



Society for Innovation & Development
an IISc Initiative

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Request for Quote for **Supply, Installation, Testing and Commissioning of Hydrogen Generator 360SLPM**

- The GEECI (Gallium Nitride Ecosystem Enabling Centre and Incubator) at SID-Indian Institute of Science is seeking bids from qualified industries for a 360SLPM Hydrogen Generator.
 - Companies need to submit two bids, a technical bid and a commercial bid, in two separate sealed envelopes. The bids should be submitted no later than 21 days from the date of posting of this tender, as listed on the website date/time stamp, and by 5 pm on the 21st day or next weekday in case the 21st day falls on a weekend or a national holiday.
 - Both technical and commercial bids should be addressed to “The Chief Executive, Society for Innovation and Development, IISc, Bangalore 560012.” GST# 29AAATS5333E1ZJ.”
 - The envelopes should be addressed to “Prof. Srinivasan Raghavan, CeNSE, IISc, Bangalore, 560012” and submitted to the office at CeNSE, IISc in Room No. GF 15 between 9 am and 5 pm.
 - All questions regarding this tender should be addressed to Prof. Srinivasan Raghavan at the email address sraghavan@iisc.ac.in
 - Post such submission all vendors should send an email to sraghavan@iisc.ac.in with the subject line: “GEECI_Bidder’s name Tool Name” to intimate him of the submission within one day.
 - Deviations from the technical specifications requested are allowed. Such deviations must be highlighted and justified. Their acceptance or rejection will be left to the discretion of the technical committee.
 - The equipment sought will be placed at the Centre for Nano Science and Engineering (CeNSE), Indian Institute of Science (IISc). IISc is India’s No. 1 institution on higher learning and the Center for Nano Science and Engineering is home to one of the best academic fabs in the world.
 - The technical response, corresponding to the tool being offered, should be in the form of a compliance table with at least 5 columns.
Serial number in column 1. Each of the numbered technical items below should be addressed in a separate row of the table in column 2. Compliance to this requirement, in Yes/No, deviation from it and justification should be provided in the neighboring columns 3-5. Post the opening of a hard copy of the technical bid the committee will request for a soft copy of the files for further processing. Companies should NOT mail soft copies of the files unless specifically requested for.
 - Detailed technical specifications of the tool being offered should be included.
 - Any additional capabilities or technical details, that you would like to bring to the attention of the purchase committee, can be listed at the end of the technical table.
 - If multiple systems can fulfill the requirements, vendors can submit multiple bids.
 - Vendors are encouraged to highlight the advantages of their tools over comparable tools from the competitors.
 - The commercial bid should be broken up to the maximum extent possible into separate items with a cost against each to enable better comparison of price for various configurations across the bidders. As an option, please provide itemized cost for any suggested accessories/addons that may enhance the usability, capability, accuracy or reliability of the tool. Vendors are encouraged to quote for as many add-ons as their tool portfolio permits.
- The quotes should be split into a line item indicating the base price and then each optional item should be listed separately with its pricing.



