भारत सरकार
अंतरिक्ष विभाग
सतीश धवन अंतरिक्ष केंद्र शार
श्रीहरिकोटा रेंज डा.घ. 524 124
श्री पोट्टि श्रीरामुलु नेल्लूर जिला, आं.प्र., भारत
दूरभाष : +91-8623 245060 (6 जं)
फैक्स : +91-8623 222099

सत्यमेव जयते

Goverment of India
Department of Space
Satish Dhawan Space Centre SHAR
Shriharikota Range P.O. 524 124
SPSR Nellore Dist., AP., India
Telephone : +91-8623 245060 (6 Lines)
Fax : +91-8623 222099

निविदा सूचना सं. TENDER NOTICE NO. SDSC SHAR/Sr.HPS/PT/RO-LSSF/16/2025-2026

भारत के राष्ट्रपति की ओर से वरि. प्रधान क्रय एवं भंडार, सतीश धवन अंतरिक्ष केंद्र श्रीहरिकोटा निम्नलिखित वस्तुओं के लिए ऑनलाइन निविदाएं आमंत्रित करते हैं:- On behalf of President of India, Sr. Head, Purchase and Stores, SDSC SHAR, SRIHARIKOTA invites on line quotations for the following.

क्र.सं. Sl No	संदर्भ सं. Ref. No.	विवरण Description	मात्रा Qty.
01.	**SDSC SHAR /LSSF PURCHASE/VALF/2025000561 New E-Procurement [Public Tender – Two Part]**	**Fabrication Contract for Monel and SS Pipes & Tubes**	**18 line items**

निविदा दस्तावेजों को डाउनलोड करने की अंतिम तिथि Last Date for downloading of tender documents : 21.07.2025 at 14:00 hrs.
ऑनलाइन निविदा जमा करने की अंतिम तिथि Due Date for submission of bids online : 21.07.2025 at 14:00 hrs.
निविदाएं खोलने की नियत तिथि Due Date for opening of tenders : 21.07.2025 at 14:05 hrs.

निविदाकार के लिए निर्देश Instructions to Tenderers:

निविदाएं ईजीपीएस के माध्यम से ही भेजी जाएं तथा कोई निविदा शुल्क लागू नहीं होगा।
Bids shall be submitted on line through EGPS only and No tender fee shall be applicable.

01. कार्य के सम्पूर्ण विवरण/जानकारी तथा नियम व शर्तों इत्यादि के लिए संलग्न अनुलग्नक को देखें। / For full details/scope of work and terms and conditions etc., please see the enclosed annexures.

02. इच्छुक निविदाकार इसरो की ई-खरीद वेबसाइट इसरो न्यू ई-प्रोकुरमेंट www.eproc.isro.gov.in से ई-निविदा डाउनलोड और अपनी निविदा ई-खरीद पोर्टल पर ऑनलाइन जमा कर सकते हैं। डाक / वाहक / स्वयं द्वारा प्राप्त निविदाओं पर विचार नहीं किया जाएगा। / Interested tenderers can download the e-tender from ISRO e-procurement website www.eproc.isro.gov.in and submit the offer on line in the e-procurement portal. Offers sent physically by post/courier/in person will not be considered.

03. निविदा दस्तावेज इसरो की वेबसाइट www.isro.gov.in इसरो न्यू ई-प्रोकुरमेंट वेबसाइट www.eproc.isro.gov.in तथा सतीश धवन अंतरिक्ष केंद्र शार की वेबसाइट www.shar.gov.in पर भी उपलब्ध हैं। इन्हें केवल ई-खरीद पोर्टल से डाउनलोड और निविदा ऑनलाइन जमा कर सकते हैं। / Tender documents are also available on ISRO website www.isro.gov.in,ISRO New e-procurement website www.eproc.isro.gov.in and SDSC SHAR, Sriharikota website www.shar.gov.in. The same can be down loaded and offer submitted on line in the new e-procurement portal only.

04. निर्धारित तिथि/समय के पश्चात प्राप्त बोलियों पर विचार नहीं किया जाएगा। / Quotations received after the due date/time will not be considered.

05. वरि. प्रधान क्रय एवं भंडार, सतीश धवन अंतरिक्ष केंद्र श्रीहरिकोटा के पास किसी भी या सभी निविदाओं को स्वीकार / अस्वीकार करने का अधिकार है। / Sr. Head, Purchase and Stores, SDSC-SHAR, Sriharikota reserves the right to accept or reject any/or all the quotations.

06. GeM GARPTS Report ID: GEM/GARPTS/24062025/TPAA6RW171BK

दिनांक DT: 26.06.2025

वरि. प्रधान क्रय एवं भंडार
Sr. HEAD PURCHASE AND STORES

CABIN PRESSURE CONTROL SYSTEM (CPCS) – ECLSS PROJECT

TENDER TECHNICAL SPECIFICATIONS FOR FABRICATION OF MONEL AND SS 304L/316L PIPES & TUBES

April-2025
SATISH DHAWAN SPACE CENTRE SHAR
SRIHARIKOTA – 524124

TECHNICAL SPECIFICATIONS FOR FABRICATION CONTRACT OF MONEL 400/SS PIPE/SS TUBE/M. SSTRUCTURAL WORKS

1.0 Introduction:

Fabrication Contract for Laying, welding, testing and qualification of fluid Circuits required for realization of Gaseous Nitrogen (GN2), Gaseous Helium (GHe) and Gaseous Oxygen (GO2) Piping circuit at Orbital Module Preparation facility (OMPF), SDSC SHAR, Sriharikota which is located 90KM away from Chennai city.

The fabrication work involves TIG welding of Monel 400 Piping, SS304L/316L piping/tubing, bending, radiography, external weld joint Pickling & Passivation, cleaning of all fabricated pipelines (i.e Monel 400 & SS 304L/316L) as per ASTM-G93, hydro/pneumatic strength, leak testing, painting and installation along with necessary MS structural fabrication works. The detailed schedule of work is given in **Table-1.**

This document specifies the works to be carried out at OMPF for Gaganyaan mission. This facility is located in Second Launch Pad complex. The list of Works to be carried out is given below.

a) Laying, fabrication and testing of Monel 400 pipes, Stainless Steel (SS) 304L/SS316L pipe lines in Clean rooms, trenches, across road in hume pipes, pipe support welding on the pipe pedestals and clamping of pipe lines

b) MS Structural fabrication works for pipe supports and cable trays.

c) Drilling of Holes in the MS Supports for fixing the clamps.

d) Painting of fabricated Pipelines and pipe line supporting structures.

e) Qualification, Testing, documentation, Interfacing of piping to the equipment, painting and numbering.

f) Supply of structural materials as given in Table-1 (i.e. Sl. No:10, 11,12, 16 & 17)

2.0 Scope of Work:

2.1 Monel 400 Piping/SS piping/tubing (SS304L/SS316L) fabrication works:

a) Welding of Monel 400 Pipes (Size:15NB, Sch160), SS Pipes of material SS304L/SS316L (Size varies from 15 NB to 25 NB of various schedules up to Sch160) & SS tubes (Size varies from OD6.35 mm to OD12.7mm)

and integration of piping circuit with equipment, flow components and qualification of circuits which include the following:

- Internal Cleaning of Pipe/tube by purging of Pipelines with dry nitrogen before usage of pipe for fabrication.
- Welding of MS supports for pipe lines. Drilling of holes in the MS supports and fixing of clamps.
- Laying of pipe lines as per the layout.
- Edge preparation, fit up of joints and TIG welding
- Bending of pipe lines to required radius
- DP test of root runs and final weld.
- End to end ball run test of all loops as per the ball sizes mentioned
- 100% Radiography of butt-welded joints.
- External pickling and passivation of joints.
- Hydro/Pneumatic strength test as per standards.
- Chemical Cleaning of pipe lines for Oxygen gas service as per the ASTM-G93 standard by forced circulation method.

