Annexure - I

A. TECHNICAL SPECIFICATION

1. INTRODUCTION

The overall scope of work comprises supply of **Natural gas-based Hydrogen production unit** including,

- Design, Detail engineering and sourcing of raw materials & bought-out items for realizing the unit
- Fabrication, testing, inspection engaging Third Party Inspection Agency and transportation of the Hydrogen production unit to IPRC, Mahendragiri
- Participation (supervision) in installation, commissioning and performance test demonstration at IPRC

2. BASIS OF DESIGN

2.1 Process: Steam reforming of Natural gas

2.2 Operation: Continuous operation on 24 x 7 basis

2.3 Modular reformer unit

2.4 Design input:

Parameter	Value
Hydrogen production capacity, Nm^3/hr	300 (Nominal)*
Purity, % (Min.)	99.999
LNG conversion, % (Min.)	80
Pressure of feed Natural gas, bar(g)	2 ± 0.5
Plant operation range, %	50 to 100

* Variation of ±5% is acceptable.

2.5 Product specification:

The unit shall be designed to produce high purity gaseous Hydrogen with the properties as follows:

Parameter	Value
Temperature, ^0C	30 ± 5
Pressure, bar(g)	13.5 ± 0.5
$CO + CO_2$	<1ppm
CH_4,Higher HC, Moisture & Nitrogen	<9 ppm
Oil, mg/m^3	<3

- Ar + He in natural gas may generally pass through the system and present in the product.
- N $m^3$is volume measured at 0^oC and 1.013 bar (a)

2.6 Raw material specification:

The raw material is natural gas with composition as listed below. The raw material supply is in the scope of Purchaser (IPRC)

Component	Vol% / ppm
Methane	89.0% (Min.)
Ethane	7.0% (Max.)
Propane	2.7% (Max.)
i + n-Butane	1.15% (Max.)
i + n-Pentane	0.15% (Max.)
Moisture	5 ppm (Max.)
CO_2	50 ppm (Max.)
Oxygen	50 ppm (Max.)
Nitrogen	0.1% (Max.)
Total Sulphur	5 mg/Nm^3 (Max.)

3. SCOPE OF WORK

Scope of Supplier

- Design, Detail engineering and sourcing of raw materials & bought-out items for realizing the unit are under the scope of supplier. The following documents shall be provided by the supplier at different stages.

  Along with the bid:
  - ✓ Utility specifications and consumption patterns shall be clearly given in the offer
  - ✓ The quantum of effluents (solids, liquids and gases) that will be generated during operation should be clearly given in the offer
  - ✓ Make, model number and specifications of the equipment, flow components and instrumentation systems along with the relevant catalogues
  - ✓ Schematic flow diagram with details of key instrumentation of the plant.
  - ✓ Overall schedule highlighting major works till delivery

  After award of PO:

  The following shall be submitted within 2 months from award of PO and the same, as part of Detail Engineering review, shall be reviewed and approved by Department.
  - ✓ Overall scheme with detailed design document
  - ✓ PLC configuration details
  - ✓ General Arrangement (GA) drawing with overall dimensions
  - ✓ Foundation details of the modular unit
  - ✓ Detailed Quality Assurance Plan (QAP)
  - ✓ Detailed commissioning procedure
  - ✓ Vendor details for bought-out items like equipment, flow components and instrumentation systems
- Fabrication, testing, inspection engaging Third Party Inspection Agency and transportation of the Hydrogen production unit and the stand alone PLC in completed form to IPRC, Mahendragiri. Supplier is responsible to ensure that all equipments / systems are installed as per the approved scheme in the skid and tested & inspected before delivery to IPRC.
- Participation (supervision) in installation, commissioning and performance test demonstration at site. Supplier is responsible to ensure that all equipments / systems are installed correctly and tested to the fullest possible extent at site. Supplier shall do troubleshooting of system if problems are encountered during commissioning.

