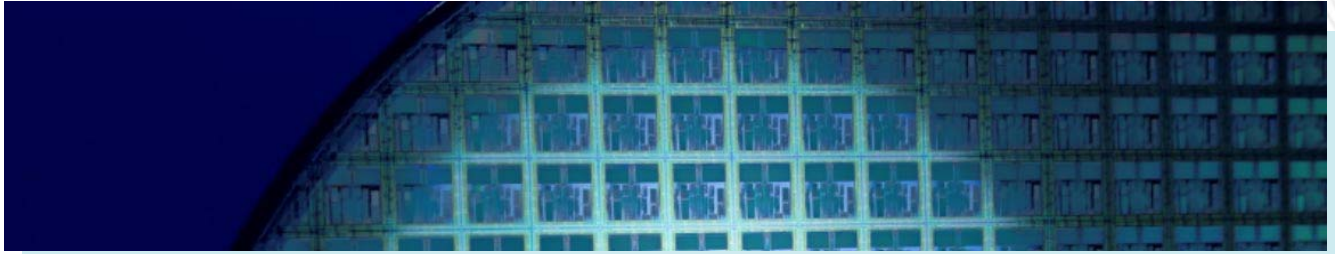


DELIVERY SYSTEMS AND SERVICES SAFETY AND RELIABILITY CHECKLIST



Protecting the Employee, Protecting the Asset, Assuring Performance Reliability—Every High-Purity Chemical and Gas Delivery System Requires Rigorous Oversight

Engineering Control, Process and Design Measures	Best Practice Guideline	Supplier Compliance
<input type="checkbox"/> Complete and thorough understanding of the chemical and physical characteristics of the gases being fed through the system	Critically important as it impacts the materials selected in the gas distribution system to prevent corrosion, particle contamination, erosion, and failure of the components	Y/N
<input type="checkbox"/> Total compliance, certification, and documentation including ISO 9001 (Quality), ISO 14001 several countries), ITRI, OSHA, TGO, NEC, IFC, REACH, ASME, ASTM, GHS, SEMC, NRTL, NFPA, ATEX, IFC, CSA, KSA, CE, CCC, SEMI S2 Class 1 Div. 2, CE, UL, etc	Safety, quality and fire code compliance	Y/N
<input type="checkbox"/> Inspection of finished products using Failure Mode and Effects Analysis (FMEA)	Reliability at time of installation	Y/N
<input type="checkbox"/> HALT, Functional, and leak testing of all systems during design before they leaving the manufacturing facility	Reliability at time of installation	Y/N
<input type="checkbox"/> Auto-crossover for multiple-cylinder cabinets	To maintain continuous supply and reduces downtime by automatically switching from a depleted to a full cylinder	Y/N
<input type="checkbox"/> Dual isolation valves	To prevent incidents, especially during maintenance on hazardous process gas systems	Y/N
<input type="checkbox"/> Temperature control systems	To heats gases to maintain flow and has essential over-temperature protection.	Y/N
<input type="checkbox"/> An ultraviolet/infrared (UV/IR) detector or temperature switch	For pyrophoric gas systems. A UV/IR detector and delayed start feature provided for silane and silane mixes system	Y/N
<input type="checkbox"/> Enhanced exhaust and venting designs using CFD (Computational Fluid Dynamics)	For the prevention of potentially harmful dead air space in the cabinet	Y/N
<input type="checkbox"/> Redundant and/or backup power capabilities	Assuring gas flow in case of system failures	Y/N
<input type="checkbox"/> Automatic backup for shutdown and recovery	Provides a second microprocessor for redundancy and to enhance uptime.	Y/N
<input type="checkbox"/> Fail-safe valves	With loss of power or pneumatics, valves close automatically	Y/N
<input type="checkbox"/> Purge efficacy studies that are software driven and tested	Assurance that the complete system is properly and completely purged of gases	Y/N

Engineering Control, Process and Design Measures	Best Practice Guideline	Supplier Compliance
<input type="checkbox"/> System controller's extensive software capability allows an operator to manage and control all data related to gas delivery Controller fault and shutdown alarms notify the operator through an alarm horn, light and alarm label of a problem with the system. The system's multiple alarms are monitored continuously	Tamperproof, real time information with four levels of security Shutdown alarms close all pneumatic valves and abort the controller program	Y/N
<input type="checkbox"/> A multi-level password protected security system	Prevents unauthorized operation or modification of the GASGUARD controller menu	Y/N
<input type="checkbox"/> Manual operation access to the controller is denied with a shutdown alarm	Prevents safety incidents	Y/N
<input type="checkbox"/> Off-line Solenoid management system available	Allows gas equipment to run uninterrupted while the controller is being serviced	Y/N
<input type="checkbox"/> Three different sizes of specially designed emergency response containment vessels to safely contain leaking cylinders	Containment of leaking cylinders	Y/N
<input type="checkbox"/> Management of Change (MOC) process for internal engineering of all systems and components	Traceability and design assurance repeatability	Y/N
<input type="checkbox"/> In-house Services and Safety audits for customers	To ensure best practices for their processes and facilities	Y/N
<input type="checkbox"/> Safety training available to all customers, from general high purity gases safety to product specific safety	Contact your sales or service representative	Y/N
<input type="checkbox"/> Access to a comprehensive, downloadable library of safety data sheets (SDS), material safety data sheets (MSDS), Safetygrams, products manuals and other literature	Safety information management	Y/N



For more information, please contact us at:

VERSUM MATERIALS, LLC
VERSUMMATERIALS.COM

The information contained herein is offered without charge for use by technically qualified personnel at their discretion and risk. All statements, technical information and recommendations contained herein are based on tests and data which we believe to be reliable, but the accuracy or completeness thereof is not guaranteed and no warranty of any kind is made with respect thereto.