

Title	GeM Bid No. GEM/2026/B/7784020 for Design, Engineering, Manufacturing, Fabrication, Supply, Transportation, Loading, Unloading, Construction, Installation, Testing, Commissioning and Site Acceptance Test of Pressure Swing Adsorption (PSA) Technology based Onsite Nitrogen Generator System
Subtitle	PART-A(II): Scope of Supply, Scope of Work and Technical Specifications



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Abbreviations

IPR	:	Institute for Plasma Research
CWS	:	Cooling Water System
WPS	:	Water Polishing System
DO	:	Dissolved Oxygen
PSA	:	Pressure Swing Adsorption Technology
OEM	:	Original Equipment Manufacturer
CMS	:	Carbon Molecular Sieve
PLC	:	Programmable Logic Controllers
HMI		Human-Machine Interface
FAT	:	Factory Acceptance Test
SAT	:	Site Acceptance Test
CS	:	Carbone Steel
MS	:	Mild Steel
SS	:	Stainless Steel
EPDM	:	Ethylene Propylene Diene Monomer
PCV	:	Pressure Control Valve
SOQ	:	Schedule of Quantities
MoC	:	Material of Construction
ASME	:	American Society of Mechanical Engineers
ASTM	:	American Society for Testing and Materials
IS	:	Indian Standard Codes
NABL	:	National Accreditation Board for Testing and Calibration Laboratories
GA		General Arrangement
QAP		Quality Assurance Plan

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1 Introduction:

- a. The Water Polishing system is installed in the Auxiliary Building at IPR campus, Near Indira Bridge, Bhat, Gandhinagar. The Water Polishing System (WPS) has Dissolved Oxygen (DO) Removal System to remove oxygen from Cooling Water System (CWS) Loops using nitrogen as sweep gas. Therefore, an Onsite Nitrogen Generator System require for DO Removal System.
- b. The detailed Scope of Work and Technical Specifications for Pressure Swing Adsorption (PSA) onsite nitrogen generator system are given in Section 2, 3, 4 and 7 of this document.

2 Scope of Work

- a. The Scope of work includes Design, Engineering, Manufacturing, Fabrication, Supply, Transportation, loading and unloading, construction, installation, testing, commissioning and Site Acceptance Test at IPR Site of complete Pressure Swing Adsorption (PSA) Technology based onsite nitrogen generator System in Auxiliary Building, Institute for Plasma Research (IPR) campus, Near Indira Bridge, Bhat, Gandhinagar. Also, arrangement of tools and equipment as necessary for Transportation, Loading, Unloading, Shifting of material, Fabrication, Fixing, Erection, construction, installation, testing, commissioning and Site Acceptance Test of Pressure Swing Adsorption (PSA) Technology based onsite nitrogen generator System in IPR Site shall be in the scope of vendor. The main scope of work of the Vendor includes, but not limited to this technical specification and scope of work, if anything which is not explicitly mentioned herein, and necessary to complete the work same shall be also in scope of vendor.
- b. It is not the intent to specify completely herein all aspects of the activities, nevertheless complete tender and services shall conform in all respects to required standard and shall be capable to performing its function in a manner acceptable to the PURCHASER.
- c. The Vendor shall be completely responsible to supply of complete onsite nitrogen generator system and materials as per suit at site dimensions. The Vendor shall be completely responsible for loading, unloading, transportation and shifting of all the material in the building. Freight and insurance shall be borne by the vendor. The Vendor shall be completely responsible for Fabrication, Painting, Fixing, construction, Erection and Installation of onsite nitrogen generator system. The vendor shall carry out and complete the said work under this contract in every respect in conformity with the contract documents.

3 Scope of Supply

Vendor shall supply **Pressure Swing Adsorption (PSA) Technology** based Onsite Nitrogen Generator System of Capacity **11 Nm³/hr** which produces minimum **99.99%** High-purity nitrogen. Nitrogen Generator System shall be **Pre-commissioned** and **skid-mounted** System/Plant. Nitrogen Generator System comprising of below items but is not necessarily limited

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to these, if anything which is not explicitly mentioned herein, and necessary to complete the system, same shall be also in scope of the vendor.