- The catalyst/adsorbent required for Hydrodesulphurizer, Reformer, Shift convertor & PSA and Lubricants for rotary equipments for conducting performance test demonstration shall be provided by the supplier.
- Supply of spares as mentioned under respective section

Scope of Purchaser (IPRC)

- Realization of foundation for the modular unit as per details shared by the Supplier
- Installation of reformer skid, its connected module and piping supplied by supplier under Supervision of Supplier
- Catalyst loading will be carried out at our site under supervision of Supplier
- Install PLC at control room and supply & install all wiring from PLC to battery limit at skid
- Furnish and install pipe rack, piping, and supports, where required, to battery limits
- Provide utilities including necessary gases for leak test of the plant
- Provide utilities for Commissioning of the plant at the battery limit. The utilities include Boiler feed water, Instrument air, Electric power, raw material LNG
- Commissioning trials will be carried out under supervision of Supplier
- Performance tests will be carried out under supervision of Supplier

4. DESCRIPTION ABOUT THE HYDROGEN PRODUCTION UNIT

Hydrogen is to be produced by catalytically reforming Natural gas and Steam at elevated temperatures in a direct-fired reformer furnace. Additional Hydrogen is to be produced by the catalytic reaction of Carbon monoxide and Steam in a shift convertor. Impurities such as Carbon monoxide, Carbon dioxide, Methane, Nitrogen and Water are to be removed in a Pressure Swing Adsorption System (PSA) and ultra-pure Hydrogen is to be produced. The unit is to be designed in an automated manner allowing safe operation of plant and production rate changes from a central control. The process flow diagram of the proposed Hydrogen production unit with major subsystems is given in Enclosure - 1.

Feed compressor: Feed compressor is required to increase the pressure of feed from 2 bar(g) to the required pressure for the reactions to take place.

Hydrodesulphurizer: The feed natural gas contains Sulphur compounds which are poisonous to the reformer catalyst and should be removed prior to reforming. Both Hydrotreating and desulphurization processes takes place in Hydrodesulphurizer. During Hydrotreating process, Sulphur compounds are catalytically converted to Hydrogen sulphide. During desulphurization process, Hydrogen sulphide is adsorbed using suitable catalyst.

Reformer: The desulphurized feed is mixed with preheated water and fed to the direct fired reformer tubes. In the reformer, natural gas and steam gets converted to H_2, CO and CO_2. Most of the fuel requirement for the burners shall be met using the tail gas from PSA and the rest is by using Natural gas.

Shift convertor: In the shift convertor, most of the CO is converted to CO_2 and H_2.

PSA: PSA purification system shall consist of multiple vessels, each having a bed of activated Carbon/activated alumina and molecular sieve. The system must operate on a repeated cycle including basic steps: Adsorption and regeneration. PSA outlet shall be with 5 micron absolute filter.

Note: The subsystems offered by the supplier can be different from proposed PFD given in Enclosure - 1. However, the product specification given in article 2.4 & 2.5 should be met by the reformer unit being supplied. The party shall attach a preliminary PFD of their system along with the technical bid.

5. UTILITY SPECIFICATIONS

The supply of utilities is in the scope of IPRC. Supplier shall provide the estimated quantity of various utilities required for producing 300 Nm^3/hr of Hydrogen in the technical bid.

5.1.Demineralized Water (DM Water)

The specification of demineralised water available is as given below. Any additional requirements shall be indicated in technical bid.

Parameter	Value	
Quality	Clean & filtered	Unfiltered water will be available Suitable filter can be selected by the supplier.
Conductivity	<1	µS/cm
Total Iron (Fe)	< 0.1	mg/lit
Silica (SiO_2)	< 0.05	mg/lit
TDS	< 1	mg/lit
Pressure	1	bar (g)
Temperature	30	°C

5.2.Nitrogen

Parameter	Value
Quality	Clean. dry, oil free
Purity, mol %	99.9
Oxygen, maximum ppmv	50
Moisture, ppm	Max.10
Pressure, bar(g)	10
Temperature, °C	30

5.3.Electric Power

Electric power	415V, 3 phase, 50 Hz.