Metal	**Contaminants**	**Alkaline Cleaning agents**
Austenitic stainless steel, ferritic stainless, nickel-based alloys, duplex stainless steel	Heavy soil, grease, light oils, and cutting fluids	Mixtures of sodium hydroxide, sodium carbonates, sodium phosphates, sodium silicates, and synthetic wetting agents
Metal	**Contaminants**	**Cleaning/passivating chemicals**
Austenitic stainless steel	Tarnish, scale/oxides, and inorganic deposits	Mixture of chromic, sulfuric, and hydrofluoric acid; Mixture of nitric, hydrofluoric, and phosphoric acids; Mixture of nitric and hydrofluoric acid; or Sulfuric acid followed by mixture of nitric and hydrofluoric acid

- Dew point measurement checks (better than -55°C) for hydro tested lines.
- Checking of cleanliness as per standards.
- Fixing of pipe supports.
- Interfacing of loops inside equipment/connecting to equipment.

- Clamping and final pneumatic leak checks.
- Painting of Pipe lines and lettering/Numbering.

The details of Supply& Fabrication work are as per **Table-1** given below.

Table-1

Sl. No	Description	UOM	Quantity
1	Fabrication (Butt welding) of Monel 400 pipe lines with Radiography (100%), Size: 15NB up to 160SCH	Nos	300
2	Fabrication (Butt welding) of Monel 400 pipe lines without Radiography, Size: 15NB up to 160SCH	Nos	30
3	Fabrication (Butt welding) of SS pipe lines with Radiography (100%), Size: 15NB up to 160SCH	Nos	500
4	Fabrication (Butt welding) of SS pipelines without Radiography, Size: 15NB up to 160SCH	Nos	50
5	Fabrication (Butt welding) of SS pipelines with Radiography (100%), Size: 25NB up to 160SCH	Nos	500
6	Fabrication (Butt welding) of SS pipe lines without Radiography, Size: 25NB up to 160SCH	Nos	50
7	Fabrication (Butt welding) of SS Tubes with Radiography (100%), Size: OD 6mm to OD 12.7mm	Nos	200
8	Fabrication (Buttwelding) of SS Tubes without Radiography, Size: OD 6mm to OD 12.7mm	Nos	20
9	MS Structural Fabrication Works (Material & paints free Issue by Department)	Kgs	3000
10	Supply of ISA25mmX25mmX6mmThk	Kgs	1000
11	Supply of ISA 40mmX40mmX6mmThk	Kgs	1000
12	Supply of ISA50mmX50mmX6mmThk	Kgs	1000
13	Painting of 25NB pipelines (Paint free issue by department)	Mtrs	1000
14	Painting of 15NB pipelines (Paint free issue by department)	Mtrs	2000
15	Pipe bending 15NB to 25NB	Nos	300
16	Hot-Dipped Galvanized, GI perforated cable tray 100mm (W) X 25mm (H) X 2.5mm Thk	Mtrs	200
17	Hot Dipped Galvanized, GI perforated cable tray150mm (W)X 25mm (H) X 2.5mm Thk	Mtrs	200
18	Numbering/Stenciling on pipelines, flow components & equipment: Letter sizes up to 25mm (Stencil cuts up to 250 mm length will be counted as 1 No)	Nos	500

Note:

1) For supply of structural material (i.e. Sl. No: 10,11 & 12) weighment will be carried out at department weigh bridge at SDSC SHAR, Sriharikota.
2) Payment of structural material will be made for actual quantity supplied (within ± 10% of indicated quantity).

2.2 TIG Welding

a. The work includes marking, cutting, profiling, aligning, fit up, tack welding, cleaning, chipping, placement of wind shields (For weather protection). Root and final TIG welding by GTAW process only. Argon purity shall be with 99.99% for both shield & purge gas. DP testing of Root & Final Pass (Both Butt and Socket weld types where ever applicable). X-ray/Gamma Ray radiography for all butt weld joints.

b. TIG Welding of Monel 400 pipes and SS Pipes of material SS304L/SS316L (Size varies from 15 NB to 25 NB of various schedules up to Sch160) and SS tubes (Sizes from OD6.35 mm to OD 12.7mm) prior to integration of piping circuit with the equipment.

c. E NiCu-7 Filler material shall be used as filler wire for Monel 400 TIG welding.

d. Contractor shall provide the Welding Procedure Specifications (WPS) for Monel 400 pipe welding. Welder has to carry out test coupon welding on Monel 400. After radiography test, clearance will be given to weld on actual pipes.

e. AISI SS308L/316L material shall be used as filler wire for SS TIG welding. It shall meet the requirements of ASME Sec. IX / AWS A5 standards

f. Only qualified welders of 6G (ASME Sec. IX) with proven track record will be permitted to carryout welding works for Monel 400 & SS304L/SS316L. Qualification of welder need to be carried out in the presence of department QC engineer suiting to the pipe size / schedule requirements. Fitters / Fabricators / Grinders should be well experienced.

g. Cutting and edge preparation of pipelines and fittings shall be carried out only with experienced grinders meant for Monel 400/Austenitic Stainless-Steel material.

2.3 Dye penetrant testing

- ✓ All pipe/tube welding joints shall be tested with Dye-penetrant test after root and final pass for butt welding and for final pass after fillet/socket welding as per ASME Sec. V. No extra cost will be paid for Dye penetrants and for DP testing of weld joints.

2.4 Pipe Bending:

a. Cold bending of pipe shall be made to the required angle by using heavy duty manual or hydraulic bending equipment.

b. Bend radius of minimum 3D-4D shall be maintained to avoid unwanted thinning. Wrinkles and scratches are not permitted on the bends.

c. Ovality of pipe bending shall be within 8% as per **ASME B 31.3**.

2.5 Pipe Laying:

a. This work includes laying of pipe lines inside the OMPF building.

b. Work includes alignment of pipes, maintaining of required slopes, proper fixing of flow components, pipe fittings & instruments, fixing of structural pipe supports, fixing of clamps and interfacing of piping circuits to equipment.

c. Erection of piping includes positioning of completed pipeline segments at required locations as per the piping layouts.

d. MS supports fixing and drilling of holes in MS supports, fixing of clamps shall be carried out for every 2.5…3.0 Meters of pipe length where ever pipe line routing is carried out. **No extra cost will be paid for fixing clamps to the pipe lines.**

2.6 Ball run test:

After completion of pipe welding and radiography clearance ball run test to be carried out to ensure required minimum bore. The details of ball sizes are as follows:

Table-2

Sl. No	Pipe Size	Pipe bore (mm)	Ball size (Min)
1.	15 NB -160S	11.74	8.5
2.	15 NB -80S	13.84	10.5
3.	15 NB -40S	15.76	12.5
4.	20NB -160S	15.58	12.5
5.	20NB -80S	18.88	15.5
6.	20NB -40S	20.96	17.5

Sl. No	Pipe Size	Pipe bore (mm)	Ball size (Min)
7.	25NB-XXS	15.22	12.0
8.	25NB-160S	20.7	17.5
9.	25NB-80S	24.3	21.0
10.	25NB-40S	26.64	23.5

Note: If the pipe line joints are not qualified during ball run test, it is the responsibility of the contractor to rectify/repair the weld joints without extra cost.