1	Air-cooled Lubricated Screw Air Compressor of suitable capacity with motor & starter. Compressor shall be so as it must produce minimum discharge pressure 7 kg/cm²(g) and minimum air flow 60 cfm.		1 set
2	Air Purification unit comprising of		
	a	Wet air receiver with Auto+ Manual drain valve, pressure gauge, safety valve, pressure switch, pressure transmitter and Temperature element	1 set
	b	Refrigerated Air Dryer with auto drain valve	1 set
	c	4 Stage Filtration System	
		- Pre-filter with Auto + Manual drain valve (5 Micron).	1 set
		- After filter with Manual drain valve (1 Micron).	1 set
		- Fine filter with Manual drain valve (0.1 Micron)	1 set
		- Activated Carbon Filter with Auto + Manual drain valve (< 0.003 ppm).	1 set
	d	Dry Air Receivers with Manual Drain system, pressure gauge, safety valve, pressure switch, pressure transmitter and Temperature element	1 set
3	PSA Module comprising of		
	a	PSA Twin Tower (02 Vessels) with Auto Changeover Valves (min. 8 nos.) and filled with Carbon Molecular Sieves	1 set
	b	Nitrogen Surge Vessel with all accessories i.e. Manual Drain system, safety valve, pressure gauge and pressure regulator, Pressure Transmitter.	1 set
	c	Electrical Control Panel with PLC based control system along with HMI (Human-Machine Interface) touch screen display Panel minimum 8-inch size for data monitoring and set the control parameters, Temperature Controller, Microprocessor based online Oxygen Analyzer with Sensor.	1 set
	d	Digital Flow Transmitter at Nitrogen Surge Vessel Nitrogen outlet.	1 set
	e	Vent with Silencer: the vent pipe shall be extended from proposed location to the nearest point to be able to exhaust the gas out side the plant room. The required size of MS pipe (approximate. 15 to 20 meter) shall be in the scope to vender.	1 set
4	Nitrogen Receiver of 2 m³ (2000-liter Water Volume capacity) with minimum pressure 5 kg/cm²g with all accessories i.e. Manual Drain system, safety valve, pressure gauge, pressure switch and Pressure Transmitter.		1 set
5	The vendor shall supply, install, and integrate all interconnected CS/SS piping and fittings, along with all required valves such as non-return valves, isolation valves, flow control valves, and pressure control valves, all necessary instruments such as flow transmitters, pressure transmitters, and temperature elements/controller/ transmitters, and the vendor shall complete all internal wiring and cabling. To operate pneumatic valve, vendor has to arrange controller for instrument air line for uninterrupted supply with in the Nitrogen Generator System.		

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6	Vendor shall supply efficient Carbon Molecular Sieves (CMS) for Nitrogen Purity, filled in PSA Towers.
7	Vendor shall connect the highest purity nitrogen supply line with existing Nitrogen pressure reduction system/station of client/purchaser located within the 5 meters from the proposed location of nitrogen generator system. hence, Vendor shall supply and install 25mm size Stainless Steel SS304 pipe with fittings and manual isolation valve (forged CF8 flanged Isolation ball valves with mating flange-1 Nos.) to complete the connection with existing Nitrogen pressure reduction system/station.
8	Vendor shall supply onsite nitrogen generator Plant/system with its mounting skid.
9	Anchoring and grouting requirement: I. Vendor shall supply and install appropriate quantity of suitable size and capacity anchor fastener. II. Vendor shall carry out Civil works i.e. preparation and construction of 200mm height pedestal and foundation for the installation of equipment/components and skids of equipment/components. OR Vendor shall provide 200mm height structural steel legs (appropriate numbers and size) below the equipment/components/skids with base plate to anchor the system directly on the floor.

4 Technical specifications

- a. Complete onsite nitrogen generator system shall be Pressure Swing Adsorption (PSA) Technology based and majorly including Air cooled Lubricated Screw Air compressor, Filtration package, Activated carbon filter, Refrigerated Air Dryer, Wet Air Receivers vessel, Dry Air Receivers vessel, automatic changeover valves, Two(02) adsorption tower charged with Highly efficient special grade of Carbon Molecular Sieve (CMS), Nitrogen Surge vessel, Nitrogen buffer Tank (Nitrogen Receiver), interconnected Valves, interconnected instruments, all internal wiring and cabling, Electrical Control Panel with PLC based control system and HMI Display panel with safety interlock. Nitrogen Generator System shall have provision for remote connection with client/purchaser system.
- b. Onsite Nitrogen Generator system shall be so as it shall-
 - generates Nitrogen **without interruption** as and when required, with Purity (**99.99% minimum**).
 - based on well-proven process and it must guarantee steady quality of nitrogen production.
 - **Skid Mounted and Pre-Commissioned.**
 - have automatic start-up, optimal control and monitoring controller.
 - fully automatic, user friendly and Easy Operation, and should not be required continuous operator's attention.

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- Energy Saving (Low power consumption), Maintenance Free, Easy & smooth start up and Flexible in Installation & Operation.
- efficiently compress, filter and dry Ambient air.
- equipped with filtration system to maintains the CMS life, Air Purification System to enable CMS work efficiently, and Refrigerated Air Dryer ensuring moisture free feed air, no moisture shall be load on CMS and achieve consistent purity of nitrogen.
- have automatic Process Change-over Valves of Stainless Steel (SS) for ensure hassle-free operation.
- Microprocessor based online oxygen Analyzer shall be provided in with Nitrogen System Panel for constant monitoring of Nitrogen Purity.
- equipped with complete safety & alarm interlocks to avoid any kind of accident.
- no cooling water required.
- In case of any abnormality the gas Generator would trip automatically with Audio Visual Alarms for Necessary action.
- In Case of Storage Tank Getting Filled the Gas Generator Goes to Sleep and restarts once the pressure in storage Tank is reduces to set Limit.
- not take more than 30 minutes to get Nitrogen purity.

c. Vender shall comply the below table parameters of technical specification as minimum:

Sr. No.	Item Description	Specifications
1	Capacity of System	11 Nm ³ /hr
2	Purity of Nitrogen	99.99%(minimum)
3	Oxygen Content	≤ 0.01%
4	Mounting	Skid Mounted
5	Cooling water required	Nil
6	Operation	Automatic - Non-Stop 24 Hrs
7	Air Pressure in Air Receiver	minimum 7 kg/cm ² (g)
8	Oxygen Level - Purity Check	Continuous – Online
9	Discharge pressure Ex PSA	minimum 5 kg/cm ² (g)
10	Nitrogen Storage Receiver Tank Size	2 m ³
11	Nitrogen Pressure in Receiver Tank	minimum 5 kg/cm ² (g)
12	AIR COMPRESSOR	
a	Type of Compressor	Lubricated Screw Air compressor
b	Cooling	Air-Cooled
c	Duty	Continuous
d	Delivered flow of Compressor	minimum 60 CFM
e	Discharge Pressure	minimum 7 kg/cm ² (g)
f	Air Compressor Motor	415V, 3-Phase, 50 Hz, IE2 (High Efficiency) or better, Induction motor, minimum IP55, Class F insulation, including automatic Star-Delta Starter.

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Sr. No.	Item Description	Specifications
13	VESSEL AND TANK	
	Wet Air Receiver, Dry Air Receivers, PSA Towers, Nitrogen Surge Vessel, Nitrogen Storage Receiver etc.	
a	Material of Construction (MoC)	Carbon Steel (As per Section 8)
b	Thickness	The thickness of the pressure vessel shell and dish shall be determined through design calculations in accordance with the applicable pressure vessel design code as per Material of Construction (MoC), design pressure and design temperature. Under all circumstances, the minimum allowable thickness for both the shell and dish shall not be less than 6 mm.
c	Design Code	ASME Sec VIII Divn. I / IS 2825
d	Design pressure	minimum 10 kg/cm ² (g)
e	Hydro Test Pressure	1.5 times of design pressure
14	PIPING	
a	Material of Construction (MoC) Piping	Carbon Steel (CS) (As per Section 8), (interconnected) Stainless Steel (SS) (As per Section 8), to connect with existing Nitrogen pressure reduction system/station of client/purchaser.
b	Thickness of piping	Schedule-40 (minimum)
c	Design pressure	minimum 10 kg/cm ² (g)
d	Hydro Test Pressure	1.5 times of design pressure
15	Complete System installed power	Total installed electrical power capacity of the system shall be lesser than 20kW.
16	Field instruments	Monitoring of Pressure, Temperature, Flow parameters and Valves status & control using HMI display panel.
17	Electrical Incomer & Panel Design	1) Incomer Molded Case Circuit Breaker (MCCB): The Electrical Panel should have 63A, 4-Pole, 415V, 50Hz, 36 kA micro-processor based MCCB as the main incomer with integrated over load, short circuit and earth fault protection. 2) Motor Protection Circuit Breaker (MPCB): 415V, 36 kA with Overload Protection, Short-Circuit Protection, Phase Unbalance protection to be used for compressor motor branch, suitable rating as per Type 2 coordination. 3) Miniature Circuit Breaker (MCB): 415 V, 10kA, Type C