5.4.Instrument Air

Parameter	Value
Quality	Clean, dry, oil free
Pressure Dew Point, °C (norm)	-40
Pressure, barg	Max. 7

Temperature, °C	30

5.5.Cooling Water

Parameter	Value		
Chlorides (max)	100		ppm
Iron (max)	< 0.1		ppm as Fe
pH	8 to 9.5		
Pressure	Supply	Return	bar(a)
	5	2	
Temperature(max)	34	40	°C

5.6.Import Hydrogen (Required only during start up)

Parameter	Value
Moisture	5 ppm
Pressure, bar(g) min.	14.2
Purity (Mol %)	> 99.9
Duration (Hours)	approx. 6 to 8
Total Sulfur	<0.1 ppmv

Note: For Nitrogen, Instrument Air & Hydrogen supply circuits, suitable filters shall be provided in the modular unit by the supplier.

6. CLIMATIC CONDITION

The climatic condition at Mahendragiri is tropical and windy with gusts. Normal monsoon period is June-July and October - November. The climatological data of Mahendragiri is as follows:

Rainfall

Maximum daily rainfall : 50 mm
Maximum monthly rainfall : 120 mm
Average annual rainfall : 550 mm

Temperature

Maximum temperature in shade : 311 K (38^0C)
Minimum temperature : 293 K (20^0C)

Humidity

Maximum relative humidity : 80%
Minimum relative humidity : 25%
Type of climate : Tropical

Wind loads:

Equipments shall be designed for an operating wind speed of 120 km/hr and survival wind speed of 200 km/hr, considering 3 seconds gust. Depending on the configuration of equipments, suitable drag coefficient shall be considered while computing the actual wind loads.

Seismic zone:

The system shall be designed for seismic load confirming to Zone 3 as per IS:1893 latest edition.

7. CODES AND STANDARDS

The design of all the equipments and associated components should conform to following codes and standards, as applicable.

- American Society of Mechanical Engineers – ASME
- Structural steel including ladders, platforms, etc., will be in accordance with Indian standards.
- Supplier codes/standards, if any

8. EQUIPMENT DETAILS:

The LNG reformer shall in general include the equipments listed below.

- **Reformer**
- **Vessels**
  - Hydrodesulfurizer
  - Shift Converter
  - Cold Condensate Separator
  - Secondary Condensate Separator
  - Tail Gas Drum
- **Heat Exchangers**
  - Feed Heater
  - Process Cooler
  - Process Gas Exchanger
  - DM Water Heater/Boiler
- **Compressors, Pumps & Fans**
  - Feed Compressor
  - DM Water Pump
  - Combustion Air Blower
- **Package Equipment**
  - Pressure Swing Adsorbers
- **Electrical Water Heater**
  - Electrical Heater

8.1. REFORMER

8.1.1. Reformer Furnace

The reformer shall be down-fired, down-flow design. The shell shall be constructed of carbon steel with an inner lining of high temperature blanket insulation. The reformer shall be designed to prevent air from entering the radiant and convection section.

8.1.2. Catalyst Tubes

The reformer catalyst tubes must be located inside the combustion chamber, which is heated by natural gas and recuperative burners. Catalyst tubes shall be made of Centralloy G 4852 Micro or equivalent material.

8.1.3. Burners

Each burner shall operate in FLOX mode. FLOX stands for Flame Less Oxidation which allows high air preheating at low NOx emissions and a homogenous temperature field in the combustion chamber. Fuel for the start burners is natural gas.

9. VENDOR LIST FOR CRITICAL COMPONENTS:

Vendors for critical components are listed below. Any alternate vendor suggested by the supplier along with their credentials, shall be finalized upon approval from Purchaser.

S.No.	Equipment / Description	Vendor
1	Burner	WS Thermal Process Tech
2	Reformer Catalyst Tubes	Schmidt & Clemens, Duralloy, Yantai, Engemasa
3	Feed Compressor	Quincy Compressor
4	PSA	Linde /Air Product / Air Liquide
5	Skid Fabrication	Skid Manufacturers(India)
6	Catalyst	Johnson Matthey, Sud-Chemie
7	PLC	Siemens

10. FEATURES REQUIRED:

1) The PSA system shall be compact & effective. Even if one of the adsorbers (in PSA) is not working, the system should be designed to work with the desired output.
2) The entire unit should be of modular design for quick and cost-effective field installation. The detailed specifications shall be given in the offer.
3) All major equipment, flow components & instruments shall be of reputed make.
4) Sampling points shall be provided at suitable locations.
5) Heat tracing shall be included wherever required.
6) Necessary insulation (hot) shall be included.
7) Detailed trip logic shall be finalized during detail engineering considering HAZOP and interfacing with existing plant requirements.
8) a) If the proposed LNG Hydrogen plant trips, then signal from the LNG Hydrogen plant PLC should provide trip signal to downstream unit PLC. In addition, close PSA outlet valve and open PSA product vent valve.

b) In case of trip signal from existing downstream unit PLC, close PSA outlet valve and open PSA product vent valve of LNG Hydrogen plant.

