DESIGN, FABRICATION, SUPPLY, INSTALLATION AND COMMISSIONING OF PERLITE VACUUM INSULATED LIQUID NITROGEN STORAGE TANK of 20kL CAPACITY WITH STANDARD FITTINGS AND OBTAINING CCOE/PESO APPROVAL

Qty- 1 Set

Part A. Technical Specifications for Perlite Vacuum Insulated Liquid Nitrogen Storage tank

1. Scope

1.1. Design, Fabrication, Supply, installation and commissioning of stationary and pressurisable Liquid Nitrogen (LN2) Storage Tank of 20kL capacity with accessories and standard fittings.

1.2. The LN2 storage tank should be highly reliable, maintenance free, designed for long life in normal environmental conditions supplied with all standard plum lines, fittings and Low-pressure atmospheric vaporizer system.

1.3. The party shall carry out installation at the identified location at LEOS-ISRO. The party shall prepare complete documentations and obtain Chief Controller of Explosives (CCOE) approval.

2. Design data for inner vessel

SN	Specifications	Requirements
2.1.	Fluid to be stored	Liquid Nitrogen
2.2.	Capacity of inner vessel (Gross)	20000 ± 3% liters (20kL)
2.3.	Capacity of inner vessel (Net)	95% of Gross capacity
2.4.	Vapour space	5% of Gross capacity
2.5.	Allowable pressure	14 Bar working pressure or better
2.6.	Operating temperature	-196°C to 40°C or better
2.7.	Design pressure	15 Bar or better
2.8.	Hydraulic test pressure	19.6 Bar or as per ASME code
2.9.	Design, fabrication, Inspection & test code	ASME Code SEC- VIII, Div –1, or EN13445 or EN13458
2.10.	Material of Construction	ASME SA 240 TP 304/304L or better.
2.11.	Radiography	100%
2.12.	Statutory Regulations	SMPV (UNFIRED) RULES 1981

3. Design data for outer vessel

SN	Specifications	Requirements
3.1.	Working pressure	Vacuum (inner) and atmosphere (outer)
3.2.	Insulation	Perlite under vacuum (Note: Super insulated tank is not acceptable)
3.3.	Working temperature	0 to 49°C or better
3.4.	Design temp	50°C or better
3.5.	Design & fabrication code	ASME Code SEC- VIII, Div –1, or EN13445 or Or EN13458 or CGA 341, 2002 or other international code
3.6.	Materials of construction	Carbon Steel ASME SA 516 Gr.60/70 or better.
3.7.	Radiography	10% or better

4. General Specifications

SN	Specifications	Requirements
4.1.	Mounting	Vertical orientation with supporting legs
4.2.	Installation	In industrial area, Peenya, LEOS-ISRO
4.3.	Type	Stationary
4.4.	Evaporation loss	Maximum 0.3% per day of full capacity at an ambient temperature of 20°C at atmospheric pressure
4.5.	Overall size	**i. Outer Tank** Diameter: should not exceed 2600 mm Height: as per vendor's design height of outer tank **ii. Inner Tank** Diameter and height as per vendor's design
4.6.	Liquid filling port	Bottom filling
4.7.	Design	Optimum design with minimum exposed Surface area with enough safety margins
4.8.	Cryo regulator	Adjustable from minimum 3 Kg/cm^2
4.9.	Manufacturing	i. All welding joints to be deep penetration welded. ii. No interstitial blow holes in welds and in the bulk material. iii. Annular surface between inner and outer walls shall be surface cleaned.
4.10.	Insulation	i. Perlite insulation Vacuum shall be provided as insulation in the annulus for barest minimum evaporation of LN2. ii. The annulus to be evacuated for high vacuum and is to be retained for long term. The standard fitting for evacuation from time to time, if required, shall be provided.
4.11.	Inter space plum lines	Inter space pipe material shall be Seamless ASME SA312-304/304L or equivalent
4.12.	Plum lines and valves	i. External piping with valves & fittings for storage tank LN2. ii. Filling and withdrawal lines (preferably 1¼" NB size) should be Super Insulated vacuum jacketed lines iii. Plum line Material: ASME SA 312 TP 304/ Equivalent. iv. Valves' material: Bronze body with Stainless steel internals or equivalent. v. Plum lines shall end with standard flange fitting.
4.13.	Fittings	All Standard fittings such as Pressure gauge, Liquid level indicator, Non-return valve, Safety /Relief valves (Minimum two in number) Vent valves, Rupture/ Burst disk, Filling valves, Over flow valve, Inlet and outlet & all interconnecting pipe lines, Redundancy for sensitive valves
4.14.	Cryogenic Valves	LN2 temperature compatible and suitable to piping size.
4.15.	Painting	All exposed surface to be mechanically cleaned and shot blasted, two coats of primer and then two coats of polyurethane paint to be provided.

