Detailed Specifications of Global Tender Notice No: 03/2015

S. NO	TENDER NO.	BRIEF DETAILS OF ITEM(S)	PAGE NOS.
1.	**17(1068)15-PB/ T-32**	Silane (SiH4) & Ammonia (NH3) gas supply and control panel for PECVD tool with all necessary safety features.	**2-4**

Scope and technical specifications of

'SiH$_4$ and NH$_3$ gas supply and control panel system for PECVD tool with all necessary safety features'

Scope : Gas supply/distribution control panels with all necessary safety features is required for (i) SiH_4 and (ii) NH_3 gases for PECVD tool which is housed in clean room complex at CSIR-NPL. It includes necessary design of the gas supply and control panel unit, supply of required items and installation and hook up with PECVD tool. The following items will be provided by NPL:

1. Gas Leak Detector (one each for SiH_4 and NH_3)
2. Gas Cabinet Enclosure to house SiH_4 and NH_3 cylinders

(1) SiH_4 gas supply/distribution control panel

This panel should have all basic safety and control features as per SEMI S2 standard used for silane handling; consisting all life safety controllers and allied electronics, constant box purge for protection against fire and explosion hazards and "Emergency Off" button to immediately power off the cabinet and close all pneumatic valves. Various components should be mounted on a stainless steel plate with necessary brackets for support.

1.1 Semi-Automatic manifold with regulator

- Check valve
- Pre-filter/post-filter
- Purge block with integrated valves
- Relief valve
- Process valve
- Waste gas valve
- Pneumatic valve
- Purge gas valve
- Isolation valves
- Excess flow/pressure valve
- Pneumatic valves for emergency shutoff

1.2 Pigtail with CGA 350 connector to cylinder.

1.3 Cross purge assembly consisting diaphragm valve with VCR end and required purge line

1.4 Vacuum generator set (generator + valve + check valve)

1.5 Necessary regulators, gauges and sensors

- Regulator to control outlet and inlet pressure
- Regulators with VCR end
- Pressure gauge for high pressure
- Pressure gauge for low pressure
- UV and IR Sensor for SiH_4
- ROR Sensor for SiH_4
- Exhaust Sensor

1.6 Helium Leak Test Port

1.7 Differential Pressure Switch for gas cabinet

1.8 Sprinkler water and necessary 1/2" SS 316 BA Water Line for gas cabinet sprinkler

1.9 One no. of Pneumatic valve in the line before control panel of the system to be provided in process area

(2) NH_3 gas Supply/distribution panel

The panel should have all necessary basic safety features with all allied electronics. It must be equipped with provision for purging and "Emergency Off" button to immediately power off the cabinet and close all pneumatic valves. Various components should be mounted on a stainless steel plate with necessary brackets for support.

2.1 Safety features

- Regulator with VCR end
- Inlet and outlet Pressure gauges

- ROR Sensor for NH_3
- Load cell with Alarm indicator
- Pneumatic valve for emergency shutoff
- Purge Block

2.2 Pigtails with CGA 660 connector to cylinder
2.3 Helium Leak Test Port
2.4 Differential pressure switch for gas cabinet

(3) Piping for SiH_4 and NH_3 Panels

3.1 Necessary 1/4" SS 316 L Nitrogen sticks (assembly of Isolation valve, Regulator & Gauge) for gas cabinets.
3.2 1/2" SS 316 L BA Nitrogen piping, purge & Vent piping for gas cabinet including necessary Tees, glands, male- female nuts, gaskets & unions.
3.3 1/4" SS 316 L BA Nitrogen piping for gas cabinet including tees, glands, male-female struts, gaskets, unions etc.
3.4 Necessary 1/2" SS 316 BA Water line for gas cabinet sprinkler with isolation valve.
3.5 Provision for moisture filter in nitrogen purge line.

(4) Mechanical connections to panel

4.1 Standard process outlet coaxial weld connection- ¼" OD 0.035" wall X ½" OD 0.049" wall SS316L compatible for orbital tube welding
4.2 Vacuum drive inlet ¼" OD Male face seal connection with necessary gaskets
4.3 Process purge outlet 1/2" OD Male face seal connection with necessary gaskets
4.4 Process purge inlet ¼" OD Male face seal connection with necessary gaskets
4.5 Pneumatic supply ¼" OD double compression fittings
4.6 Box purge Inlet ¼" OD double compression fittings

(5) Safety controller and display

5.1 Single Emergency shutdown/shutoff system (ESS) for semiautomatic controller with minimum of 10 inch display and hooter should be provided in the process area as well as in gas cabinet area so that if any leakage takes place in the cylinder or service lines, some indication should reach to the person/user who is working on the system and the same should be integrated with sensors and detectors.