9) Standard burner controls are to be provided consisting of (or as required):
   - High and low fuel pressure
   - Fuel to burners - double block and vent sized in accordance with IRI standards
   - Solenoid valves for burner system
   - Spark igniter for each burner
   - Flame detectors for flame burners

   All flame failure relays, ignition transformers, indicating lights and push buttons are to be mounted in a free-standing enclosure approved for the area, which shall be mounted on the module
10) Plant safety shutdown must be designed to prevent costly damage to catalyst and reformer furnace. Standard shutdown logic is provided below as reference.
    - If the burners go out and if the firebox temperature is below 1,526°F (850°C), plant automatically shuts down
    - High and low fuel pressure to burners will automatically shut plant down.
    - In case of high reformer temperature, plant shuts down.
    - In case of high shift converter temperature, plant shuts down.
    - Failure of blower shuts plant down.
    - Additional shutdown signal to downstream plant - 3 Nos
11) Maximum noise level during normal operation should not exceed 85 dBA when measured one meter from the skid.
12) Two fluorescent lights pre-wired on the module Ex proof Flame proof IIc T3 shall be provided
13) From an ambient condition, the plant should be started up to produce quality hydrogen in about 12 to 16 hrs.
14) If the plant is shut down for a short period (about 30 minutes), it should be started up in 6-8 hours to come back to the original production.

11. Piping

Piping for all on-module equipment is to be provided by the Supplier and installed between pieces of equipment. Termination at module edge can be with a standard ANSI pipefitting. Some module piping and equipment can be dismounted for shipping because of height limitations. However, this should be minimized. All bolts and gaskets for on-module piping and ship-loose piping are to be supplied. The details of the termination points in the module for further connection by purchaser at site shall be provided.

12. Structural

Structural design should be based on the wind pressure and force as per IS-845 (Part-3) and seismic zone as per Zone 3 of IS 1893.

13. Painting

All un-insulated, on-module equipment and piping supplied by the party are to be painted. Equipment such as pumps, fans, compressors, motors and electrical & instrumentation housings can be supplied with the manufacturer's standard finish, unless otherwise specified.

Field painting will be allowed only for repair of damaged, painted surfaces. Ladders and small platforms are to be galvanized.

14. Instrumentation

PLC, control valves, flow and pressure transmitters and other instrumentation are to be provided by the Supplier. Local start/stop switches and remote stop function are to be provided for the rotating equipment. Plant safety shutdowns are to be incorporated in the logic.

All the field instruments should be intrinsically safe for Hydrogen (IIc) environment as per EEx ia II C T3 (ATEX). PLC shall be located inside control room on rack. Control room is located about 40 m away from the reformer unit. Schematic flow diagram shall be given in the offer with details of key instrumentation of the plant.

15. Electrical

All equipment and materials have to be suitable for installation in an area classified as Zone 2, Flame proof Group IIc, Temperature Class T3.All the motors shall have enclosures suitable for the area. The motors are to be furnished with push buttons on module and on the remote-control system operator interface. All on-module wiring is to be supplied and installed by the Supplier. Supplier should provide termination drawings. Motor control centre and new I/O cabinet shall be located on module. Purchaser will provide supply at the interface 415 V, 3 Phase, 50 Hz.

16. Control system

The control system shall consist of a Programmable Logic Controller (PLC) of Siemens S7-1500 or equivalent (Any deviation shall be finalized upon approval from Purchaser) with required Power Supply, CPU, signal modules, Communication Processor and Interface Modules.

The local PLC cabinet shall include a 15" Touch screen panel for local control and monitoring of the process. The local HMI shall be programmed with software and the PLC will communicate with the HMI via Ethernet. Control panel shall be skid mounted system.