2.7 Radiography:

- ✓ All butt-welds shall be subjected to radiographic examinations X-ray/Gamma-ray source as per ASME sec. V for a sensitivity of 2-2T.
- ✓ Interpretation of weld joints radiographs shall be done by the vendor and followed by department QC as per relevant codes.
- ✓ Exclusive radiography machine / gamma ray source has to be arranged by the contractor when sufficient numbers of joints are available for examination.
- ✓ D2 films shall be used for gamma rays and D5 films shall be used for X-rays. Elliptical shots (double wall double image) may be employed.
- ✓ The penetrometer used shall conform to ASTM E 1025/ASTM E747 (or) relevant DIN standards.
- ✓ Re-take due to rejection of radiograph owing to bad image quality or repair joints shall be at the cost of contractor.
- ✓ Radiography shall be carried out by qualified technicians (i.e.) minimum level- I of ISNT/ ASNT and qualification certificates shall be produced with latest renewal to the department before proceeding with the work.
- ✓ Radiography film shall be evaluated and report shall be submitted by Level II ISNT/ ASNT (or) higher qualified person. However, department inspector will carry out the final evaluation and his decision is final.

2.8 Painting:

a. High built epoxy primer and finish coat of Aliphatic acrylic polyurethane finish paint shall be applied.

b. The paints to be applied are special type (epoxy paints) i.e. two component paints. Both the components are to be mixed and applied immediately after mixing.

c. All the surfaces shall be applied with the one coat of primer of 125…150-micron DFT where ever required and one coat of finish coat of 50…60-micron DFT by the experienced painters.

d. All the surfaces to be painted shall be cleaned thoroughly with metallic wire brushes, chipping hammers, emery papers etc., for removing rust, mill scales and old paint coats. Finally, surfaces shall be cleaned with cotton waste.

e. All tools and consumables required for surface preparation, paint brushes for painting, skilled painters and supervision is in the scope of contractor.

f. Supply of paints (Primer and finish coat) and thinners, identification of jobs, stage wise supervision are in the scope of department.

g. The contractor shall offer for stage wise inspection during painting.

h. **Color scheme**: It will be provided by purchaser at a later stage and in general as per relevant Indian standards and which will be applicable for final coat.

Note:

- ✓ Painting of one-meter pipe line includes application of one coat with primer and one finish coat with paint on pipe line after removing pipe clamp, applying paint to pipe clamps & shim plate and re fixing back (clamps will be fixed at 2.5-3.0 Meters distance on avg.). Any flow components exists in the pipe line also to be painted and included in the pipe line painting only.
- ✓ Spray painting gun is in the scope of supplier. Air supply for spray gun is in the scope of the department.
- ✓ Wherever brush application is required, all brushes and emery papers are in the scope of contractor.

2.9 Inspection:

Department Engineer will participate in the following inspection activities:

a. Fit-up, alignment of equipment and weld edge preparation. Fit-up of all the joints shall be cleared by department engineer prior to the welding.

b. Witness of all DP tests and clearance for further works.

c. Review and clearance of all radiography films.

d. Witness of ball run test, strength tests(hydro/pneumatic) and pneumatic leak checks.

e. Witness of pipeline cleanliness tests.

f. Participation in all critical qualification tests as part of final loops qualification and interfacing with the equipment.

g. The contractor shall offer for stage wise inspection during painting. The following inspections will be carried out by Department Engineer for painting

   a) Pre-surface preparation inspection.

   b) Inspection of coating on the equipment.

   c) Evaluating cleaning between coats.

   d) DFT measurement through paint thickness measurement gauge.

2.10 Sequence of work execution (From fabrication to system commissioning)

a) Laying of pipe lines and TIG welding as per the approved P&ID.

b) After welding, as built drawing shall be generated and joint numbers shall be indicated on the pipe lines for radiography.

c) Radiography shall be carried out for butt weld joints, wherever applicable.

d) After radiography, ball run test shall be carried out and ensure that pipe line bore is maintained as per the specification

e) After radiography review and Ball run test clearance will be given for purging the pipe lines with the dry GN2 gas.

f) Preparation of pipe supports and fixing of pipe clamps for all the pipe lines.

g) Hydro/Pneumatic test shall be carried out for the new/existing modified lines based on the operating pressure of the pipe line.

h) Chemical cleaning of Pipe lines for oxygen gas service as per ASTM-G93 standard (Department will provide cleaning procedure, if required). Procurement of cleaning agent is in the scope of supplier/fabricator. Cleaning of pipe lines shall be carried out by forced circulation method only.

i) After hydro test, Purging with GN2 and dew point measurement shall be carried out. Ensure that dew point shall be better than -55 Deg.C.

j) Replacement of test gaskets with actual gaskets wherever required.

k) For all the new/existing modified lines particle check shall be carried out. Ensure that particle size greater than 20micron is NIL.

l) Fixing of flow components i.e. valves, filters wherever applicable.

m) Integrated leak checks along with the pneumatic equipment.

n) Painting of pipe lines.

o) Stenciling/tagging of pipe lines and flow components.

p) Preparation of test packs/reports (for each pipe line number), photocopies (Xerox) and binding.

Note: All the above works will be in the scope of the contractor under department personnel supervision.

3.0 MS Structural Fabrication Works:

a. Fabrication of supports for piping & flow components and equipment supports. Suitable anchoring shall be planned using MS structural material and anchor fasteners. Structural work fabrication shall be with SMAW welding with electrodes of AWS E6010/E6011/E6013/E7018.

b. Drilling and anchoring of pipe supports, hangers and on the wall /floor/roof embedment shall be carried out in situ based on the requirement.

c. Pipe supports to be fabricated for every 2.5-3.0 Meters span in the yard, trenches, ceiling and along the columns as per the requirements.

d. Cable trays laying and welding of cable trays as per routing finalized by Department Engineer. No separate payment will be made for laying of cable trays and the supply quantity is also limited only (<400 m).

e. The structural steel material shall be supplied by the department as free issue.

4.0 Scope of Supply:

Scope of supply of various elements, materials, consumables etc. are as follows:

4.1 Department scope of supply

The following items will be supplied by department at free of cost.

a. Monel 400 Pipes/SS Pipes / SS tubes and associated fittings.

b. Structural material required for supports and cable trays.

c. Earthing Copper conductive material.

d. Required anchor fasteners, bolts and nuts for equipment installation and assembly.

e. Test gaskets and actual gaskets for equipment/piping.

f. Hydro/Pneumatic test adaptors.

g. Hydro-test pumps and pressure gauges.

h. DM water for hydro test.

i. Purge gases air/nitrogen.

j. Electric power for fabrication work (nearest distance aprx. 30 m)

k. Paints (Primer & Finish Coat) and thinner.