4.16.	Atmospheric Vaporizer	External evaporator for Pressure Building (PB) up with P.B. valve/regulator, Natural draft ambient air vaporizer with Aluminium finned construction and vertically mounted type, Safety relief valves as per standard.
4.17.	Automatic tank pressure maintaining system	i. PID/PLC based Control system shall be provided for automatic control of tank pressure with manual over ride option ii. Suitable Flow control valves, sensors and instrumentation shall be provided iii. Additional valves and plum line fittings shall be provided, if required iv. Pressure Display range: 0-20 Bar or better v. Automatic pressure setting range: 2 Bar- 10 Bar or better
4.18.	Installation and commissioning	i. The party shall carry out the installation works at the identified site. ii. The party shall carry out unloading, positioning and securing the storage tank in its place iii. The party shall complete the commissioning the work
4.19.	Safety	i. The vendor should take care utmost care while working in LEOS-ISRO. ii. In case of any accident occurring due to any reasons while carrying out the work at LEOS premises, Department will not be responsible in any way for the same
4.20.	Guarantee	Tank and its complete accessories should be guaranteed for trouble free operation against defective material and workmanship for the period of 18 months from the date of dispatch or 12 months from the Acceptance after installation whichever is later.

5. Supply of Spares

Following spares shall be supplied along with the tank

SN	Item description	Quantity
5.1.	Safety Relief Valve	4 Nos
5.2.	Non-return valve	2 No
5.3.	Cryogenic Globe Valve	4 Nos
5.4.	Valves used in evaporator	2 Nos
5.5.	Rupture/Burst disk	5 Nos
5.6.	Gaskets used in plum lines	5 sets (total number of gasket x 5)
5.7.	Pressure and level indicators	2 sets
5.8.	Cryo regulator	1 Set.
5.9.	Pressure sensors, flow control valves and Controller for Automatic tank pressure maintaining system	1 Set

PART B: Documentation and PESO/CCOE license

1. Scope

1.1. The party shall obtain the license for the new tank by providing necessary documents.

1.2. The existing license and CCOE/Petroleum and Explosives Safety Organisation (PESO) approved drawing will be shared with the party. This new tank (20 kL) will be addition to the existing tanks.

1.3. The party shall prepare revised layout drawing including this tank and obtain approval from CCOE/PESO by providing necessary documents.

1.4. Supply of foundation bolts in advance should be included in the scope of supply and installation.

2. Approval and Documentation

2.1. The vendors may visit LEOS-ISRO to assess the existing LN2 tank location drawings, documents and new LN2 tank installation site.

2.2. The vendor shall have the responsibility of generating amended the layout to obtain CCOE/PESO approval.

2.3. The vendor shall have the responsibility of obtaining CCOE/PESO for the period of **three years**.

2.4. The vendor has to submit the layout plan for CCOE/PESO approval only after obtaining consent from LEOS.

2.5. The vendor shall coordinate with CCOE/PESO and get site approval and filling license on behalf of LEOS, and shall hand over to LEOS along with the approved revised Site plan and the filling license in originals. The charges completely should be borne by the supplier.

2.6. The charges for the existing tanks' filling license shall be borne by LEOS-ISRO, if applicable and required.

PART C : General

1. Deliverables

1.1. LN_2 storage tank with all fittings, spares, and the super insulated lines.

1.2. All Original Quality control data sheet, Inspection reports etc.

1.3. Warranty certificate.

1.4. Operation and maintenance manuals.

1.5. CCOE/PESO approval (license) for three years for the new tank including for the amended layout

2. Bidding process

The bidding process is two-part tender. The vendor shall carefully read the above specifications and then submit the offer in Two parts viz., Technical bid and Price bid.

2.1. Technical Bid:

The offers with technical compliance statement with offered specifications only will be considered. Offered Specifications shall be submitted with documentary proof/ data sheet.

Offers with incomplete compliance or stating mere comply will be considered as incomplete offer and will be rejected without any communication. Price details should not be revealed in technical bid, otherwise the offer will be rejected without any communication.

2.2. Price bid

The cost offered by the party shall be for the complete scope only. Lowest Offer L1 will be arrived at the total landed cost at LEOS offered by the party.

3. The Offer shall be submitted along with following documents in the technical bid

3.1. Compliance statement supported with catalogs, leaflets, brochures, application notes etc. including make and model of the major components.

3.2. Complete Piping and Instrumentation (P&I) diagram.

3.3. Foundation details/design drawings.

3.4. Supporting documents for heritage & experience, if any.

4. Pre delivery inspection

4.1. Pre-delivery inspection will be carried out by LEOS engineer at the supplier's premises.

4.2. All the required documents such as Quality control, third party certificates, CCOE approval, materials' tests certificates, calibration certificates of relief valves, gauges, etc. shall be kept ready during the inspection at the supplier's premises.

4.3. Clearance will be provided for the dispatch of the tank after the successful pre-delivery inspection.

5. Delivery Schedule

5.1. Supplier shall provide the foundation details and the required tanker anchoring foundation fasteners to LEOS within 3 months of receipt of Purchase Order (PO) acceptance. LEOS will provide the required foundation and make it ready at the time of installation.

5.2. Completion of Factory inspection: within 10 months of PO acceptance. The party shall invite LEOS for the factory inspection with minimum prior intimation of 1 month.

5.3. Delivery of tank after dispatch clearance: Within 12 months of PO acceptance.

5.4. Completion of installation: Within 1 month after receipt of storage tank at LEOS.

5.5. CCOE license and commissioning within 1 month of installation

5.6. Entire scope shall be completed within 14 months of PO acceptance