to complete the work satisfactorily, are to be treated as incidental and same shall be carried out by the Contractor as part of the work.
	2. The Contractor shall do all the necessary work such as chipping of floor, grouting, etc. necessary to erect any floor or wall mounted fittings etc. and be responsible for patching up all the cut-outs made during erection.
	3. Proper steel structures shall be designed to support all accessories.
	4. It may sometimes be necessary to remove/ rearrange/ replace some of the installed members instruments to facilitate erection of equipment. In such cases, the removal and re-erection of such members, which are essential, and if so agreed by the department, will have to be done by the Contractor, at no extra cost.
<b>7.</b>	<b>CABLE TRAY FIXING</b>
	Purchaser will show the main routing of the trays. Tray routing and distribution drawings shall be prepared by the contractor and take necessary approvals from Purchaser and execute the job in accordance with the approved lay out.
	Contractor's scope of erection of trays/sub-trays/supports shall normally include mounting the cable trays and sub-trays as per approved drawing. Contractor's scope of work shall include laying and supporting of trays, fabrication of tray-supports wherever required, painting of supports and associated minor civil work wherever required.
	This shall include fabrication, welding and installation of branch trays including supports from structural.
	The supports shall be welded to the main structures, grouted in the walls or welded to the plate inserts. Welding of supports to main equipment/piping shall never be allowed. Welding of trays shall not be allowed.
	The department will show the main routing of the trays only and routing of distribution trays shall be determined by the contractor at site in accordance with the equipment and structural member's layout. Minor civil masonry works like grouting, providing inserts, chipping the concrete, bricks etc., shall be included under the contractor's scope of work and nothing extra shall be paid to the contractor on this account.
	The contractor shall arrange to provide hangers, rigs, inserts and other fixtures on the walls, ceilings, structures and permanent scaffolding etc. for fixing trays. Fabrication and fixing of necessary jigs, hangers, insert and other fixtures as per need will be considered as a part of erection of structural steel and nothing extra on this account shall be paid to the contractor.
<b>8.</b>	<b>TUBING AND FITTINGS</b>
	Contractor should supply SS tubes, Fittings (Swagelok type) as per our Technical Specification along with erection accessories
	Qualified bidder should prepare Instrument hook up drawings for air distribution and take necessary approvals from purchaser before commencing the erection Job. Contractor should follow the approved drawings as a guide line for laying the Tubes.
	Tubing shall run in perforated trays with proper supports. Hangers and other fixtures required for support of trays shall be provided, either by welding or by bolting on walls/

	ceilings/ structures. Hanger clamps and other fastening hardware shall be of corrosion resistant metals and hot-dip galvanized.
	Precautions shall be taken to prevent the entry of foreign materials in tube lines before and during erection. Before installation, all tubes must be flushed with air.
	Suitable identification tags shall be provided for easy checkup and for connections.
	Tubes installed but not connected, shall have ends closed with plugs to prevent the entry of foreign material.
	All equipment, air supply and pneumatic tubing and cable trays shall be supported rigid enough to prevent vibration and anchored sufficiently to prevent strains on equipment installed. Hangers and supports shall be so installed as not to interfere with free expansion and contraction of the piping and tubing between anchors. Suitable vibration dampeners, etc., shall be provided wherever necessary.
	Fabrication and painting of all support structures and fixtures for proper fixing of trays for cables and Tubes is the responsibility of Contractor. Raw material for fabrication of Supports for cable trays should be supplied by the contractor. The supports shall be welded to the main structures, grouted in the walls or welded to the plate inserts. Welding of supports to equipment/piping shall never be allowed. Minor civil masonry works like grouting, providing inserts, chipping the concrete, bricks etc., shall be included under the contractor's scope of work. Cut-outs in the wall of CR/ Plant area shall be suitably sealed by the contractor.
	The tubing is from air header to the respective Electro-pneumatic and control valves. The average distance between air header to each valve is 10 meters. 65 such tubing lines is required to be installed along with fittings wherever required. This includes bends, clamping etc.