4.2 Scope of Contractor

The following machinery, manpower and consumables shall be in the contractor's scope. Machinery scope is not limited to the following. Necessary tools along with machinery shall be in the contractor's scope for executing the scope of given fabrication, erection, testing and commissioning works. Depending on the work front contractor has to mobilize additional batches to meet the schedule of work.

a. Man Power:

- ✓ Experienced supervisor with 5 to 10 years in the piping fabrication, who is able to read the given fabrication drawings and execute the works with systematic planning.
- ✓ 6G qualified TIG welders for Monel 400/SS welding.
- ✓ Welder for MS fabrication (SMAW, Gas cutting etc…)
- ✓ Qualified and skilled fitters.
- ✓ Skilled grinders and helpers.
- ✓ Skilled Painters
- ✓ Site Engineer/Supervisor

b. Machinery:

- ✓ TIG welding machines with suitable accessories like cables, torches, electrodes etc.
- ✓ Safety appliances such as face shield, gloves, eye glasses etc. for personnel protection.
- ✓ Manual welding machine for welding of structural steel.
- ✓ Grinding and cutting machines with necessary attachments.
- ✓ Gas cutting set.
- ✓ Hand and magnetic base drilling machine.
- ✓ Hammer drilling machine for drilling holes in concrete.

- ✓ Pipe bending machine, hand tube benders and tube cutters.
- ✓ Material required for Scuff folding for erection of vertical piping.
- ✓ Wind shields while working in open areas.
- ✓ Forced circulation pump for cleaning the pipe lines with cleaning agent as per ASTM-G93.

c. Consumables:

- ✓ SS filler wires & E NiCu-7 wires for TIG welding.
- ✓ Electrodes for SMAW (E6010/E6011/E6013/E7018)
- ✓ Grinding wheels, cutting wheels, emery cloth/papers, ss wire brush cotton waste etc.
- ✓ Industrial gases (Argon, Oxygen, Acetylene), regulator along with flow meter sets for welding and gas cutting.
- ✓ Cleaning agent as per ASTM-G93.
- ✓ Dye penetrant test kits along with dye penetrant chemicals.
- ✓ Paint Brushes& Guns (Good Quality Makes)

Specifications for the consumables as given below:

Consumables	Size, mm	Make
Monel 400 Filler wires	1.0/1.2/1.6/2.0/2.4	Philips/ ESAB / Adani
SS Filler wires	1.0/1.2/1.6/2.0/2.4	Philips/ ESAB / Adani
SMAW Electrodes	2.5/3.15/4.0	Philips/ ESAB / Adani/ D & H Scheron
Argon cylinder with commercial grade with 99.99% Purity	50 liters cylinder with pressure 140-150 Bar (g)	Praxair / Bhoruka / Inox /BOC
Dye penetrant test kit with cleaner/penetrant/developer	420 ml tins	Magnaflux / Check Mate
Oxygen acetylene cylinders with commercial 99.99%	50 liters cylinder with pressure 140 - 150 Bar (g).	Praxair / Bhoruka / Inox

Consumables	Size, mm	Make
grade		/BOC

Note: All the above consumables shall be obtained with the manufacturer's certificate for its conformity. Any change in the above make, it should be approved by department.

d. Evaluation of Machinery and Manpower and Consumables

Technical evaluation by the Department Engineer will be carried out for machinery and man power to ascertain their complete suitability / performance for the jobs described above. Based on this evaluation clearance will be given for taking up the actual job

e. Documentation

- ✓ During the execution of work the following documents shall be prepared.
  - Preparation of Material identification reports
  - Preparation of line wise weld history sheets
  - Preparation of isometrics and as built drawings in Auto Cad
- ✓ Contractor has to generate the following reports/drawings before commencement of hydro/pneumatic test.
  - Test loop drawings
  - Ball run test reports
  - Radiography reports
- ✓ After commissioning, **3 sets of Loop wise documents** (Line number wise) consisting of the following works /tests shall be submitted with neatly bounded condition:
  - Process and Inst. Diagram in AutoCAD
  - As Built Drawing in AutoCAD
  - Material Inspection Report
  - Joint History Sheet (Including DP & Radiography test)
  - Ball Run Test Report
  - Mechanical Clearance (Pre-Test)
  - Strength test Report (Hydro/Pneumatic)
  - Chemical cleaning report for oxygen service
  - Cleanliness (particulate checks) Report

- Pneumatic Leak Check Report
- Moisture Measurement Report
- Painting Report

5.0 Manpower, & Schedules:

- ✓ Contractor has to deploy **Minimum of two Welding Batches (Each batch consists of Welder-1, Fitter-1, Grinder-1 and Helper-2) for Monel 400 one batch and for SS &MS**one batch to carry out the job. Party shall deploy additional **Welding Batches** in case of requirement. Such additional manpower shall be deployed within 7 days' notice.
- ✓ Tentative start of work will be intimated to Contractor **Two weeks** in-advance.
- ✓ The contractor will be allowed to work beyond office hours if required and including holidays to meet the project schedule.
- ✓ In order to complete the work in time, it is recommended to deploy adequate manpower and supervisors and the work shall be carried out in two or three shifts based on requirement.
- ✓ Progress review meetings once in a week will be conducted for monitoring the status of works and the contractor's site representative need to attend with all relevant inputs.

6.0 Payment terms:

a. Payment will be made on pro-rata basis for the completed portion of work once in a month after duly certified by the Department Engineer. 70% against completion of fabrication &erection work and balance 30% after testing, Cleaning pipe lines for oxygen service as per ASTM-G93 and acceptance.

b. Security deposit of 3% PO value (excluding material supply part) shall be submitted to the purchaser after release of P.O (within 10 days) and the same shall be returned to the supplier on successful completion of work contract.

c. The works as described above shall be treated as completed only after certification of the Department Engineers.

d. The purchaser reserves right to cancel the contract at any time in case of failure of the contractor to fulfill the various requirements mentioned in the Purchase order (like number of welding batches etc.)

7.0 Offer Validity:

The validity of the offers / tenders should be 90 days from the date of opening of the tenders. Tenders with offer validity less than the period mentioned above, will not be considered for evaluation.

8.0 General Conditions of the Contract:

- ✓ **Due to interconnected nature of work scope, over all L1 will be selected towards awarding the contract. Party shall submit the acceptance for the same.**
- ✓ **Period of contract:** Period of Contract is for 24 months from the date of release of purchase order.
- ✓ ***The quantity variation of + 25% is permissible on the Total contract value based on site requirements. Price will be considered for this variation based on unit prices.***
- ✓ Group insurance for workmen shall be taken for this work by the contractor. The proof of such insurance shall be submitted immediately after awarding the contract prior to the commencement of work.
- ✓ Separate man power consisting of supervisors-01No, skilled manpower for assembly and testing works-02 Nos, helpers-03 Nos shall be deployed to carry out the qualification and commissioning activities as demanded by the department continuously till completion of the activities.
- ✓ One Experienced engineer/Technical Assistant holding Diploma in Mechanical Engineering/B.Tech in Mechanical Engineering shall be deployed for monitoring and noting the work progress, documenting sequence of works (Details of documentation work are given below).
- ✓ Computer for preparation of documentation, Printers, Xerox and binding is in the scope of contractor. 3 Sets of final document dossiers shall be submitted.
- ✓ Contractor shall take enough care to ensure to progress of the work without any material and personnel damage. It is the sole responsibility of contractor to ensure all safety norms to his personnel during transportation between work spot and Department/Contractor stores, and work in prefabrication area, in storage shed and in yard. Department will not hold responsibility to any mishap to the contractor personnel.
- ✓ Medical Assistance: While executing this contract work, if any of the workers engaged by contract agency is injured, they will be provided with first-aid by department. However, contract agency has to take care of subsequent medical treatment elsewhere.
- ✓ Contractor has to give an undertaking that they will comply with prevailing safety norms at site put forth by department. Safety officer shall have full access to contractor's storage shed/office for inspection.