(6) Installation and Testing for both gas cabinets

6.1 Installation of panel with above mentioned instruments & gas piping system.
6.2 Instrumentation interlocks on site.
6.3 Pressure and Helium leak testing

(7) Technical Specifications for various components

7.1 Makes for material/components supply
(i) The supply control panels should be make of Tesscom/Spectron/Matheson/KAS tech
(ii) Manifolds, various valves, regulators, cross purge assembly, pressure gauges, vacuum generators, electronics, pigtail, sprinkler system should be of makes Swagelok/Tesscom/ Matheson/ Spectron/GCE druVa / Parker/ TKF/Rotarex/Veriflow.
(iii) The detectors/sensors head and detectors/sensors fitted in the supply control/cabinets should be Bionics/Cosmos/Honeywel (Midas)/Cosmos/Draeger.
(iv) The SS tubing and co-axial tubing should be from Swagelok/Valex/Sandvik/Dockweiler.
7.2 The Isolation & Diaphragm valves should be as per SEMI S2 standard.
7.3 Single melt seamless, Interior surface electro-polished, Stainless steel TP316L, compatible for orbital welding and meet ASTM standards A269 for tubing & Fittings for N_2 (≥5N purity) gas
7.4 Gas regulators with stainless steel 316 L EP body, Seats PCTFE/ Teflon; Seals metal to metal; Diaphragm stainless steel 316 L EP, Maximum inlet pressure ≥3000 psig, Outlet pressure 2–30 psig , Operating temperature –40 to +60°C

(8) Testing and validation

7.1 Testing and validation as per SEMI S2 standard after the complete installation of the supply control panels for both gases, piping and all other associated components (water sprinkler, exhaust, nitrogen connection etc.).

7.2 Pressure testing: at 1.1 times maximum working pressure

7.3 Helium Leak Testing: Helium leak testing should be carried out with dry vacuum pump having leak detection capability up to $1x10^{-11}$ mbar He Ltrs/sec and shall pass minimum level of $1x10^{-9}$ mbar He ltrs/sec and duly certified. The He leak detector to be brought by the vendor.

(9) Documentation

8.1 List of safety measures/precautions taken care of in the design of the control panels/distribution systems for both SiH_4 and NH_3 gases must be specified.

8.2 Schematic of the design of supply panels for the both gases must be submitted with sufficient illustrations.

8.3 Soft and hard copy of the operation and maintenance manuals

(10) Warranty

2 years from the date of installation/commissioning of the complete systems for both gases.

(11) Miscellaneous Essential Requirements

11.1 Electrical: As per Indian standard.

11.2 Training: for 2 NPL personals for operation and maintenance of the panels at NPL

11.3 Site visit must be conducted before quote.

11.4 The make and specifications of the key components being used in the control panels of both gases: for example, different valves, regulators, cross purge assembly, pressure gauges, sensors, vacuum generators, electronics, pigtail, sprinkler, and so must be standard and of international repute.

11.5 Control platform for the supply control panels/gas cabinets should meet all standards as set forth in the SEMI S2 guidelines.

11.6 The vendor should provide the startup and training which include proper cylinder changing, controller operation, diagnostic evaluations and trouble shooting at CSIR-NPL free of cost.

11.7 The vendor should have experience of installation of SiH_4 and NH_3 gas supply control/distribution systems. The same should be produced with old purchase orders (POs) and related customer details.

11.8 The vendor should have experience of work in semiconductor industry and clean rooms (class 1000 or better) with standard protocol.

11.9 All valves should be electro-pneumatically operated. Supply to all valves should be AC 220 V. Electro-pneumatic valves should be bello sealed.

11.10 Gas lines from gas enclosures to PECVD tool are erected. However, He leak test for both lines from tool to the gas supply panels for both gases need to be tested.

(12) Acceptance Criteria

12.1 Preliminary testing and validation as per item No. 8

12.2 SiH_4 and NH_3 gas cylinders to be connected and gas lines to be tested again.

12.3 Demonstration of the detection limit of the detectors/sensors.

(13) Optional

Vendor must quote the price for each optional item and should be quoted separately.

13.1 AMC for minimum 2 years

13.2 Testing for Oxygen/moisture traces

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