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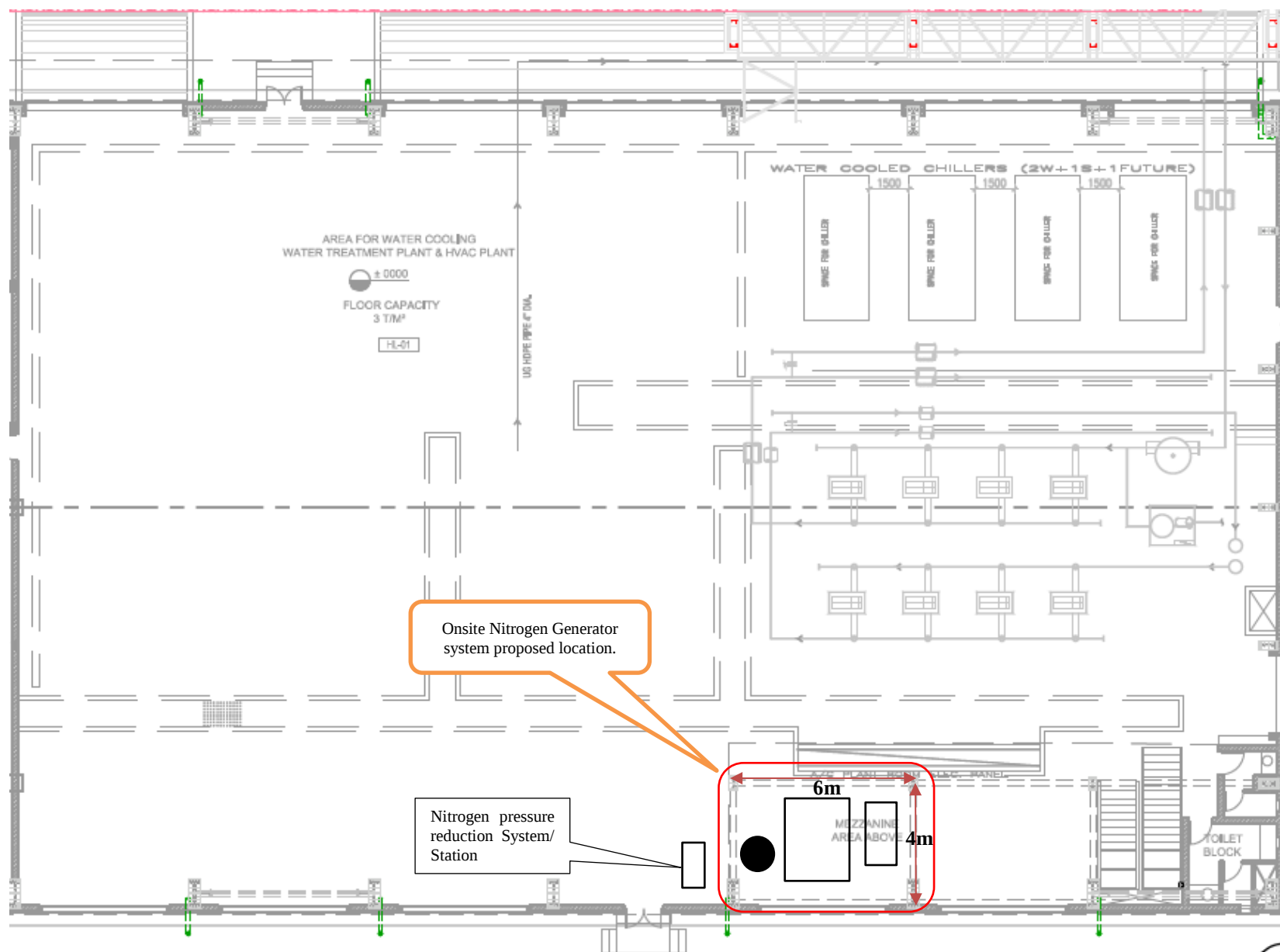
Sr. No.	Item Description	Specifications
		4) Panel Enclosure & Protection: minimum Ingress Protection rating of IP54 5) Indicating Lights & Meters: The panel face should include R-Y-B phase indicating lamps, a digital Multifunction Meter (MFM) to display Voltage, Current, kW, and Power Factor, and a prominent Mushroom-head Emergency Stop Push Button.
18	Power & Control Cabling	1) Power Cabling: 3C, XLPE insulated, FRLS Copper Cable, (2 runs for Star-Delta configuration), suitable capacity. 2) Control and Instrument Cabling: All control connections to the HMI, and instruments must utilize 1.5 sq. mm. multi-strand copper flexible control cables (or twisted-pair shielded cables for analogue instruments like flow/pressure transmitters).
19	Earthing (Grounding) Requirement	Earthing Provision: The vendor shall provide independent, separate, and distinct earthing terminals on both the skid frame and the main electrical control panel. All interconnected structural parts and equipment frames must maintain complete electrical continuity to these grounding terminals. (As per IS 3043)

- d. In Auxiliary Building plant room floor capacity is 3T/m²; hence, vendor shall design and manufacture the Onsite Nitrogen Generator system considering this floor capacity.
- e. Vendor shall have to provide the suitable size of Anchor fasteners. All bolts, nuts and washers for the assembly shall be of Stainless Steel (SS) and of metric sizes and shall be included in the Vendor's scope.
- f. All the Carbon Steel (CS) / Mild Steel (MS) components/items shall be painted one coat of anti-rust primer paint (after proper cleaning of the surface) finished with two coats of epoxy / enamel paint of selected colour code, and shall be of good brand/makes like Berger/Asian Paint/ICI /Shalimar/Dulux Paint or equivalent.
- g. Vendor shall ensure, the Nitrogen Generator System shall be free from sharp edges and sharp corner.
- h. Nitrogen Generator System should be compact and occupies small floor area and should be accommodated with in the area earmarked in the below sketch.