## **Section – 2: Technical Specifications of SS Tubes & Fittings**

1. **Scope:** This specification covers the general requirements for the manufacture, inspection, testing, supply, installation, testing and commissioning of Tubes and Tube fittings with ferrule in PTFE & Stainless Steel 304. The design, manufacture and performance assessment shall conform to following standards

### **2. Applicable Standards:-**

- 2.1.ANSI B1:1: Unified screwed threads class 2A, 2B
- 2.2.ANSI B31:3: American National Standard code for pressure Pipings, Petroleum Refinery Pipings.
- 2.3.ASTM A-269: Seamless and welded Austenitic Stainless Steel tubing for General Service.
- 2.4.ASTM A 262: Standard practice of detecting Susceptibility to intergranular Attack in austenitic Stainless Steels Practice.
- 2.5.ASTM A 380: Standard practice for cleaning, descaling and passivation of stainless steel parts, equipment and systems.
- 2.6.ASTM A450 Specification for General Requirements for Carbon, Ferritic Alloy, and Austenitic Alloy Steel Tubes
- 2.7.ASTM A213: Specification for Seamless Ferritic and Austenitic Alloy-Steel Boiler, Superheater, and Heat Exchanger Tubes

- 2.8.ASTM A276: Specification for Stainless Steel Bars and Shapes
- 2.9.ASTM A479: Specification for Stainless Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels
- 2.10. ASTM F1387: Standard Specification for Performance of Piping and Tubing Mechanically Attached Fittings
- 2.11. ASTM A182 / A182M – 08: Standard Specification for Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service Material

### **3. Materials & Workmanship:**

- 3.1. Tubing shall be manufactured in accordance with the requirements of ASTM A213/A213M.
- 3.2. Tubing shall be seamless.
- 3.3. All instrumentation tubing shall be internally clean and free of dirt, rust, oil or other foreign matter.
- 3.5. The entire scope of supply of raw materials shall lie in the party's scope. Materials, processes and standard parts shall be of good commercial quality and in accordance with good practices pertinent to the manufacture of high quality fittings for critical service.
- 3.6. Workmanship: Workmanship shall be in accordance with high-grade commercial practice; adequate to ensure satisfactory operation and service life. Fittings shall be free from all burrs, loose scale and silver, which might become dis-lodged in usage and all other defects, which might affect their serviceability. All sealing surfaces must be smooth to one-micron finish.

### **4. Requirements:**

- 4.1. Material requirements: The fittings shall be made of SS-304. The fittings can be forged or made from barstock. Ferrules for SS-304 fittings shall also be Virgin PTFE.
- 4.2. Service conditions: The fittings shall be suitable for the Service under the following conditions:

Process Fluid : Nitrogen Gas, Air, Water.

Pressure : Upto 8 Kg/cm<sup>2</sup> (g)

Temperature : Upto to 80°C

- 4.3 Design and Constructions: The design of these fittings shall be such as to permit tube entry and fitting make up without removal of the nut and ferrules. All the components (except Teflon ferrules, wherever applicable) shall be of the same material as the fitting body for thermal compatibility and corrosion resistance.

### **5. Inspection And Testing:**

- 5.1. Inspection and testing of the materials shall be carried out as per approved Quality Assurance Plan (QAP), approved procedures and relevant codes & standards by the supplier/manufacturer prior to dispatch.

- 5.2. Testing shall be carried out at NABL accredited Test Laboratory in India at manufacturer's cost.
  - 5.3. The purchaser reserves the right to witnessing these tests at vendor's works/laboratory.
  - 5.4. However, the final acceptance of the material shall be based on satisfactory test results of audit samples tested by the purchaser at NABL accredited laboratory.
  - 5.5. Chemical testing: Samples from each heat and lot/batch of each size of fitting shall be tested for chemical composition as per relevant codes and results should be as per applicable code.
  - 5.6. Mechanical Testing: Samples from each heat and lot/batch of each size of fitting shall be tested for mechanical properties as per relevant codes and results should be as per applicable code.
  - 5.7. Visual & Dimensional Examination: Each fitting shall be visually checked to ensure that the surface is free from defects like tool marks, burrs and other surface defects. Dimensional inspection of each fitting shall be carried out as per applicable code. Negative thickness tolerance of the finished fitting shall be limited to 10% of nominal wall thickness of the pipe.
- a. Chemical analysis for One per lot.
  - b. Mechanical tests as per ASTM
  - c. Hydrostatic pressure test at 12 Kg/cm<sup>2</sup>(g) for 10% of Quantity.