17. INSPECTION

The in-process (stage) and pre-delivery inspection of the unit shall be carried out by one of the following Third Party Inspection (TPI) agencies:

- Lloyds Register Industrial Services Pvt Ltd (LRIS)
- Det-Norske Veritas (DNV)
- TechnischerUberwachungsVerein (TUV)
- Bureau Veritas (BV)

It shall be the responsibility of the supplier to arrange for and coordinate with the TPI agency. The scope of inspection shall be as follows.

- Review and approval of the design calculations, fabrication drawings and QAP
- Identification of raw materials and review of the material test certificates for compliance with the relevant requirements, including UT for plates
- Review of test and calibration certificates for compliance with the specification and visual examination of the bought-out flow components and instruments

- Witnessing of pressure test and leak test at Supplier's site
- Review of commissioning procedure
- Issuance of Pre-Delivery Inspection (PDI) certificate

Note: Apart from inspection by the TPI agency, the Purchaser's representative(s) shall also witness any test as may be deemed necessary, at their discretion.

18. INSTALLATION, PERFORMANCE TEST AND ACCEPTANCE

Purchaser will install the modular unit and conduct commissioning trials as per the procedure provided by the supplier. Supplier is responsible to ensure that all the skid equipment is installed correctly, tested and inspected to the fullest possible extent at site.

Performance test shall begin immediately after the plant has been brought to continuous operation under design conditions. For the performance test, the plant shall be operated for 48consecutive hours excluding start and shutdown transients. If the average results obtained during this period are equal to or better than Supplier's performance guarantees (product product specification given in article 2.4 & 2.5), taking into consideration the respective tolerances in Supplier's favour, the performance guarantees shall be deemed fulfilled. Based on the performance test results, Purchaser will provide acceptance certificate.

In case any discrepancy or ill-performance is observed during installation/performance test, it shall be the Supplier's responsibility to rectify/ replace the defective/ ill-performing subsystems. In case the defective/ ill-performing sub-systems require rectification/ rework to be carried out at the Supplier's works, it shall be Supplier's responsibility to rectify at site or at their work centre by transporting the same to the Supplier's works, if required and back to the Purchaser's site, at supplier's cost. Charges for supervision of installation, commissioning and performance tests shall be included in the offer along with the product cost.

19. DOCUMENTATION

The following documents (in English) in 2 hard prints/ copies as well as in electronic/ soft copy shall be furnished at different stages specified thereupon.

Detail engineering review: After placement/ award of the Purchase order, the Purchaser shall conduct the ***Detail Engineering Review (DER)***. The following documents duly reviewed and approved by the TPI agency for compliance with the requirements of the relevant design codes as specified in this document, shall be submitted to the Purchaser within 2 months from PO placement. Before commencement of any fabrication, the Supplier is required to submit all the drawings and documents duly approved by TPI agency for approval by the Department. These documents are subject to review by the Purchaser and only upon approval of the same by the Purchaser, the Supplier shall proceed with fabrication. However, the Purchaser's approval shall not absolve the Supplier of their responsibility to comply with the specifications of the Purchase order.

a. An overall dimensioned General Arrangement (GA) drawing of all the equipment showing the assembled view along with all accessories shall be provided. The interface details for both fluid connections and instrument connections, including the relative positioning among the interfaces shall also be shown in the GA drawing.
b. The foundation details of the modular unit, indicating the forces and moments acting on the foundation due to static and dynamic loading, wind loads and seismic load shall be

provided within 2 months after placement of order. The calculations for arriving at the forces and moments acting on the foundation due to the aforesaid factors shall also be provided.

c. A schedule chart, preferably in the form a PERT network, detailing the various activities involved in fabrication/procurement and the time required for completing the same, so as to comply with the specified overall delivery period, shall be furnished.
d. A detailed Quality Assurance Plan (QAP) shall be provided
e. Make, model number and specifications of the equipment, flow components and instrumentation systems along with the relevant catalogues finalized for procurement.
f. Overall scheme with detailed design document
g. PLC configuration details
h. General Arrangement (GA) drawing with overall dimensions
i. Foundation details of the modular unit
j. Detailed commissioning procedure
k. List of spares and consumables for commissioning and Operation & Maintenance

During the course of fabrication: The details of activities completed by the end of every month shall be sent to the Purchaser. The delay, if any, from the agreed schedule and the reasons, if any, therefore shall be highlighted. The schedule chart shall also be updated in such cases.