- ✓ The price quoted in the price schedule should be valid till completion of the project or 24 months period from the date of placement of purchase order. However due to any Department program schedule, if the works to be completed as per above description calls for extension in the indicated period, contractor shall carryout the same at quoted price.
- ✓ Contractor supervisor shall ensure that their personnel are strictly confined to the assigned job and place of work.
- ✓ The contractor need to work between 9.00 AM to 5.30 PM on all week days (Six days) including holidays, generally if needed
- ✓ and even after office hours as demanded by Department.
- ✓ The contractor shall ensure minimum wages as prescribed in minimum wages Act as per the State / Central Government Act. He and his work force have to follow safety standard prescribed. Contractor has to comply with all labour regulations as prescribed in various Acts in respect of himself and his man power.
- ✓ Contractor shall get approval from Department for the specifications of all items in his scope of supply, bought out items if any, before placing orders for the same.

9.0 Bid/Offer Submission details:

The bid/offer shall be submitted in two parts

- ✓ **Part-I: Technical- Commercial bid** contains the technical information and commercial compliance aspects.
- ✓ **Part-II: Price Bid:**The Price bid should contain the Prices.

Part-I: Techno-Commercial bid:

The tenderer shall necessarily present the following in the techno-commercial bid:

- The tenderer shall furnish **point-wise confirmation (Technical Compliance attached in Annexure-II)** for the technical specifications given in the enquiry.
- The tenderer shall necessarily furnish the details of previously executed orders. Necessary documentary evidence along with end user certificate (confirming the satisfactory performance) shall be submitted along with offer as a mandatory requirement. **Non-compliance of this requirement shall lead to rejection of the offer.**
- **Bidder need to submit un-priced price bid copy (as highlighted below) indicating the description of all the cost elements considered, without indicating the price. Tenderer shall note that**

indication of price in the techno-commercial bid shall lead to dis-qualification of bid.

- **Similar work:** The Bidder shall have the experience in executing Monel &SS pipe fabrication, Erection of equipment, hydro and pneumatic testing and related documentation works.
- The price bids will be opened only after evaluation and acceptance of the technical bid of the respective tenderer.

Part-II: Price Bid

1) Format of Un-Priced Price Bid:

Sl. No	Item Description	Unit	Quantity	Cost/ Unit (Rs)	Taxes (GST)	Total cost (Rs)
1.	Fabrication (Buttwelding) of Monel 400 pipe lines with Radiography (100%), Size: 15NB up to 160SCH	Nos	300	Un-Priced	Un-Priced	Un-Priced
2.	Fabrication (Buttwelding) of Monel 400 pipe lines without Radiography, Size: 15NB up to 160SCH	Nos	30	Un-Priced	Un-Priced	Un-Priced
3.	Fabrication (Buttwelding) of SS pipelines with Radiography (100%), Size: 15NB up to 160SCH	Nos	500	Un-Priced	Un-Priced	Un-Priced
4.	Fabrication (Buttwelding) of SS pipelines without Radiography, Size: 15NB up to 160SCH	Nos	50	Un-Priced	Un-Priced	Un-Priced
5.	Fabrication (Buttwelding) of SS pipelines with Radiography (100%), Size: 25NB up to 160SCH	Nos	500	Un-Priced	Un-Priced	Un-Priced
6.	Fabrication (Buttwelding)of SS pipelines without Radiography, Size: 25NB up to 160SCH	Nos	50	Un-Priced	Un-Priced	Un-Priced
7.	Fabrication (Buttwelding) of SS Tubes with Radiography (100%), Size: OD 6mm to OD 12.7mm	Nos	200	Un-Priced	Un-Priced	Un-Priced
8.	Fabrication (Buttwelding) of SS Tubes without Radiography, Size: OD 6mm to OD 12.7mm	Nos	20	Un-Priced	Un-Priced	Un-Priced
9.	MS Structural Fabrication Works (Material & paints Free Issue by Department)	Kgs	3000	Un-Priced	Un-Priced	Un-Priced
10.	Supply of ISA 25mm X25mm X6mm Thk	Kgs	1000	Un-Priced	Un-Priced	Un-Priced
11.	Supply of ISA 40mm X 40mm X6mmThk	Kgs	1000	Un-Priced	Un-Priced	Un-Priced
12.	Supply of ISA 50mm X50mm X6mmThk	Kgs	1000	Un-Priced	Un-Priced	Un-Priced

Sl. No	Item Description	Unit	Quantity	Cost/ Unit (Rs)	Taxes (GST)	Total cost (Rs)
13.	Painting of 25NB pipelines (Paint free issue by department)	Mtrs	1000	Un-Priced	Un-Priced	Un-Priced
14.	Painting of 15NB pipelines (Paint free issue by department)	Mtrs	2000	Un-Priced	Un-Priced	Un-Priced
15.	Pipe bending15NB to 25NB	Nos	300	Un-Priced	Un-Priced	Un-Priced
16.	Hot Dipped Galvanized, GI perforated cable tray100mm(W)X 25mm(H) X 2.5mm Thk	Mtrs	200	Un-Priced	Un-Priced	Un-Priced
17.	Hot Dipped Galvanized, GI perforated cable tray 150mm(W)X 25mm(H) X 2.5mm Thk	Mtrs	200	Un-Priced	Un-Priced	Un-Priced
18.	Numbering/Stenciling on pipelines, flow components& equipment: Letter sizes up to 25mm (Stencil cuts up to 250 mm length will be counted as 1 No)	Nos	500	Un-Priced	Un-Priced	Un-Priced

2) Format of Priced Price Bid:

Sl. No	Item Description	Unit	Quantity	Cost/Unit (Rs)	Taxes (GST)	Total cost (Rs)
1.	Fabrication (Buttwelding) of Monel 400 pipe lines with Radiography (100%), Size: 15NB up to 160SCH	Nos	300			
2.	Fabrication (Buttwelding) of Monel 400 pipe lines without Radiography, Size: 15NB up to 160SCH	Nos	30			
3.	Fabrication (Buttwelding) of SS pipelines with Radiography (100%), Size: 15NB up to 160SCH	Nos	500			
4.	Fabrication (Buttwelding) of SS pipelines without Radiography, Size: 15NB up to 160SCH	Nos	50			
5.	Fabrication (Buttwelding) of SS pipelines with Radiography (100%), Size: 25NB up to 160SCH	Nos	500			
6.	Fabrication (Buttwelding)of SS pipelines without Radiography, Size: 25NB up to 160SCH	Nos	50			
7.	Fabrication (Buttwelding) of SS Tubes with Radiography (100%), Size: OD 6mm to OD 12.7mm	Nos	200			
8.	Fabrication (Buttwelding) of SS Tubes without Radiography, Size: OD 6mm to OD 12.7mm	Nos	20			
9.	MS Structural Fabrication Works (Material & paints Free Issue by Department)	Kgs	3000			
10.	Supply of ISA 25mm X25mm X6mm Thk	Kgs	1000			
11.	Supply of ISA 40mm X 40mm X6mmThk	Kgs	1000			
12.	Supply of ISA 50mm X50mm X6mmThk	Kgs	1000			
13.	Painting of 25NB pipelines (Paint	Mtrs	1000			