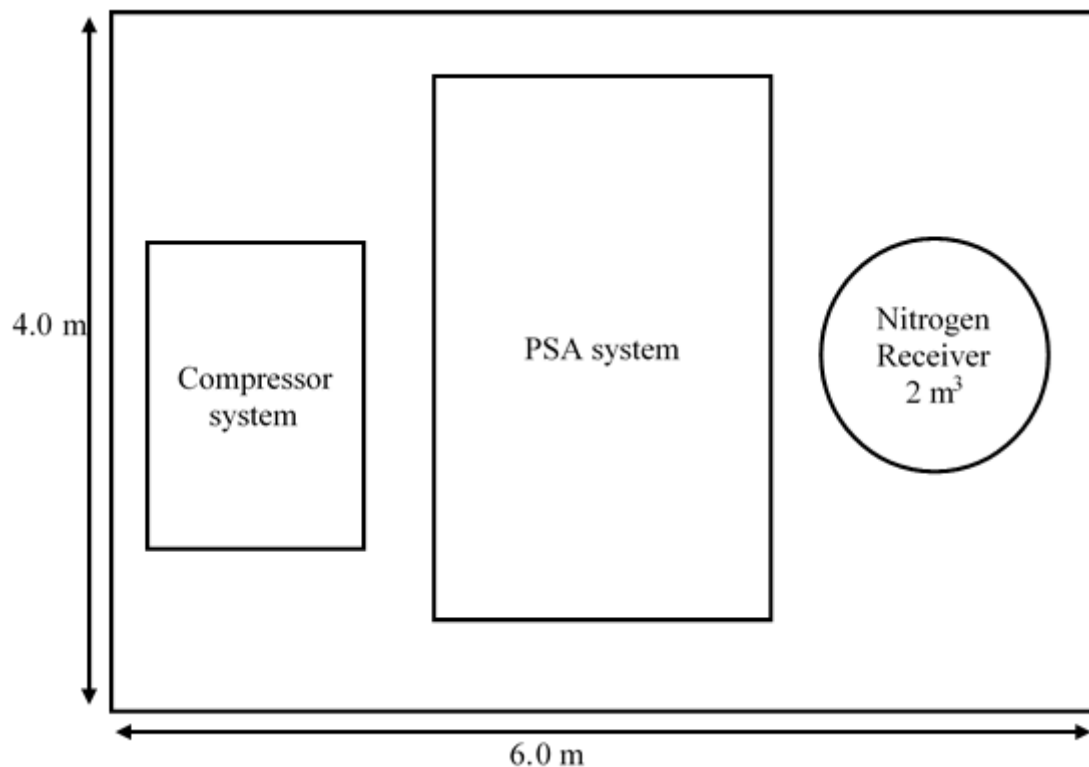


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- i. All materials used must conform in all respects to required standards and must be new and first class in all respective parts shall be machined true in a workman like manner.
- j. All materials shall be free from defects and imperfections. They shall be of certified quality for physical properties and chemical properties. Materials shall be of IS, ASTM, BS or any equivalent standard.
- k. Vendor shall submit material certificates, test certificates.
- l. The workmanship shall be in accordance with high grade industrial practice adequate to ensure satisfactory service life.
- m. All welding shall be performed in accordance with the code for boiler and pressure vessels. The Vendor shall have all welding procedure, welding equipment and operators qualified prior to commencing and welding on the works. All welding joints of piping and vessel shall be done by qualified welders only. The root and final passes of all welded joints (piping and vessels) shall be tested by Liquid Penetrant Testing (LPT)/ Dye Penetrant Testing (DPT).
- n. Any procedure for the repair of the defect in the weldments and all other materials shall be submitted to the purchaser.

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- o. The Vendor shall ensure that the system/items shall be erected at site as per the manufacturer's guidelines. Special care should be taken during unloading at site, transfer from storage area to installation site with special handling arrangement. Necessary Tools and equipment, winches, cranes/hoist/derrick/dolly and trolley cart shall be arranged by the vendor and execution of the same shall be carried out by the vendor at no extra cost from the purchaser. Vendor shall ensure that no damage during transit. If there is any damage happened during transit, immediately the same should bring to the notice of the purchaser. Any such damage/loss during transit shall be liability and accountability of Vendor only.
- p. Vendor shall provide training to the purchaser's personnel for operation and maintenance of the Onsite Nitrogen Generator System.

4.1 SAFETY INTERLOCKS

- a. PLC based control panel with locked enclosure shall be fully wired and factory mounted on the Onsite Nitrogen Generator System and has the following features:
 - i. The display shall have messages in plain English language. Coded two or three character displays are not acceptable.
 - ii. Onsite Nitrogen Generator system shall have provision of Local and Remote - ON and OFF operating.
 - iii. Must have communication mode - ProfiNet / Modbus TCP for integration with other systems and easy operator interface.
 - iv. All the data related to parameter monitoring, valve status & control, alarms/trip of Onsite Nitrogen Generator System shall be accessible from PLC controller through communication mode - ProfiNet / Modbus TCP to main control room.
 - v. Single Push Button for Emergency stop.
- b. In case of any abnormality the gas Generator will trip automatically with Audio Visual Alarms for necessary action. In case of storage tank getting filled, the gas generator shall go to sleep and restarts once the pressure in storage tank is reduce to set limit.
- c. Onsite Nitrogen Generator system shall consist below given Safety Interlocks as minimum. The following information shall be available on the display with simple entry on the keypad.

AUDIO / VISUAL ALARM

- Inlet Air Temperature High
- Inlet Air Pressure Low
- Oxygen Percentage high
- Nitrogen Receiver Pressure High

NITROGEN PLANT TRIP

- Inlet Air Temperature High
- Inlet Air Pressure Low

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- Nitrogen Receiver Pressure High

NITROGEN PURITY DISTURBED

- If Nitrogen Purity disturbed Audio Visual Alarm generated & Vent valve will remains OPEN till Healthy Condition Achieved.

