

**DOCUMENT FOR SUPPLY, INSTALLATION TESTING A  
AND COMMISSIONING OF LIQUID OXYGEN PLANT**

**Technical specifications for Liquid Oxygen Plant for 6 New All India Institute of Medical Sciences**

**RESPONSIBILITY OF BIDDER**

Bidder shall be responsible for complete design, supply, installation, testing and commissioning including turnkey works and construction as applicable. The bidders are required to survey the site before furnishing the quotations.

Bidder shall execute all required civil, electrical, plumbing, lighting, fire safety and other works as maybe required for complete installation and trouble-free functioning as a part of the 'turnkey work'. Hospital will provide electrical supply with isolator in the plant. Should supply Control panel for switching between primary and secondary system. Should connect the liquid oxygen plant to the hospital MGPS System. Bidder will be responsible for trenching or other associated work related to installation and commissioning of complete Liquid Oxygen System.

The job will be on turn-key basis and the bidders are required to visit the sites before submitting their bid.

**1.Liquid Oxygen supply system**

One vessel of 20 KL Liquid oxygen VIE vessel system will be the primary (main) supply source. In case of failure in liquid oxygen supply, it should automatically switch over to secondary oxygen manifold having 2 X 20 cylinders. Design should be state-of-the-art.

The unit should consist of a double walled vertical vessel (inner pressure vessel made of stainless steel and outer vessel of carbon steel). It should be fitted with standard accessories and should have "passed" the standard inspection requirement at factory for VIE. The copy of the certificate should be forwarded to the purchaser prior to shipping and original should be enclosed along with the shipping document.

**1.1 SCOPE:**

**Supply and installation of Vacuum Insulated Evaporator (VIE)**

One vessel of 20 KL Liquid oxygen VIE vessel system will be the primary (main) supply source. The system should have separate tank, VIE, AV coil, controllers etc. Required pipe line including necessary accessories like isolation valves, non-return valves, line regulators etc. has to be supplied. Essential inter connection to the manifolds through automatic change over control should be provided.

The vendor should supply all the above items on a minimum monthly rental charge. Annual escalation up to a maximum of 5% is admissible. Cost of liquid oxygen supply will be extra as applicable.

- The vendor should supply liquid medical oxygen at site without interruption to meet the continuous demand of the hospital. The vendor should quote the cost of gas per m<sup>3</sup>(cost of gas + transportation Charges to the site from the nearest manufacturing unit). The charge should be valid for a period of minimum one year.
- The plant and the controllers being supplied and maintained by the vendor would be considered his property.

### **Scope and responsibility of the vendor**

- The vendor should transport the liquid medical oxygen, VIE, AVC , pipes, regulators, accessories, fence etc. as required to the site.
- Erection and commissioning of the VIE, AV coil, and the interconnection of LO plant to the manifolds of the hospital with suitable modifications is the vendors responsibility.
- Necessary maintenance of the VIE, AV coil, controllers etc. is the responsibility of the supplier.
- The vendor should liaise with the Chief Controller of Explosives, Nagpur to get the essential safety clearance certificate. Service charge required for this work should be paid by the vendor.

### **1.2 Product and Service Specification:**

- Proposed capacity of the primary liquid oxygen storage tank is 20 KL
- Gas outlet pressure to be maintained at 4.2 kg/cm<sup>2</sup>.
- Space taken for installation should be as per regulations of Indian explosive controller and having easy access for LMO tank.
- The site would be protected by fence around, well lit by sodium vapour lamps and demarcated with proper signage.
- Indication of liquid oxygen level and outlet gas pressure should be provided.
- Automatic change over should be provided between the primary and secondary source. In case of failure in liquid oxygen supply, it should automatically switch over to an primary oxygen manifold having 2 x 20 cylinders.

### **1.3 Specification of Components**

**Product:** The liquid medical oxygen (LMO) supplied at site should be of IP grade. The LMO supplied should comply with all relevant SMPV regulations and standards under the preview of the Indian Drugs and Cosmetic Act rules. They should also satisfy the IP 2007 specifications.