Pre-delivery review: On completion of fabrication and testing, but prior to delivery of the consignment, the Purchaser shall conduct a pre-delivery review. During the review, the following documents, duly approved by the TPI agency, shall be submitted to the Purchaser. The Purchaser shall review the same to ensure compliance with the specification of the Purchase order. On being satisfied, the Purchaser shall issue a "Purchaser's delivery clearance", only upon receipt of which the Supplier shall proceed with delivery of the consignment.

a. Documents as per QAP & Documentation
b. The certificates of all tests and calibration (including those for the bought-out flow components and instruments) shall be provided. Each page of the certificates shall be duly counter-signed and stamped by the TPI agency
c. Pre-Delivery Inspection certificate by the TPI agency
d. Warranty certificate
e. As-built GA and fabrication drawings
f. Instruction manual for operation of the unit covering all operations

Pre-commissioning works: Supplier is responsible for pre-commissioning works and related documentation. The following documents shall be provided in this regard.

a. Rotary equipments check, its alignment and commissioning
b. Catalyst tube pressure drop
c. Cause & Effect analysis
d. Overall plant leak test
e. Loop check verification
f. Mechanical completion certificate
g. P&ID latest version

h. Other documents related to PLC, safety etc.

20. SUPPLY OF SPARES

Spare parts and consumables for erection and commissioning: It's the bidder's responsibility to provide spare parts for sub-systems and consumables (like lubricants, greases etc) required for installation, commissioning & performance testing of the reformer unit at IPRC after delivery. The cost of these elements shall be included in the price quoted.

Spare parts for Operation & Maintenance: Subsequent to final acceptance of the reformer unit and Instrumentation system, IPRC requires following critical spares for satisfactory operation of the plant. Bidder shall provide the rate of the following spares.

S. No.	Description	Qty required
1.	Filter element for filters	1 element for each type of filter
2.	Seals for Feed compressor	1 set
3.	Heating elements for heaters (if applicable)	1 set
4.	Seals for DM water pump	1 set
5.	Bearings and seals for blower	1 set
6.	Spare kit or igniter assembly for burner	1 set
7.	Valve seal kits and actuators for PSA	1 set
8.	Seal kits for control and EP valves	1 set

B. COMMERCIAL TERMS AND CONDITIONS

1. **Pre-Qualification Criteria (PQC):**

The bidder shall meet the following Pre-Qualification Criteria and relevant documents shall be submitted in their bid.

- The bidder, either the principal/OEM or the authorized dealer of the principal/OEM, must have executed at least 1 purchase order for supply of modular Hydrogen production unit with purity of 99.999% and capacity $\geq$ 250 Nm^3/hr ($\geq$ 20 kg/hr) in the period from 01/01/2018 to 28/02/2025. Copy of purchase orders and acceptance/clearance certificates by client/TPI agency shall be attached and the date of acceptance/clearance certificates shall be between 01/01/2018 to 28/02/2025.
- Average annual turnover in the last 5 financial years from 01/04/2019 to 31/03/2024 should be more than Rs. 10 Crore. The audited balance sheets shall be submitted.
- Valid authorization from the Principal/OEM (Applicable for dealers who bid)

These documents are essential for evaluation of bidder's capability and shall be attached in their bid.

2. **Delivery Period**: The Department envisages a delivery period of about 16 months and the bidder shall quote the best possible delivery period. The delivery period shall be reckoned from the date of Purchase order to the date of delivery as per specified delivery term.
    - Within 2 months from the date of PO, supplier shall submit necessary documents for DER
    - Within two weeks, Purchaser will scrutinize and provide clearance/comments on documents received from Supplier

    Installation, commissioning and performance test will be carried out by the Purchaser within 3 months from the receipt of the modular unit at IPRC under the supervision of the supplier. Detailed schedule shall be provided by the supplier along with the techno-commercial bid.

    At least two weeks in advance, Purchaser shall intimate the Supplier about the schedule of activities for deputing their personnel for supervision.