4.2 QUALITY ASSURANCE, INSPECTION AND TESTING

- a. The Vendor shall ensure his in-house inspection to establish and maintain the quality of workmanship in his and his sub-vendors works to ensure the mechanical accuracy of components compliance with drawings, identify and acceptability of all material, part and equipment. He shall conduct all tests required to ensure that the equipment and the material furnished conform to the requirement of applicable codes.
- b. The purchaser's representative shall be given full access to the shop in which equipment is being manufactured or tested. All test records shall be made available.
- c. All the instruments used for conducting the specified shop tests shall be calibrated and calibration certificates shall be furnished from a recognized institution. The calibration shall have been carried out not more than six months prior to the testing date. Final routine and performance tests for the complete units shall be carried out.
- d. Purchaser or his authorized representative will have the right to inspect at any stage of manufacture and construction, all materials, components and workmanship and testing of material.
- e. The Vendor or his sub-vendor should allow access at all reasonable time during manufacture, assembly. Testing and inspection to the premises where the work is being carried out and shall provide all gauges, instruments, testing facilities required for inspection and testing of component/equipment.
- f. All material used should be new and conforming to specific standards. Test certificates for composition and physical properties of the material used shall be provided. Test certificates and mill certificate shall be provided for the material.
- g. Hydrostatic Test - The pressure vessel shall be tested with Test pressure of 1.5 times that of design pressure for the period of min. one hour when there shall be no drop-in pressure and indicating no any leaks. All other pressure parts including inter-connecting piping will also be hydrostatically tested. The minimum test pressure shall be 1.5 times the design pressure.
- h. Air Test - All parts subjected to gas pressure shall be air tested at 1.2 times the design pressure. No leakage shall be allowed.
- i. Visual Inspection - System shall not be painted before inspection. After inspection, test certificates shall be furnished by the Vendor. All equipment shall be visually inspected and Factory Acceptance Test (FAT) shall be carried out before shipment.

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4.3 TESTING FOR PANEL AND INSTRUMENTS

- a. All bought out items including electric motors, compressor, electrical panel and control panel, etc. shall be shop tested.
- b. All the instruments shall be calibrated and certificate shall be furnished.
- c. The panels have been satisfactorily designed and manufactured in accordance to the relevant standards.
- d. The performance testing shall be carried out with the electric motors, compressor, electrical panel and control panel to be supplied by the Vendor along with Onsite Nitrogen Generator system.
- e. The electrical items and Instruments shall have water and dust protection and comply to suitable IP (Ingress Protection) rating.

4.4 PERFORMANCE TEST

- a. Vendor's shall carry out the Factory Acceptance Test (FAT) of Nitrogen Generator System at no extra cost to the purchaser. The FAT report shall be submitted to the Purchaser before getting dispatch clearance. Purchaser may witness the FAT.
- b. Vendor's shall carry out the Site Acceptance Test (SAT) after installation at site. Site acceptance test shall also be in the Vendor's scope of supply/work at no extra cost to the purchaser.
- c. Vendor's shall submit Site Acceptance Test (SAT) report of supplied PSA onsite nitrogen generator system.

4.5 DOCUMENTS (DELIVERABLES) BY VENDOR

- a. Vendor's shall submit following documents within 10 days of formal Purchase Order (PO):
 - P&I Diagrams of Nitrogen Package,
 - General Arrangement (GA) & Layout Drawings,
 - Foundation Details,
 - Electrical Control Panel GA & Wiring Diagram
 - Technical Data Sheets of all Major Components
 - Quality Assurance Plan (QAP)
 - Detail schedule of project execution
- b. After completion of project / at the time of dispatch Vendor's shall submit following documents within 10 days:
 - As Built Drawings (GA / P&ID)
 - Final Electrical Control Panel GA & Wiring Diagram
 - Nitrogen System Operation & Maintenance Manual.
 - All factory testing reports

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- Site testing and commissioning reports

4.6 Bidders may take note of the following points while sending their offers:

- The Vendor shall arrange at own cost all necessary labours, materials, spares, tools & tackles, hoisting equipment, necessary scaffoldings, scaffolding materials, construction equipment, temporary structures and necessary safety devices etc. required for erection and installation at site.
- The movements of derricks, hoisting equipment and other equipment should be such that no damage/breaking occur to building, equipment, material and men.
- The Vendor shall provide all consumables required for carrying out the work covered under this scope of work & rate quoted shall be inclusive of all those things.
- The Vendor has to arrange at own cost which are required for fabrication, erection, cleaning, painting, testing and commissioning of the system. Welding machines and all welding consumables like welding electrodes, filler rods and wires, gases like Oxygen, Acetylene, Argon, Carbon dioxide, Panes etc., Dye penetrant and other required non-destructive testing materials and equipment shall be covered under this scope of work & the Vendor has to arrange at own cost.
- Vendor shall arrange lighting, accommodation for labour etc. required for the work at their own cost. Necessary permission from statutory authority shall be obtained by the Vendor.
- Cost free electricity can be drawn from the nearby switches by the bidder for the site work.
- Any equipment, component, instruments, material and labour required in order to achieve the completeness of the work as above shall be deemed to be included in the scope of the Vendor without any extra cost to the purchaser.
- In case any accessories that are necessary to work as per mentioned scope but not specifically identified herein shall also be in the Vendor's scope of supply/work at no extra cost to the purchaser.
- Civil work mandatory to complete the installation shall also be in the Vendor's scope of supply/work at no extra cost to the purchaser i.e. pedestal to install the machines, skid units and receiver tanks.
- The Vendor shall pack all the items in suitable packaging to protect the item from any damage during loading, unloading, transportation and site delivery.