### **Storage Tank Specifications**

The storage tank and the vaporizer coils should be designed as per the ASME specifications.

The cryogenic vessel will be of cylindrical shape with vaporiser and the pressure control system. It should be provided with the essential components to fill the liquid, to build up pressure, to relieve pressure, to withdraw product and to evacuate the vessel. All protective, safety and alarm provisions mandatory to Liquid Medical Oxygen plants should be supplied.

**The requirement of the Cryogenic Vessel should be:**

1. Configuration: Vertical
2. Inner vessel maximum allowable working Pressure: 10 kg/cm<sup>2</sup>
3. Inner vessel hydrostatic test pressure: Greater than 14 kg/cm<sup>2</sup>
4. Outer vessel material of construction: Carbon steel
5. Inner vessel material of construction: Stainless steel

**Storage Tank Capacity**

The vacuum insulated evaporator vessel should have a capacity of 20 kilo liters. The AV coil should have adequate capacity to handle the gas flow requirements of the hospital.

**Vaporiser Coil**

1. Maximum operating Pressure: 20 kg/cm<sup>2</sup>
2. Design Pressure: 22 kg/cm<sup>2</sup>
3. Pneumatic test Pressure: Greater than 24 kg/cm<sup>2</sup>
4. Inlet temperature: - 196 to +40°C.

The fence, foundation, lighting, signage, approach gate etc are to be designed and installed by the vendor.

**1.4 Payment /Measurement of delivered quantities**

Quantity of liquid oxygen delivered is determined by the difference in weight of the tank before and after the delivery of the gas at the site.

The conversion factor used to convert weight to volume is as follows:

1 kg of the liquid medical oxygen=0.77 m<sup>3</sup> at the reference pressure of 1 atmosphere and temperature of 27°C.

**Rate Contract**

AIIMS will enter into a rate contract with the vendor for exclusive supply of Liquid Medical Oxygen for a minimum period of 5 years on yearly basis (From the date of first delivery). A formal agreement will be signed for this. Due penalty for faulty/interrupted delivery should be incorporated by mutual agreement.

**1.5 Safety**

The vendor should ensure that all international safety norms and standards applicable as implemented and certified by the CCE.

Following are the mandatory provisions:

- Vessel sizing for at least 7 days' stock

- Vessel low liquid level alarm
- Vessel low pressure alarm
- Pipeline low pressure alarm.
- Twin regulator
- Twin safety valve
- Non return valve and 3 way diverter (bypass) valve
- Automatic changeover to manifolds with control panel
- Alarm on indicating manifold in use in case the vessel is not in use.
- Alarm on low pressure back-up manifold cylinders

### **Statutory Requirements**

All statutory requirements of the Chief Controller of Explosives of India and SMPV rules need to be followed, besides all regulations and guidelines put forward by the Govt. of India from time to time should be followed.

### **Maintenance**

All routine preventive maintenance and break-down maintenance of the liquid oxygen plant should be done by the vendor. Experienced personnel should be readily available. Log of all works undertaken in the plant should be meticulously maintained by the vendor. The maintenance charges are to be included with the annual rental.

### **Source of liquid oxygen supply**

The manufacturing/filling facility should be proximal to the site (should be reachable latest by 24/36 hrs) preferably with smaller back up facilities to meet emergencies.

### **Tankers for delivery of Liquid Oxygen**

The exclusive tankers for transport of liquid oxygen engaged/ owned by the vendor should have all valid CCE documents. They should comply with the national and international safety directives. The documents should be readily produced for verification when demanded. The vendor should engage only skilled drivers with adequate training in decantation of liquid oxygen. The drivers should hold valid licenses. The vendor should have a large tanker fleet to ensure cross trunking whenever short supply occurs.

### **Experience**

The vendor should have vast experience in supplying, installing, operating and maintaining liquid medical oxygen plant in hospitals all over India.