Procedure

- 1) Only vendors who are compliant with the technical requirements will be considered for commercial comparison. The bid is awarded to the lowest cost vendors (referred as L1).
- 2) The commercial comparison is made as per Government of India rules, specifically GFR 2017. Note that GFR has recently been amended. As per recent edits to the GFR, there are three classes of vendors distinguished by their “local content”. In the cover letter, vendors must mention which applies to them:
 - a. Class 1 supplier: Goods and services have a local content of equal to or more than 50%.
 - b. Class 2 supplier: Goods and services have a local content more than 20% but less than 50%
 - c. Non-local supplier: Goods and services have a local content of equal to or less than 20%
- 3) This tender will only apply entertain Class 1 or Class 2 suppliers. Vendors must provide a self-declaration of what Class they belong to.
- 4) In the commercial bid, please provide an itemized cost of the system and required accessories, such as detector, cabling, panel, software, piping etc.,
- 5) As an option, please provide itemized cost for any suggested accessories/add-ons that may enhance the usability, capability, accuracy or reliability of the system. Vendors are encouraged to quote for as many add-ons as their tool portfolio permits.
- 6) Quote should come only from Indian Original Equipment Manufacturer (OEM) or their Indian authorized distributor. The quotations should be in INR only and must include shipping cost.
- 7) Mention GST separately. IISc will be taxed at 5%. IISc will provide the GST exemption certificate against invoice.
- 8) Please indicate the warranty provided with the tool. Warrant of 3 years or more is required.
- 9) As an option, provide itemized cost for required spares and consumables for 2 years of operation from the time of installation.
- 10) Clarify if periodic (preventive) maintenance be done by a trained on-site engineer or requires a specialist from the OEM.
- 11) If maintenance requires OEM, as an additional option, provide cost of an annual maintenance contract (AMC) for 3 years, post-warranty. The AMC must cover 1 scheduled and 1 emergency visit per year. It must also indicate who will service the AMC, an Indian agent or the OEM. The AMC cost must also include an itemized list of spares that are essential for the scheduled visits.
- 12) The technical proposal must include references from 5 previous installations in India. Please provide the names and contact addresses of the referees so that the committee can contact them independently.

Technical Requirements

1.	Application	On-site hydrogen Gas Generator for a semiconductor foundry. Scope of the order includes: 1. H2 generator 2. H2 storage tank
2.	Industry type	Semiconductor cleanroom class 100 and class 1000
3.	Generator type	1. A non-caustic and maintenance-free proton exchange membrane (PEM). No KOH/NaOH or asbestos. 2. The system must be integrated, automated, site-ready, with a compact enclosure. 3. System must not require the use of nitrogen or other inert gas for purging or inerting during routine operation after first time installation. 4. Oxygen gas produced as a byproduct shall be exhausted to ambient without any special ducting or handling.
4.	Production rate	360 standard liters per minute (SLPM) ($\pm 10\%$). Operational range must be 0-100 %. No mechanical compression should be needed. Upgradable upto 30Nm ³ .
5.	Delivery pressure	Tunable between 5 to 30 barg/435 psig ($\pm 10\%$).
6.	Tubing and fittings	Electro polished SS316 RA < 0.4um. Only metal face-seal fittings (VCR's) as per the P&ID refer fig 1 All tubing and fitting should pass the below mentioned tests. 1) Pressure hold test at 1.5 times of operating pressure for 24 hours with 0 psi pressure drop. 2) He leak Check at 10 ⁻⁹ mbar l/sec 3) Trace moisture test < 10 micron 4) Trace oxygen test < 10 micron 5) Trace particle test < 10 micron
7.	Purity	ISO 14687-1 Type 1 grade C ISO 14687-2 Type 1 grade D 99.9998% [H2O < 2 ppm, -72°C (-98°F) Dew Point, N2 < 2 ppm, O2 < 1 ppm, all others undetectable]
8.	Operation	Automatic operation. Specifically: 1. The system should match load automatically with no pressure spikes of more than 10 psi that last longer than 1 second 2. The system should have inbuilt diagnostics. At the very least the system should: a) Continuously monitor purity of gas produced. The data from last 48 hours should be available for download. b) Continuously monitor dew point. The dew point sensor should be capable of measuring -120 °C or less. The data from last 48 hours should be available for download.