Sl. No	Item Description	Unit	Quantity	Cost/Unit (Rs)	Taxes (GST)	Total cost (Rs)
	free issue by department)					
14.	Painting of 15NB pipelines (Paint free issue by department)	Mtrs	2000			
15.	Pipe bending15NB to 25NB	Nos	300			
16.	Hot Dipped Galvanized, GI perforated cable tray100mm(W)X 25mm(H) X 2.5mm Thk	Mtrs	200			
17.	Hot Dipped Galvanized, GI perforated cable tray 150mm(W)X 25mm(H) X 2.5mm Thk	Mtrs	200			
18.	Numbering/Stenciling on pipelines, flow components& equipment: Letter sizes up to 25mm (Stencil cuts up to 250 mm length will be counted as 1 No)	Nos	500			

10.0 Tender evaluation:

The following documents shall be submitted along with the Techno-commercial bid for prequalification of Bidder.

a) Contractor should have executed fabrication contracts involving erection and commissioning of Monel 400 (Cu-Ni/Inconel/Monel Equivalent) piping, SS Piping (i.e. SS TIG Welding for pipe & tube, bending of SS pipes, radiography of SS butt welded joints) and MS structures (i.e. MS material supply, fabrication & erection works) during the last five years by considering last financial year ending with March-2025 shall be submitted for tender evaluation. Single PO for similar works of Rs.30 Lakhs (or) Two POs for similar works of Rs. 20 Lakhs each (or) Three POs for similar works of Rs.15 Lakhs each.

(or)

Contractor should have executed fabrication contracts involving erection and commissioning of Monel 400 (Cu-Ni/Inconel/Monel Equivalent) piping, SS Piping (i.e. SS TIG Welding for pipe & tube, bending of SS pipes, radiography of SS butt welded joints) and MS structures (i.e. MS material supply, fabrication & erection works) with a minimum cumulative value of all purchase orders amounting to ₹.30 Lakhs (in the last five years by considering last financial year ending with March-2025).

b) Work completion certificates shall be submitted along with offer for the above PO's. Without this offer will not be considered.

c) P.O copies with only structural steel welding, P.O copies with only CS/GI pipe with arc welding are not acceptable.

d) **List of working personnel:** Welders - **Min.2 welders** (**6G qualified TIG welders for Monel/SS pipe welding**), Fitters-Min.2 fitters, Grinders-Min.2 grinders, helpers-as per the requirement), fabrication supervisors-as per the requirement, drafts man (Min.01) and skilled personnel for documentation (Min.01 member) & one welding batch for MS.

e) List of Machinery & Equipment to be used for the work (like TIG welding machines-Min.2 Numbers, Grinding-Min.2 numbers, gas welding equipment, Pipe bending and other equipment as per project requirement).

f) **Compliance:** Point wise compliance to the tender specifications shall be submitted and any deviation from the specification shall be highlighted clearly in the offer. Technical compliance duly filled by the party as per ***Annexure-II*** to be submitted along with the offer.

Annexure-II

Technical Compliance
(To be submitted by the bidder along with Technical Bid)

Tenderer shall furnish point-wise confirmation for the following. Change of specifications/ deviations (if any) shall be brought out in the offer with detailed justification.

Sl. No	ISRO Description	Technical Compliance (By the party)
Scope of work		
1.	Acceptance for the terms and conditions given in Introduction of Specification. Any Obligation or clarification shall be listed if any	
2.	The fabrication work involves TIG welding of Monel 400 Piping, SS304L/316L piping/tubing, bending, radiography, external weld joint Pickling & Passivation, cleaning of all fabricated pipelines (i.e Monel 400 & SS 304L/316L) as per ASTM-G93, hydro/pneumatic strength, leak testing, painting and installation along with necessary MS structural fabrication works. The detailed schedule of work is given in **Table-1.**	
3.	**Monel 400 Piping/SS piping/tubing (SS304L/SS316L) fabrication works:** a) Welding of Monel 400 Pipes (Size:15NB, Sch160), SS Pipes of material SS304L/SS316L (Size varies from 15 NB to 25 NB of various schedules up to Sch160) & SS tubes (Size varies from OD6.35 mm to OD12.7 mm) and integration of piping circuit with equipment, flow components and qualification of circuits which include the following: • Internal Cleaning of Pipe/tube by purging of Pipelines with dry nitrogen before usage of pipe for fabrication. • Welding of MS supports for pipe lines. Drilling of holes in the MS supports and fixing of clamps. • Laying of pipe lines as per the layout. • Edge preparation, fit up of joints and TIG welding	

Sl. No	ISRO Description	Technical Compliance (By the party)
	• Bending of pipe lines to required radius • DP test of root runs and final weld. • End to end ball run test of all loops as per the ball sizes mentioned • 100% Radiography of butt-welded joints. • External pickling and passivation of joints. • Hydro/Pneumatic strength test as per standards. • Chemical Cleaning of pipe lines for Oxygen gas service as per the ASTM-G93 standard by forced circulation method. • Dew point measurement checks (better than -55°C) for hydro tested lines. • Checking of cleanliness as per standards. • Fixing of pipe supports. • Interfacing of loops inside equipment/connecting to equipment. • Clamping and final pneumatic leak checks. • Painting of Pipe lines and lettering/Numbering.	
TIG Welding:		
4.	a) The work includes marking, cutting, profiling, aligning, fit up, tack welding, cleaning, chipping, placement of wind shields (For weather protection). Root and final TIG welding by GTAW process only. Argon purity shall be with 99.99% for both shield & purge gas. DP testing of Root & Final Pass (Both Butt and Socket weld types where ever applicable). X-ray/Gamma Ray radiography for all butt weld joints. b) TIG Welding of Monel 400 pipes and SS Pipes of material SS304L/SS316L (Size varies from 15 NB to 25 NB of	

Sl. No	ISRO Description	Technical Compliance (By the party)
	various schedules up to Sch160) and SS tubes (Sizes from OD6.35 mm to OD 12.7 mm) prior to integration of piping circuit with the equipment. c) E NiCu-7/ Equivalent Filler material shall be used as filler wire for Monel 400 TIG welding. d) Contractor shall provide the Welding Procedure Specifications (WPS) for Monel 400 pipe welding. Welder has to carry out test coupon welding on Monel 400. After radiography test, clearance will be given to weld on actual pipes. e) AISI SS308L/316Lmaterial shall be used as filler wire for SS TIG welding. It shall meet the requirements of ASME Sec. IX / AWS A5 standards f) Only qualified welders of 6G (ASME Sec. IX) with proven track record will be permitted to carryout welding works for Monel 400 & SS304L/SS316L. Qualification of welder need to be carried out in the presence of department QC engineer suiting to the pipe size / schedule requirements. Fitters / Fabricators / Grinders should be well experienced. g) Cutting and edge preparation of pipelines and fittings shall be carried out only with experienced grinders meant for Monel 400/Austenitic Stainless-Steel material.	
Dye penetrant testing:		
5.	All pipe/tube welding joints shall be tested with Dye-penetrant test after root and final pass for butt welding and for final pass after fillet/socket welding as per ASME Sec.V. No extra cost will be paid for Dye penetrants and for DP testing of weld joints.	
Pipe Bending:		
6.	a) Cold bending of pipe shall be made to the required angle by using heavy duty manual or hydraulic bending	

Sl. No	ISRO Description	Technical Compliance (By the party)
	equipment. b) Bend radius of minimum 3D-4D shall be maintained to avoid unwanted thinning. Wrinkles and scratches are not permitted on the bends. c) Ovality of pipe bending shall be within 8% as per **ASME B 31.3**.	
Pipe Laying:		
7.	.. This work includes laying of pipe lines inside the OMPF building. .. Work includes alignment of pipes, maintaining of required slopes, proper fixing of flow components, pipe fittings & instruments, fixing of structural pipe supports, fixing of clamps and interfacing of piping circuits to equipment. .. Erection of piping includes positioning of completed pipeline segments at required locations as per the piping layouts. .. MS supports fixing and drilling of holes in MS supports, fixing of clamps shall be carried out for every 2.5…3.0 Meters of pipe length where ever pipe line routing is carried out. **No extra cost will be paid for fixing clamps to the pipe lines.**	
Ball run test:		
8.	After completion of pipe welding and radiography clearance ball run test to be carried out to ensure required minimum bore. The details of ball sizes are given in Table-2.	
Radiography:		
9.	a) All butt-welds shall be subjected to radiographic examinations X-ray/Gamma-ray source as per ASME sec. V for a sensitivity of 2-2T b) Interpretation of weld joints radiographs shall be done by the vendor and followed by department QC as per relevant codes.	