3. **Warranty**: The unit shall be guaranteed for satisfactory performance over a period of 18 months from the date of dispatch from the Supplier's works or 12 months from the date of commissioning at the Purchaser's site, whichever happens to be earlier, against fabrication, manufacturing and workmanship defects. In case any defect develops in the work due to bad material and / or bad workmanship before the expiry of guarantee period, the Supplier, on notification by Department, shall rectify or remedy the defect or replace items, at their own cost and shall make their own arrangements to provide materials, labour, equipment and any other appliances required in this regard.

4. **Confidentiality:** The technical information, drawings, specification and other related documents forming part of enquiry or PO are the property of the Department and shall not be used for any other purpose, except for execution of this order. All rights, including the rights in the event of grant of a patent and registration of designs are reserved. The technical information, drawings, specifications, records and other documents shall not be copied, transcribed, traced or reproduced in any other form or otherwise in whole and/ or duplicated, modified and/or disclosed to a third party and/or not misused in any other form whatsoever without the Department's consent in writing except to the extent required for the execution of the work. This technical information, drawings, specifications, records and other documents shall be returned to the Department with all approved copies and duplicates, if any, immediately after they have been used for the agreed purpose.

5. **Payment Terms:** Advance payment shall be paid against submission of Bank Guarantee (BG) for equivalent sum from a nationalized/ scheduled bank approved by RBI or a reputed first-class international bank valid till final acceptance of unit with additional claim period of 60 days.

    Moreover, in case of delay in delivery by the supplier beyond the stipulated period due to reasons not attributable to the Department, the Department will recover interest on the advance payment over the period of delay at the MCLR as notified by State Bank of India on the date of final acceptance of items. (This will be over and above LD).

5.1 Advance payment:

Maximum 30% of Purchase Order (PO) value shall be paid against the submission of following documents;

a) Proforma Invoice
b) Bank guarantee for an equal amount issued by schedule bank valid till the delivery of unit at IPRC, Mahendragiri, as per enclosed format
c) Security deposit

5.2 On receipt of items at IPRC:

On receipt of entire reformer unit and PLC at IPRC, payment to an extent of 100 % minus percentage of advance payment, if any, minus 20 % (i.e. percentage of final payment) along with applicable taxes & duties shall be paid against the submission of following documents and;

a) Proforma Invoice
b) Pre-Dispatch inspection certificate by TPI agency
c) Delivery clearance by the Purchaser

5.3 On completion of performance test:

Balance 20% of PO value shall be paid on acceptance of the items at our site against the submission of following documents;

a) Invoice
b) Performance test completion certificate
c) Performance Bank Guarantee (PBG) for 3% of PO value valid for a period up to 60 days beyond the date of completion of warranty period

6. **Taxes and duties**: IPRC will issue concessional GST certificate for the indigenous materials against proforma invoice. IPRC is exempted from CD payment for the imported materials that are directly supplied to IPRC. Bidder shall clearly mention the portion of imported components (in percentage of total value) in the quote.