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		<ul style="list-style-type: none">c) Continuously check for H₂ leak. Raise alarm if leak is found and shutdown the systemd) Raise warning if maintenance is pending.
9.	Documentation	<ul style="list-style-type: none">1. Complete P & ID diagram of the system2. Complete user manual including product description, operation principle, user information, and troubleshooting.3. SOP for regular preventive maintenance that can be done by in-house engineer.4. SOP for monitoring during operation.5. SOP for troubleshooting
10	Location	Generator to be stored indoor or ventilated sheds.
11	Noise level	<70 dB at 1 meter
12	Generator: Installation, Footprint & weight	<ul style="list-style-type: none">1. The system will be stored within 10 ft of an electrical duct and panel in a building actively populated by humans. The system must be intrinsically safe for such an installation in an unclassified area. Vendor must specify set-back distance or hazard classification. The set-back cannot be more than 1 metre.2. Please specify the total footprint in cm x cm. System must have a combined foot print of less than 4 m²3. Please specify the weight.
13	Storage tank	<ul style="list-style-type: none">1. Capacity: 500 liter ± 10%2. The storage tank will be stored inside the same area as the generator. Vendor must specify set-back distance or hazard classification. The set-back cannot be more than 1 metre.3. SS 316. ASME Section VIII Div.14. Working Pressure: 30 Kg/cm²5. Design Pressure: 50 Kg/cm²6. Purging, venting and drain ports for tank cleaning.7. High pressure relief valve and pressure monitoring.
14	Conformity	ISO 22734-1, NFPA 69 and EN 1127-1. Copy of test certificates must be attached.
15	System software	<ul style="list-style-type: none">1. Vendor must provide a front panel displaying equipment status.2. The software must allow varying levels of instrument access. Restricted access for an operator and full access to an engineer.3. The software should interface with the online monitoring facility.4. Complete logs of all the process and system parameters to be available and stored for future troubleshooting.5. Graphical representation of system and process parameters.6. Please specify the date the system was launched and the date till when the software will be supported.7. Must have the capability for remote monitoring with software graphical user interface via TCP/IP Ethernet or MODBUS for individual signals via TCP/IP



	Periodic Maintenance	<ol style="list-style-type: none">1. The system should require minimal maintenance.2. Mention the recommended preventive maintenance schedule for the system. Any accessories needed for periodic preventive maintenance for 3 years.3. Can the preventive maintenance be done by a trained on-site engineer or requires a specialist from the OEM? If the latter, please provide cost of a 3-year AMC with required kit/consumables.4. The system should be supported by a trained local representative and should have a 12-hour window of response.
16	Installation and Training	<ol style="list-style-type: none">1. Installation and training at customer site, by the experts from principals should be part of the package.2. During the installation all the specifications of the processes should be verified for acceptance by the customer.
17	Power & utilities	<ol style="list-style-type: none">1. The instrument should work with Indian standards and power sockets.2. Mention the power requirement.3. Vendors must mention any utility requirement (water, air, exhaust, etc.). The list of utility at site is given below. The system must not need anything beyond this.
18	Safety	<ol style="list-style-type: none">1. Mention the safety standards to which the system is designed.2. The system must come with a complement of interlocks to prevent common user errors.3. Mention any special safety requirements that the facility must have to support the installation.4. System must shutdown safely without a need for UPS. Any residual H₂ generated during shutdown must be safely vented.5. List all the sensors available. Must have onboard H₂ sensor.
19	Recommendation	<ol style="list-style-type: none">1. The vendor must submit references from at least 3 previous installations2. The names and contact addresses of the references must be submitted with the proposal, so the purchase committee can contact them independently.
20	Standards	cTUVus (UL and CSA equivalent), CE (PED, Mach. Dir., EMC), ISO 22734-1, NFPA 69 and EN 1127-1
21	Operating conditions	<ol style="list-style-type: none">1. Temperature range: 5-40°C2. RH: 10-90%3. Altitude: 1000 m