5 List of preferred Makes of Bought-Out Items

Vendor's shall preferably supply the major bought-out components or technically equivalent as per below details:

Sr. No.	Item Name		Preferred Make
1.	Air Compressor	:	ELGI / Atlas Copco / Substantially Equivalent

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2.	Refrigerated air dryer	:	Reputed Make
3.	Changeover Valves	:	Festo / Uflow/ Aira / Jekon/ Substantially Equivalent
4.	Solenoid Valves	:	Rotex (Neles) / Uflow / Aira / Jekon/ Substantially Equivalent
5.	Filters	:	Reputed Make
6.	Pressure Switches	:	Danfoss/ Substantially Equivalent
7.	Pressure Gauges	:	Baumer / GI/ Substantially Equivalent
8.	Pressure Regulator	:	Janatics / Aira/ Substantially Equivalent
9.	Back Pressure Controller	:	VKE / Nirmal/ Air / Hyper/ Substantially Equivalent
10.	Rotameter	:	Flow Star / Eureka/ Substantially Equivalent
11.	PLC controller	:	Siemens/ Equivalent
12.	Temperature Controller	:	Honeywell/ Multispan / Selec/ Substantially Equivalent
13.	Oxygen Sensor	:	Honeywell (City Sensor)/ EQVT/ Substantially Equivalent
14.	Online Oxygen Analyzer	:	Technovation/ Substantially Equivalent
15.	Safety valve	:	Fainger / Safecon/ Aira / Substantially Equivalent
16.	Non-Return Valve	:	Racer/ Jekon / Aira / Substantially Equivalent
17.	Electrical Switch Gears	:	Siemens / Schneider / Substantially Equivalent
18.	On-Off Switches	:	Salzer/ Substantially Equivalent
19.	Digital Flow Transmitter	:	Honeywell/ Forbes marshal / Substantially Equivalent
20.	Motor	:	Siemens/ ABB/ CGL/ Havells/ Substantially Marathon/ Equivalent
21.	Switchgear items (MCCB, MCB, MPCB, Contactor)	:	Siemens / Schneider / L&T/ ABB/ Substantially Equivalent

6 Data Sheet to be filled by Vendor

S. No.	Item Description	Unit	Specifications to be filled by Vendor
1	Capacity of System	Nm ³ /hr	11
2	Purity of Nitrogen	%	99.99% (minimum)
3	Oxygen in outlet Nitrogen gas	%	≤ 0.01%
4	Compressed Air Requirement (Inlet Air Pressure Requirement)	Nm ³ /hr (CFM) kg/cm ² (g)	
5	Nitrogen Outlet - Dew Point	°C	
6	Nitrogen Outlet Pressure	kg/cm ² (g)	
7	Nitrogen Outlet Temperature	°C	

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S. No.	Item Description	Unit	Specifications to be filled by Vendor
8	Cooling water required	Nil	Nil
9	Lubricated Screw Air compressor		
a	Air compressor Make/Model		
b	Air Delivery	Nm ³ /min (CFM)	
c	Discharge Pressure	kg/cm ² (g)	
d	Compressor Efficiency		
e	Motor Power	kW	
f	Motor Efficiency Class		
g	Motor IP value		
10	Refrigerated air dryer		
a	Make/Model		
b	Capacity	Nm ³ /min (CFM)	
c	Operating Pressure	kg/cm ² (g)	
11	Wet Air Receivers		
a	Size		
b	Material of Construction	As per section 8	
12	Dry Air Receivers		
a	Size		
b	Material of Construction	As per section 8	
13	PSA Towers		
a	Size		
b	Material of Construction	As per section 8	
14	Auto Changeover Valves		
a	Make/Model		
b	Type		
c	Size		
d	Quantity		
15	Activated Alumina		
a	Make		
b	Life		
16	Carbon Molecular Sieve (CMS)		
a	Make		
b	Grade		
c	Life		
17	Nitrogen Surge Vessel		
a	Size & Capacity	mm x mm & m ³	
b	Material of Construction	As per section 8	
18	Nitrogen Receiver		
a	Size & Capacity	mm x mm & m ³	
b	Material of Construction	As per section 8	

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S. No.	Item Description	Unit	Specifications to be filled by Vendor
19	Electrical Control Panel with PLC based control system		
a	Electrical supply requirement	Volt, Phase	
b	Installed Power of Control Panel	kW	
20	Total Area Required for Nitrogen system LXBXH in meters (Approx.)	L(m)XB(m)XH(m)	
21	Switch Time between two PSA Tower		