The supplier shall prepare Quality Assurance Plan (QAP). Manufacturing & testing procedures and will get approved by the purchaser before starting actual work. Purchase Order with material specification, schedule of quantity, approved QAP, approved Manufacturing & testing procedures shall be governing documents for execution of this work.

6. **General:** The manufacturer shall notify the purchaser, the date and location of the performance tests, giving sufficient notice to enable the purchaser or his authorized representative to be present.

Note: (i) All fittings shall be supplied with Teflon ferrules and SS-304 nuts and bolts.  
(ii) Pressure rating of all SS-304 tube fittings will belong to class 150

Markings:

- 6.1. Stainless steel tubing shall be marked once every three to four feet with the ASTM specification number and grade, OD, wall thickness, and heat number.
- 6.2. Fittings shall be supplied in the original manufacturer's boxes with marking of ASTM specification number and grade

## 7. Qualification Criteria For Bidders

- 7.1. The Bidder/ manufacturer should have minimum Five year experience in manufacturing / supplying and executing similar type of job specified in this Document

- 7.2. The past supply performance of the firm with respect to quality of Job/ Supply and delivery shall be satisfactory. The supplier shall submit documents like performance feedback, dispatch documents etc. with contact details of the clients.
- 7.3. Details of major orders executed by the firm for similar supplies in past five years for DAE/PSU or any other Govt Labs. Details of orders shall indicate Purchase Order. No. & Date, name of client (with name, email-id & contact no. of concerned engineer/officer of the client for reference), material specification of SS fittings, supplied quantity, cost of order, stipulated delivery date and actual delivery date of material. Supporting documents like copies of orders and delivery/dispatch documents shall be submitted.
- 7.4. List of deviations from this specification, if any stating the clause of Specification & Deviation. All points mentioned in specification shall be adequately filled with technical details/ values. In case, there is no deviation, a statement to that effect in reference to the Tender No: shall be submitted along with the offer.

## **8. Criteria for Bid Evaluation**

- 8.1. Bidder should **submit offer for all Material and Quantity**. Offer will be evaluated on Totality, ie on the basis of overall technically suitable lowest offer. Offer for supply of material and quantity partially will not be considered as entire quantity is required together for completion of timely Project Execution.
- 8.2. Bidder should submit atleast two references of similar type of job executed in any Public Sector Unit/ Laboratory in the past, with Purchase Order No: copy of completion certificate and performance report obtained from purchaser along with complete contact details of the Purchaser, such as phone No: and email id with their original bid.
- 8.3. Supplier's site evaluation is required, before placing purchase order, for assessing the facility and capability to execute the specified Job.

## **9. Pre Dispatch Inspection Procedure**

Pre Dispatch Inspections shall be carried out in conformation with the technical specification mentioned in this document at Supplier's works. No deviation shall be acceptable.

## **10. Criteria for Acceptance**

- 10.1. Final acceptance will be given only after successful execution of entire Job mentioned in this Document and System Acceptance Test at BARC, Trombay.
- 10.2. The System acceptance test shall be carried out in the presence of purchaser's representative and Engineer-in-charge .
- 10.3. Verification as per final bill of material. –
- 10.4. Check-up for proper workmanship, identification, ferruling, nameplates etc. –
- 10.5. As built drawing of cable tray routing.
- 10.6. Availability of 20% consumables

## **11. Warranty**

Vendor should furnish an Extended Warranty of Twelve months from the date of completion of the work. Warranty shall be furnished for trouble-free operation with specified performance as per NIT Terms & Condition. Any defects or deficiency in performance observed during the period of warantee, shall be repaired/ rectified/ replaced (as maybe the case) at free of cost by the vendor at the site of installation.

## **12. Shipment:**

- 12.1. Materials shall be dispatched only after Pre dispatch Inspection (PDI) and obtaining a shipping release from the Purchaser.
- 12.2. The supplier shall be fully responsible for protective measures to be followed to ensure the safe delivery of the materials.
- 12.3. No material shall be dispatched without prior written consent of the purchaser / Purchaser's representative.