



**INDIAN INSTITUTE OF TECHNOLOGY BOMBAY**  
**MATERIALS MANAGEMENT DIVISION**  
 Powai, Mumbai 400076

**Revised Specifications sheet for the Liquid Nitrogen Plant**

<u>Sl.No.</u>	<u>Required indent specifications</u>	<u>Our Requirement</u>	<i><u>Pl mention your remarks in YES or NO formator mention the values</u></i>
	<i>The plant will have to be designed for liquefaction at a pressure of 1 bar(g) and with a liquid purity of at least 99%</i>		
<b><u>A</u></b>	Required liquid nitrogen production capacity at a pressure of 1 bar(g).	<b><i>95 liters per hour</i></b>	
<b><u>B</u></b>	Required purity of liquid nitrogen at 1 bar(g).	<b><i>99%</i></b>	
<b><u>C</u></b>	<b><u>Power consumption</u></b> Must be minimum. Power consumption of all accessories with break-up should be mentioned. Power consumption per litre of liquid nitrogen produced should be mentioned.		
<b><u>D</u></b>	<b><u>Scope of Supply:</u></b>		
1.	One modular, oil lubricated rotary screw compressor with integral electrical starter and motor protection.		
2.	Air blast cooler or chiller unit.		
3.	Buffer tank or air receiver.		
4.	Pressure swing adsorber/air separation system.		
5.	Cold box with integral turbine and turbine cooling system or cryo-generator.		
6.	<b><u>Liquid Nitrogen vessel:</u></b>		
a.	Liquid nitrogen vessel, vertical or horizontal type capacity: 2000 litres.		
b.	Storage vessel working pressure: <b><i>1 bar(g)</i></b> .		
c.	The above liquid nitrogen vessel should have 2 ports for connecting liquid delivery transfer lines.		
d.	In addition to the above, the storage vessel should be fitted with standard accessories such as decanting port with flow capacity liquid outlet valve, adjustable liquid pressure maintaining system, liquid-level controller with adjustable high and low set point switches, liquid-level indicator, pressure indicator, pressure safety and relief valves.		
7	Required installation piping/hose kit.		
8	Major maintenance kit or spares required for 12,000 hours of plant operation.		
9	Two sets of complete user manual in English language.		
10	Tools set for plant servicing and repairs [12000, 24000 and		

	36000hours].	
<b><u>E</u></b>	<b><u>Plant operation and Control</u></b>	
1.	Plant should be capable of unattended, fully automatic, fool-proof and fail-safe operation and be equipped with adequate number of annunciators, alarms and safety devices.	
2.	The plant operation and control should be fully automatic using PLC Control.Provision for remote monitoring as an optional.	
3.	Confirmation that the plant has capability of unattended, fully automatic, fool-proof and fail-safe operation.	
4.	System Diagnostics: Should be system integrated with visual display unit.	
5.	Start-up is to be with a single switch operation.Auto-restart after any period of power resumption with start-up time to full production.	
6.	The plant must be operable on the electrical supply parameters available at the institute as: 415 VAC plus or minus 10%, 3-phase, 50 Hz. The offer must certify that all the machinery, equipment, instruments and controls will keep working and will remain safe at these parameters of electrical supply. In case the electrical supply parameters change beyond the above range the system may shut-down but all its components will remain safe from any damage.	
7.	The plant will be located at the institute in Mumbai (India) which is at sea shore and hence exposed to hot (up to 45 <sup>o</sup> Celsius), humidity (up to 95% RH) and saline atmosphere. The offer must certify that the supplied plant protection will safely withstand these conditions.	
<b><u>F</u></b>	<b><u>Plant Operationtraining:</u></b>	
1.	The offer must include onsite installation and commissioning of the liquefier and all its components along with onsite training of our operators.	
2.	Final performance test will be conducted after commissioning in Institute premises.	
<b><u>G</u></b>	<b><u>Essential requirements for the evaluation of the tender</u></b>	
1.	<p><b><u>NOTE:</u></b> The criteria for selecting the plant will be on the basis of vendor presentation at IIT Bombay in front of an expert selection committee and recommendation from the expert panel while meeting other requirement criteria specified. The selection committee will comprise of personnel from IIT Bombay and external experts. Vendor presentation must include manpower requirement, quoted capital cost and verifiable running operating cost as well as maintenance cost. 10 year life time operational needs should also be included. Presentation should include existing customer list and certificate of appreciation from them (minimum of 2 different customer appreciation).</p> <p><b><u>Date for Vendor's Presentation will be Intimated once the Technical Bid is opened through emails to participants.</u></b></p>	
2.	The offer must provide performance data on guaranteed	

	liquefying rates in various operating pressure (i.e., atm pressure, 1bar (g), 2bar (g)) and corresponding liquid nitrogen purity.	
3.	Defrosting/Purging: No defrosting/purging should be necessary. An integral purifier should remove water traces, if any.	
4.	The offer must include O <sub>2</sub> sensor with alarm, humidity level indicator, noise level indicator.	
5.	Minimum maintenance interval of the plant shall not be less than 6000 hours of operation.	
6.	The offer must furnish preventive maintenance schedules for the plant and its components inclusive of mechanical, electrical and electronic systems.	
7.	The offer must contain a list of mechanical / electrical / electronic spare parts for all the plant components like cold box/ cryo-generator, compressor, air separation system/PSA, control system, etc.	
8.	Assembly & Testing: Should be factory assembled and rigorously tested.	
9.	The offer must contain full details of the plant components viz. make, model,type, of compressor details of oil removal system, air separationsystem/PSA, purifier module, coldbox or cryo-generator.	
10.	Vendor should submit the details of similar plants supplied in India. Contact details of all such customers to be provided as reference at least two purchase orders. Vendor must attach performance certificates / appreciation letters of successful running of the LN <sub>2</sub> plant from the end users in India. If found necessary a feedback from existing customers will be solicited.	
11.	The offer must mention the electric power requirements (cable size, ratings,etc.), air and water requirement, floor preparation if needed, requirement of duct size if any and other utilities required.	
12.	The offer must contain shipment packing size, weight and volume of each consignment.	
13.	The offer must have with minimum two years warranty from the date of installation and commissioning.	
14.	The offer must confirm that the warranty will start from the date of satisfactory commissioning in the Institute.	
15.	The offer must include noise reduction or absorption arrangements if sound level exceeds 80 dB.	
16.	The offer must mention service response time for any breakdown of plant during warranty.	
17.	Special Training: Inspection and hands-on training about operation of the plant in factory during factory test of the plant for 5 days(not including holidays) for 2 persons with accomodation, food & travel expenses to & from. All cost to be borne by the equipment supplier.	
<b>H</b>	<b>Other Requirements:</b>	
1.	Delivery schedule	
2.	Time required for the plant installation & commissioning at site.	

3.	Installation and commissioning requirement, if any.	
4.	Validity of the offer should be 180 days from the date of opening of the tender.	