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

Ref. PR No. 1000058649 Rfx. No. 6100003220

Item Description: Automated control and glovebox integration (Qty 1)

Sr. No	Item Description	Detailed Technical Specification	Technical Compliance (Yes / No)	Additional Information (if any)
1.	Automated control system	**(A). Automated control system:** a. Control system for remote operation of all valves, mass flow controllers, pressure controllers, system temperature and pressure b. Recipe maker for creation of multi-step processes c. User should be able to configure ranges of MFCs & pressure controllers d. Should be operational in manual or recipe mode e. Should be integrated with the interlock system for safe system operation f. The scope of work should includes: i. Power supplies ii. Supply and installation of all PLCs, Software, required modules, converters and complete wiring iii. Provision of manuals with schematic diagrams and wiring details iv. Supply of all electronics required for integration and GUI software. v. Industrial PC vi. PID controllers for line heaters (10 number) vii. Line Heaters (10 number) viii. Solenoid bank – for 40 valve and 20 additional channels (60 connections (SMC 5/2 dual actuator solenoid valve 24 volts DC, 8 number): ix. Should be able to control 30 MFC/PC and differential pressure gauges x. Should be able to control vent line MFCs with differential pressure gauge		

		xi. Should include pressure Regulator and Compressor for pneumatic valves xii. Design, installation, and training **(B). Safety and interlock system:** a. The growth chamber and gas manifold should be enclosed in a vented chamber. b. A He leak test line and connection should be provided so that the entire system till the exhaust can be easily leak tested. c. Integrated toxic gas detection system for H_2Se and H_2S should be provided (but integration needs to be planned for) d. Inlet gas pressure sensors, H_2 sensor, ventilation sensor, reactor overpressure sensor to be provided. e. The function of each sensor is given below and must satisfy these requirements: i. Inlet gas pressure – this is an inline gauge that should provide an electrical signal if the pressure of N_2/H_2 drops below 40-50 psi for proper operation of the MFCs and PCs. ii. H_2 sensor should measure H_2 concentration in the vented enclosure in the event of a system leak. It should shut down everything, especially the furnace and start a purge sequence. iii. Ventilation sensor –Should measure the flow rate of the gas in the duct provided for ventilation. 800 SCFM may be maintained in a vented enclosure with the growth chamber. If it drops too low, it should give indication any leaks. iv. Reactor over-pressure sensor should be able to initiate the emergency release valve connected to the exhaust. f. Interlock system for above sensors with automatic system shutdown g. Growth and transfer chamber should be interlocked. **(C). Evidence of operation:** a. Control of valves and MFCs in the manual and recipe mode b. Inclusion of safety interlocks in alarms		

		c. The transfer process must be monitored on the software interface and required interlocks must be available. d. Glovebox operation and regeneration must be demonstrated. MFC, PC, differential pressure gauges, and 3-way valves in IITB scope		
2.	Wafer loading and unloading without ambient exposure	a. A customized glovebox to be integrated with the growth system. Wafer loading/unloading into a connected glove box must be facilitated. b. The O2 and H2O level must be <0.5 ppm in the glovebox. c. Regeneration must be feasible. d. There must be a loading dock for smaller samples and an antechamber for bubbler refilling. e. At least 4 Electrical ports are necessary in the glove box to house components like weighing balance and a vacuum sealing station f. Additional provision on the glove box for further expansion should be provided. g. Robotic arm/equivalent that can navigate between chambers. h. The transfer chamber valves are to be configured such that transfer is possible only when a certain pressure is reached and both the chambers are at the same pressure. i. Pressure monitoring of the glove box must be possible. j. A reliable wafer-lift mechanism must be incorporated for ease of transfer.		
3.	Delivery	Delivery: System must be delivered and installed within 3 months.		
4.	Warranty	Warranty of the system: 1 year from the date and installation for all the parts.		