Appendix

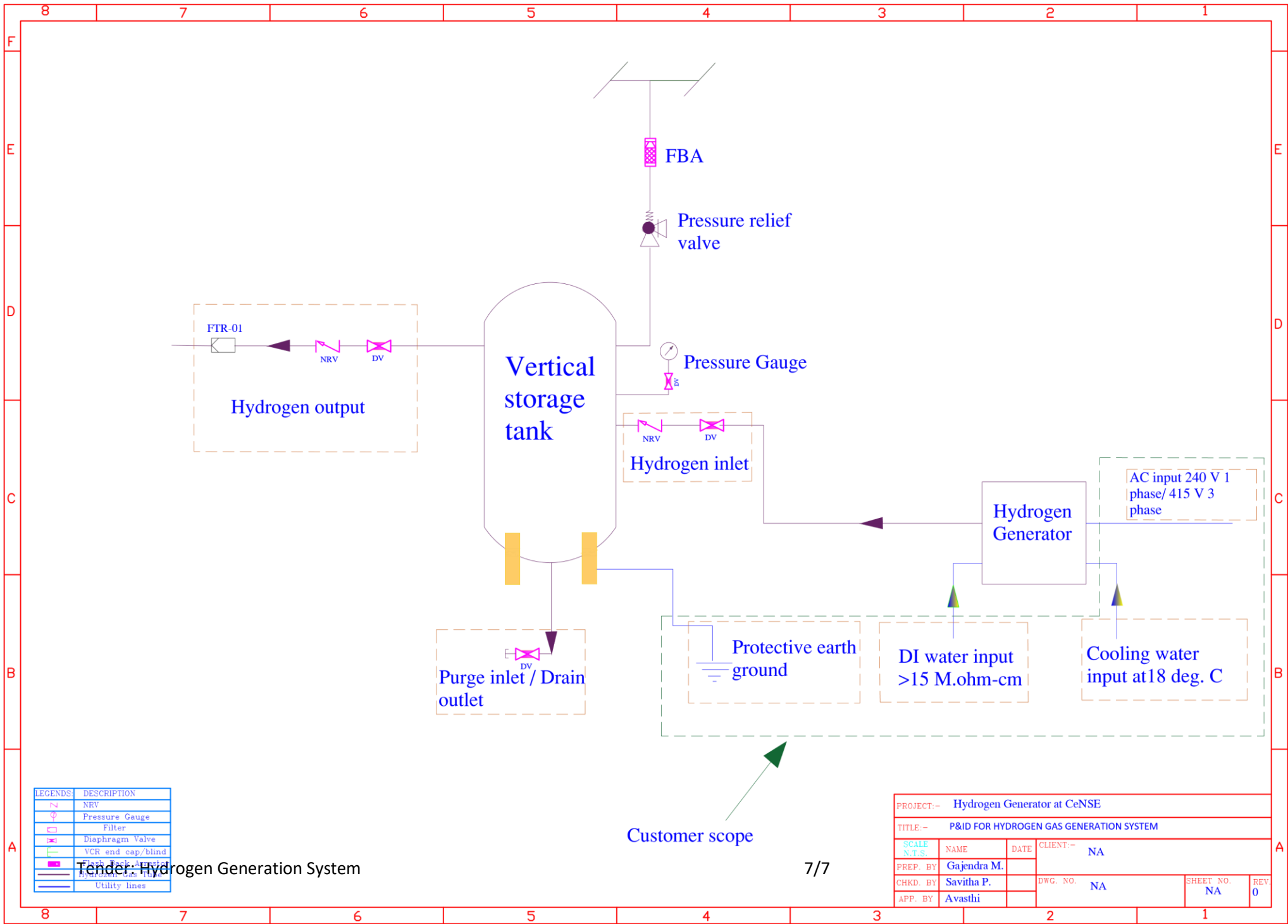


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- 1) Utility available on the site:
 1. Single phase (240 V) and three phase (415 V) at 50 Hz. Load of upto 10 kVA is acceptable
 2. DI water with resistivity > 15 MOhm-cm. Temperature 10-30 °C.
 3. Closed loop cooling water upto 4 bar pressure and 18 °C.
 4. Indoor location or covered shed for both generator and storage tank.
- 2) P&ID of a model H2 generator system is given in the next page. The dashed lines in green is under IISc scope. The rest is under vendor scope

Thanking you,



LEGENDS	DESCRIPTION
	NRV
	Pressure Gauge
	Filter
	Diaphragm Valve
	VCR end cap/blind
	Flash back arrestor
	Hydrogen gas line
	Utility lines

Tender: Hydrogen Generation System

Customer scope

7/7

PROJECT:- Hydrogen Generator at CeNSE				
TITLE:- P&ID FOR HYDROGEN GAS GENERATION SYSTEM				
SCALE	NAME	DATE	CLIENT:- NA	
N.T.S.	Gajendra M.			
PREP. BY	Savitha P.		DWG. NO.	NA
CHKD. BY	Avasthi		SHEET NO.	NA
APP. BY			REV.	0