7 Design Codes & Standards and Material Specifications

1	Pressure Vessels Design and Fabrication	:	ASME Sec VIII Division 1 / IS 2825
2	Material of Construction (MoC) of Plate for Pressure Vessels	:	ASTM A 516 Gr 70/ Equivalent/ Equivalent Indian Standard (IS)
3	Material of Construction (MoC) of Pipes		
a	Carbon Steel:	:	ASTM A 53 Gr. B Type S / ASTM A106 B/ ASTM A 672 Gr B 60/ Equivalent/ Equivalent Indian Standard (IS)
b	Stainless Steel:	:	ASTM A 312 TP 304L/ ASTM A 358 GR 304L CL1/ Equivalent/ Equivalent Indian Standard (IS)

8 General Instructions (on site activities)

- a. Vendor shall strictly abide by the local statutory regulations imposed by the IPR / Police authorities regarding any equipment, operation, drainage, security, etc., wherever applicable.
- b. Vendor shall follow IPR safety rules. In addition, following security regulation shall be followed strictly while movement of labourers /workers/Vendor's personnel, etc.
 - i. Vendor shall issue I-cards to his workers deployed on regular basis.
 - ii. Supervisor of Vendor having photo pass can bring daily wage workers / casual workers inside premises for work. He should prepare list of such workers in duplicate. The original copy shall be handed over to the security or representative of the Purchaser at the gate and obtain endorsement on duplicate copy on a daily basis.
 - iii. The daily wage workers / casual workers employed by the Vendor must wear florescence visi wear without fail during their presence inside premises.
 - iv. Police Verification certificate for employees / labours are to be produced as per the security requirements of the IPR.

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- c. Regarding disposal of fabrication waste from site of work, the Vendor has to abide by the guidelines and any other regulations issued by statutory authorities in the matter from time to time and IPR is not responsible in any way in the matter.
- d. On completion of the work, the Vendor shall remove & dispose of all unwanted and other unsightly materials caused by his working and thereby, leaving the premises and the items in good, clean, safe & operable condition.
- e. Necessary protocols / guidelines shall be followed, as and when required, as per rules and regulations of Govt. of India / Gujarat / IPR.
- f. The mentioned work shall be carried out under direct supervision of ITER-India responsible person along with trained persons of the Vendor.
- g. Vendor shall be allowed to execute the work in IPR site from 9.30 a.m. to 5.30 p.m. on all working days. Public Holiday, Saturday and Sunday shall be holiday, working shall not be allowed. Bidder are required to provide the completion duration considering this.
- h. Work permit will only issue after furnishing the require and mandatory document for permission.

9 Final Acceptance

Onsite Nitrogen Generator System will be inspected and checked by the Purchaser, will be considered finally accepted only after successful achieving required parameters at site i.e. Nitrogen purity min. 99.99%, flow, pressure and temperature, and successful completion of testing, commissioning at Purchaser's site.

Acceptance criteria		
Sr. No.	Descriptions	Value
1	Air receiver air pressure	Minimum 7 bar
2	Nitrogen purity	Minimum 99.99%
3	Nitrogen Storage Receiver pressure	Minimum 5 bar
4	Microprocessor base online oxygen Analyzer performance check	Oxygen Level - Purity Check, Continuous-Online
5	All monitoring & control, alarms/trips etc. functionality check using HMI display panel	Operational parameter check
6	Flow, Pressure, Temperature, Purity Level and Control parameters check	At field instruments and micro-controller display

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10 Technical Compliance Statement

Sr. No.	Description	Bidder shall comply	Remarks if any
1	Scope of Work (As per Clause 2 of This document)	Complied / Not Complied	
2	Scope of Supply (As per Clause 3 of This document)	Complied / Not Complied	
3	Technical specifications (As per Clause 4 of This document)	Complied / Not Complied	
4	List of Makes of Bought-Out Components (As per Clause 5 of This document)	Complied / Not Complied	
5	Data Sheet to be filled by Vendor (As per Clause 6 of This document)	Complied / Not Complied	
6	Design Codes & Standards and Material Specifications (As per Clause 7 of This document)	Complied / Not Complied	
7	General Instructions (on site activities) (As per Clause 8 of This document)	Complied / Not Complied	
8	Final Acceptance (As per Clause 9 of This document)	Complied / Not Complied	
9	Technical Compliance Statement (As per Clause 10 of This document)	Complied / Not Complied	
10	Signed Annexure-I	Complied / Not Complied	

	Title: Design, Engineering, Manufacturing, Fabrication, Supply, Transportation, Loading, Unloading, Construction, Installation, Testing, Commissioning and Site Acceptance Test of Pressure Swing Adsorption (PSA) Technology based Onsite Nitrogen Generator System	GeM Bid No.
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Annexure - I

ITER-India, INSTITUTE FOR PLASMA RESEARCH

Date:

(to be attached with the bid as one of the conditions (optional) for meeting the eligibility criteria)

GeM Bid No.	
GeM Bid Date	
GeM Bid Due Date	

This is to certify that

Mr.

of M/s

has / have visited the Institute for Plasma Research on

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to understand the work and get acquainted themselves with details to enable them to quote against the enquiry for Pressure Swing Adsorption (PSA) Technology based onsite nitrogen generator System in Auxiliary Building, Institute for Plasma Research (IPR) campus, Near Indira Bridge, Bhat, Gandhinagar.

(Engineer In-charge)
ITER-India, Gandhinagar