Sl. No	ISRO Description	Technical Compliance (By the party)
	c) Exclusive radiography machine / gamma ray source has to be arranged by the contractor when sufficient numbers of joints are available for examination. d) D2 films shall be used for gamma rays and D5 films shall be used for X-rays. Elliptical shots (double wall double image) may be employed. e) The penetrometer used shall conform to ASTM E 1025/ASTM E747 (or) relevant DIN standards. f) Re-take due to rejection of radiograph owing to bad image quality or repair joints shall be at the cost of contractor. g) Radiography shall be carried out by qualified technicians (i.e.) minimum level- I of ISNT/ ASNT and qualification certificates shall be produced with latest renewal to the department before proceeding with the work. h) Radiography film shall be evaluated and report shall be submitted by Level II ISNT/ ASNT (or) higher qualified person. However, department inspector will carry out the final evaluation and his decision is final.	
Painting:		
10.	a) High built epoxy primer and finish coat of Aliphatic acrylic polyurethane finish paint shall be applied. b) The paints to be applied are special type (epoxy paints) i.e. two component paints. Both the components are to be mixed and applied immediately after mixing. c) All the surfaces shall be applied with the one coat of primer of 125…150-micron DFT where ever required and one coat of finish coat of 50…60-micron DFT by the experienced painters. d) All the surfaces to be painted shall be cleaned thoroughly with metallic wire brushes, chipping hammers, emery papers etc., for removing rust, mill scales and old paint coats. Finally, surfaces shall be cleaned with cotton waste. e) All tools and consumables required for surface	

Sl. No	ISRO Description	Technical Compliance (By the party)
	preparation, paint brushes for painting, skilled painters and supervision is in the scope of contractor. f) Supply of paints (Primer and finish coat) and thinners, identification of jobs, stage wise supervision are in the scope of department. g) The contractor shall offer for stage wise inspection during painting. h) **Color scheme**: It will be provided by purchaser at a later stage and in general as per relevant Indian standards and which will be applicable for final coat.	
Inspection:		
11.	Department Engineer will participate in the following inspection activities: a. Fit-up, alignment of equipment and weld edge preparation. Fit-up of all the joints shall be cleared by department engineer prior to the welding. b. Witness of all DP tests and clearance for further works. c. Review and clearance of all radiography films. d. Witness of ball run test, strength tests (hydro/pneumatic) and pneumatic leak checks. e. Witness of pipeline cleanliness tests. f. Participation in all critical qualification tests as part of final loops qualification and interfacing with the equipment. g. The contractor shall offer for stage wise inspection during painting. The following inspections will be carried out by Department Engineer for painting e) Pre-surface preparation inspection. f) Inspection of coating on the equipment.	

Sl. No	ISRO Description	Technical Compliance (By the party)
	g) Evaluating cleaning between coats. h) DFT measurement through paint thickness measurement gauge.	
MS Structural Fabrication Works:		
12.	a) Fabrication of supports for piping & flow components and equipment supports. Suitable anchoring shall be planned using MS structural material and anchor fasteners. Structural work fabrication shall be with SMAW welding with electrodes of AWS E6010/E6011/E6013/E7018. b) Drilling and anchoring of pipe supports, hangers and on the wall /floor/roof embedment shall be carried out in situ based on the requirement. c) Pipe supports to be fabricated for every 2.5-3.0 Meters span in the yard, trenches, ceiling and along the columns as per the requirements. d) Cable trays laying and welding of cable trays as per routing finalized by Department Engineer. No separate payment will be made for laying of cable trays and the supply quantity is also limited only (<400 m). e) The structural steel material shall be supplied by the department as free issue.	
Department scope of supply:		
13.	The following items will be supplied by department at free of cost. a) Monel 400 Pipes/SS Pipes / SS tubes and associated fittings. b) Structural material required for supports and cable trays. c) Earthing Copper conductive material. d) Required anchor fasteners, bolts and nuts for equipment installation and assembly. e) Test gaskets and actual gaskets for equipment/piping. f) Hydro/Pneumatic test adaptors.	

Sl. No	ISRO Description	Technical Compliance (By the party)
	g) Hydro-test pumps and pressure gauges. h) DM water for hydro test. i) Purge gases air/nitrogen. j) Electric power for fabrication work (nearest distance aprx. 30 m) k) Paints (Primer & Finish Coat) and thinner.	
Scope of Contractor:		
14.	**a. Man Power:** ✓ Experienced supervisor with 5 to 10 years in the piping fabrication, who is able to read the given fabrication drawings and execute the works with systematic planning. ✓ 6G qualified TIG welders for Monel 400/SS welding. ✓ Welder for MS fabrication (SMAW, Gas cutting etc…) ✓ Qualified and skilled fitters. ✓ Skilled grinders and helpers. ✓ Skilled Painters ✓ Site Engineer/Supervisor	
15.	**b. Machinery:** ✓ TIG welding machines with suitable accessories like cables, torches, electrodes etc. ✓ Safety appliances such as face shield, gloves, eye glasses etc. for personnel protection. ✓ Manual welding machine for welding of structural steel. ✓ Grinding and cutting machines with necessary attachments. ✓ Gas cutting set. ✓ Hand and magnetic base drilling machine. ✓ Hammer drilling machine for drilling holes in concrete. ✓ Pipe bending machine, hand tube benders and tube cutters. ✓ Material required for Scuff folding for erection of vertical piping. ✓ Wind shields while working in open areas. ✓ Forced circulation pump for cleaning the pipe lines with	

Sl. No	ISRO Description	Technical Compliance (By the party)
	cleaning agent as per ASTM-G93.	
16.	**c. Consumables:** ✓ SS filler wires & E NiCu-7/Equivalent (For Monel) wires for TIG welding. ✓ Electrodes for SMAW (E6010/E6011/E6013/E7018) ✓ Grinding wheels, cutting wheels, emery cloth/papers, ss wire brush cotton waste etc. ✓ Industrial gases (Argon, Oxygen, Acetylene), regulator along with flow meter sets for welding and gas cutting. ✓ Cleaning agent as per ASTM-G93. ✓ Dye penetrant test kits along with dye penetrant chemicals. ✓ Paint Brushes& Guns (Good Quality Makes)	
17.	**d. Evaluation of Machinery and Manpower and Consumables** Technical evaluation by the Department Engineer will be carried out for machinery and man power to ascertain their complete suitability / performance for the jobs described above. Based on this evaluation clearance will be given for taking up the actual job.	
18.	**e. Documentation** ✓ During the execution of work the following documents shall be prepared. • Preparation of Material identification reports • Preparation of line wise weld history sheets • Preparation of isometrics and as built drawings in Auto Cad ✓ Contractor has to generate the following reports/drawings before commencement of hydro/pneumatic test. • Test loop drawings	