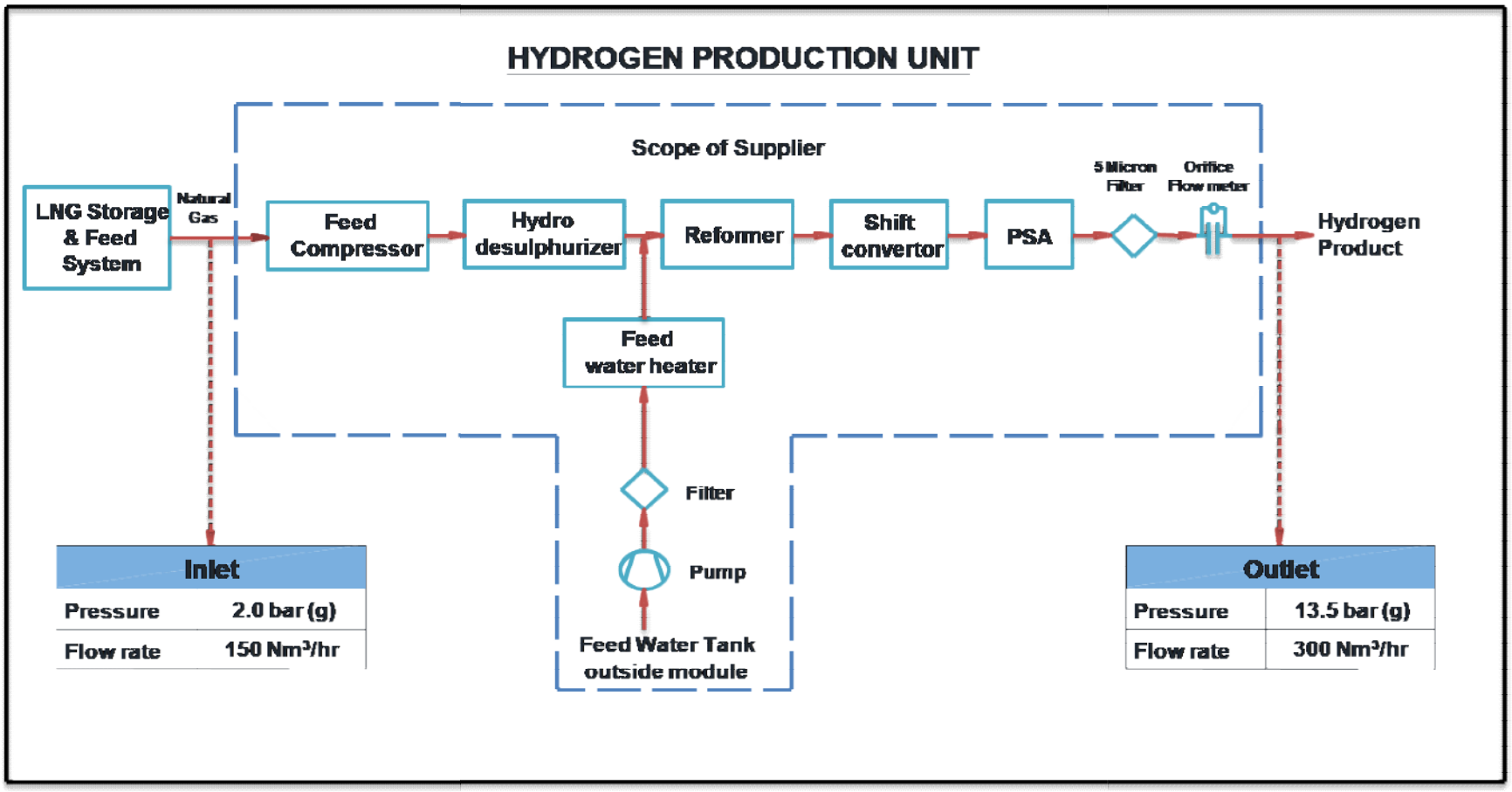
7. **Dispatch**: The Supplier is responsible for obtaining a clear receipt from the Transport Authorities specifying the details of consignment. The consignment should be dispatched at Store Office, IPRC. If sent in any other address, it shall be at the risk of the Supplier. Purchaser will take no responsibility for short deliveries or wrong supply of consignment when the same are booked on 'said to contain' basis. Purchaser shall pay for only such stores that are actually received by them in accordance with the PO. The transit insurance will be in Supplier's scope.

8. **Bid:** It is a Two part bid with Techno-commercial bid providing the technical & commercial details and Price bid indicating the prices**. No price shall be indicated in Techno-commercial bid and any mention of price in the techno-commercial bid will render the bid invalid.**

9. Clauses like Security Deposit, Liquidated Damages (LD), Performance Bank Guarantee, Force Majeure etc. shall be as per tender specifications.

10. Bidder shall confirm the support to provide non-comprehensive AMC for the period of 2 years after warranty period. Department will process PO for AMC separately after warranty period, if required.

Enclosure - 1


HYDROGEN PRODUCTION UNIT
Scope of Supplier
LNG Storage & Feed System
Natural Gas
Feed Compressor
Hydro desulphurizer
Reformer
Shift convertor
PSA
5 Micron Filter
Orifice Flow meter
Hydrogen Product
Feed water heater
Filter
Pump
Feed Water Tank outside module
Inlet
Pressure 2.0 bar (g)
Flow rate 150 Nm³/hr
Outlet
Pressure 13.5 bar (g)
Flow rate 300 Nm³/hr