Sl. No	ISRO Description	Technical Compliance (By the party)
	• Ball run test reports • Radiography reports ✓ After commissioning, **3 sets of Loop wise documents** (Line number wise) consisting of the following works /tests shall be submitted with neatly bounded condition: • Process and Inst. Diagram in AutoCAD • As Built Drawing in AutoCAD • Material Inspection Report • Joint History Sheet (Including DP & Radiography test) • Ball Run Test Report • Mechanical Clearance (Pre-Test) • Strength test Report (Hydro/Pneumatic) • Chemical cleaning report for oxygen service • Cleanliness (particulate checks) Report • Pneumatic Leak Check Report • Moisture Measurement Report • Painting Report	
Manpower& Schedules:		
19.	a) Contractor has to deploy **Minimum of two Welding Batches (Each batch consists of Welder-1, Fitter-1, Grinder-1 and Helper-2) for Monel 400 one batch and for SS & MS**one batch to carry out the job. Party shall deploy additional **Welding Batches** in case of requirement. Such additional manpower shall be deployed within 7 days' notice. b) Tentative start of work will be intimated to Contractor	

Sl. No	ISRO Description	Technical Compliance (By the party)
	Two weeks in-advance. c) The contractor will be allowed to work beyond office hours if required and including holidays to meet the project schedule. d) In order to complete the work in time, it is recommended to deploy adequate manpower and supervisors and the work shall be carried out in two or three shifts based on requirement. e) Progress review meetings once in a week will be conducted for monitoring the status of works and the contractor's site representative need to attend with all relevant inputs.	
Payment terms:		
20.	a) Payment will be made on pro-rata basis for the completed portion of work once in a month after duly certified by the Department Engineer. 70% against completion of fabrication & erection work and balance 30% after testing, Cleaning pipe lines for oxygen service as per ASTM-G93 and acceptance. b) Security deposit of 3% PO value (excluding material supply part) shall be submitted to the purchaser after release of P.O (within 10 days) and the same shall be returned to the supplier on successful completion of work contract. c) The works as described above shall be treated as completed only after certification of the Department Engineers. d) The purchaser reserves right to cancel the contract at any time in case of failure of the contractor to fulfill the various requirements mentioned in the Purchase order (like number of welding batches etc.)	
General Conditions of the Contract:		

Sl. No	ISRO Description	Technical Compliance (By the party)
21.	**Due to interconnected nature of work scope, over all L1 will be selected towards awarding the contract. Party shall submit the acceptance for the same.**	
22.	**Period of contract:** Period of Contract is for 24 months from the date of release of purchase order.	
23.	***The quantity variation of + 25% is permissible on the Total contract value based on site requirements. Price will be considered for this variation basedon unit prices.***	
24.	Group insurance for workmen shall be taken for this work by the contractor. The proof of such insurance shall be submitted immediately after awarding the contract prior to the commencement of work.	
25.	Separate man power consisting of supervisors-01No, skilled manpower for assembly and testing works-02 Nos, helpers-03 Nos shall be deployed to carry out the qualification and commissioning activities as demanded by the department continuously till completion of the activities.	
26.	One Experienced engineer/Technical Assistant holding Diploma in Mechanical Engineering/B.Tech in Mechanical Engineering shall be deployed for monitoring and noting the work progress, documenting sequence of works (Details of documentation work are given below).	
27.	Computer for preparation of documentation, Printers, Xerox and binding is in the scope of contractor. 3 Sets of final documents shall be submitted.	
28.	Contractor shall take enough care to ensure to progress of the work without any material and personnel damage. It is the sole responsibility of contractor to ensure all safety norms to his personnel during transportation between work spot and Department/Contractor stores, and work in	

Sl. No	ISRO Description	Technical Compliance (By the party)
	prefabrication area, in storage shed and in yard. Department will not hold responsibility to any mishap to the contractor personnel.	
29.	Medical Assistance: While executing this contract work, if any of the workers engaged by contract agency is injured, they will be provided with first-aid by department. However, contract agency has to take care of subsequent medical treatment elsewhere.	
30.	Contractor has to give an undertaking that they will comply with prevailing safety norms at site put forth by department. Safety officer shall have full access to contractor's storage shed/office for inspection.	
31.	The price quoted in the price schedule should be valid till completion of the project or 24 months period from the date of placement of purchase order. However due to any Department program schedule, if the works to be completed as per above description calls for extension in the indicated period, contractor shall carryout the same at quoted price.	
32.	Contractor supervisor shall ensure that their personnel are strictly confined to the assigned job and place of work.	
33.	The contractor need to work between 9.00 AM to 5.30 PM on all week days (Six days) including holidays, generally if neededand even after office hours as demanded by Department.	
34.	The contractor shall ensure minimum wages as prescribed in minimum wages Act as per the State / Central Government Act. He and his work force have to follow safety standard prescribed. Contractor has to comply with all labour regulations as prescribed in various Acts in respect of himself and his man power.	

Sl. No	ISRO Description	Technical Compliance (By the party)
35.	Contractor shall get approval from Department for the specifications of all items in his scope of supply, bought out items if any, before placing orders for the same.	
Tender evaluation:		
36.	**The following documents shall be submitted along with the Techno-commercial bid for prequalification of Bidder** Contractor should have executed fabrication contracts involving erection and commissioning of Monel 400 (or Monel Equivalent) piping, SS Piping (i.e. SS TIG Welding for pipe & tube, bending of SS pipes, radiography of SS butt welded joints) and MS structures (i.e. MS material supply, fabrication & erection works) during the last five years by considering last financial year ending with March-2025 shall be submitted for tender evaluation. Single PO for similar works of Rs.30 Lakhs (or) Two POs for similar works of Rs. 20 Lakhs each (or) Three POs for similar works of Rs.15 Lakhs each. **(or)** Contractor should have executed fabrication contracts involving erection and commissioning of piping (i.e. SS TIG Welding for pipe & tube, bending of SS pipes, radiography of SS butt welded joints) and MS structures (i.e. MS material supply, fabrication & erection works) with a minimum cumulative value of all purchase orders amounting to ₹. 30 Lakhs (in the last five years by considering last financial year ending with March-2025).	
37.	Work completion certificates shall be submitted along with offer for the above PO's. Without this offer will not be considered.	
38.	P.O copies with only structural steel welding, P.O copies with only CS/GI pipe with arc welding are not acceptable.	
39.	List of working personnel: Welders - **Min.2 welders** (**6G qualified TIG welders for Monel/SS pipe welding**), Fitters-	

Sl. No	ISRO Description	Technical Compliance (By the party)
	Min.2 fitters, Grinders-Min.2 grinders, helpers-as per the requirement), fabrication supervisors-as per the requirement, drafts man (Min.01) and skilled personnel for documentation (Min.01member) & one welding batch for MS.	
40.	List of Machinery &Equipment to be used for the work (like TIG welding machines-Min.2 Numbers, Grinding-Min.2 numbers, gas welding equipment, Pipe bending and other equipment as per project requirement).	