

## Gas Purification



Finer linewidths and increasingly complex processes continue to present new challenges for today's semiconductor manufacturers. Impurities that did not cause serious problems in the past may now cause defects on the wafer, compromise process quality and reduce product yields. Molecular impurities, also known as gaseous or volatile impurities, have recently become of greater concern as sources of defects. Common molecular impurities include moisture, oxygen, carbon dioxide, carbon monoxide, hydrocarbons and metal carbonyls. These impurities cannot be removed by particle filtration; they require a reactive bed of material for removal. The process of removing molecular impurities from the gas stream is known as gas purification.

### Our Technology

#### AresKleen™ Technology

The AresKleen product is a totally inorganic media that is very reactive to impurities. The technology provides sub-ppb level performance for the impurities in inert, noble, nonreactive, hydride, perfluorocarbon and corrosive gases.

Features and benefits of our purifiers include the following.

- Room temperature operation, which eliminates the need for an additional heat source.
- A small, uniform substrate that provides for excellent bed packing, enabling installation of the purifiers in either the vertical or horizontal orientation.
- Integral particle filters, which allow the purifiers to be used as drop-in retrofits for existing in-line particle filters, without the need for equipment modification.
- Gas-specific media that can purify a variety of gases.

### Our Product Line

Pall purifier assemblies are available in a wide variety of sizes to handle a range of flow rates. This enables customers to install purifiers where they need them most.

Our line of purifier products includes the following.

- Gaskleen® 1-1/8" C-Seal Top Mount purifier: Handles flow rates up to 3 slpm and peak (noncontinuous) flow rates up to 15 slpm.
- Mini Gaskleen purifier: Handles flow rates up to 1 slpm and peak (noncontinuous) flow rates up to 2 slpm.
- Gaskleen II purifier: Handles flow rates up to 3 slpm and peak (noncontinuous) flow rates up to 5 slpm.
- Gaskleen ST purifier: Handles flow rates up to 5 slpm and peak (noncontinuous) flow rates up to 10 slpm.
- Maxi Gaskleen purifier: Handles flow rates up to 50 slpm and peak (noncontinuous) flow rates up to 100 slpm.
- PG Series Gaskleen purifiers.
  - ◆ PG550: Handles flow rates up to 75 slpm and peak (noncontinuous) flow rates up to 150 slpm.
  - ◆ PG2400: Handles flow rates up to 500 slpm.
  - ◆ PG11000: Handles flow rates up to 1,000 slpm.

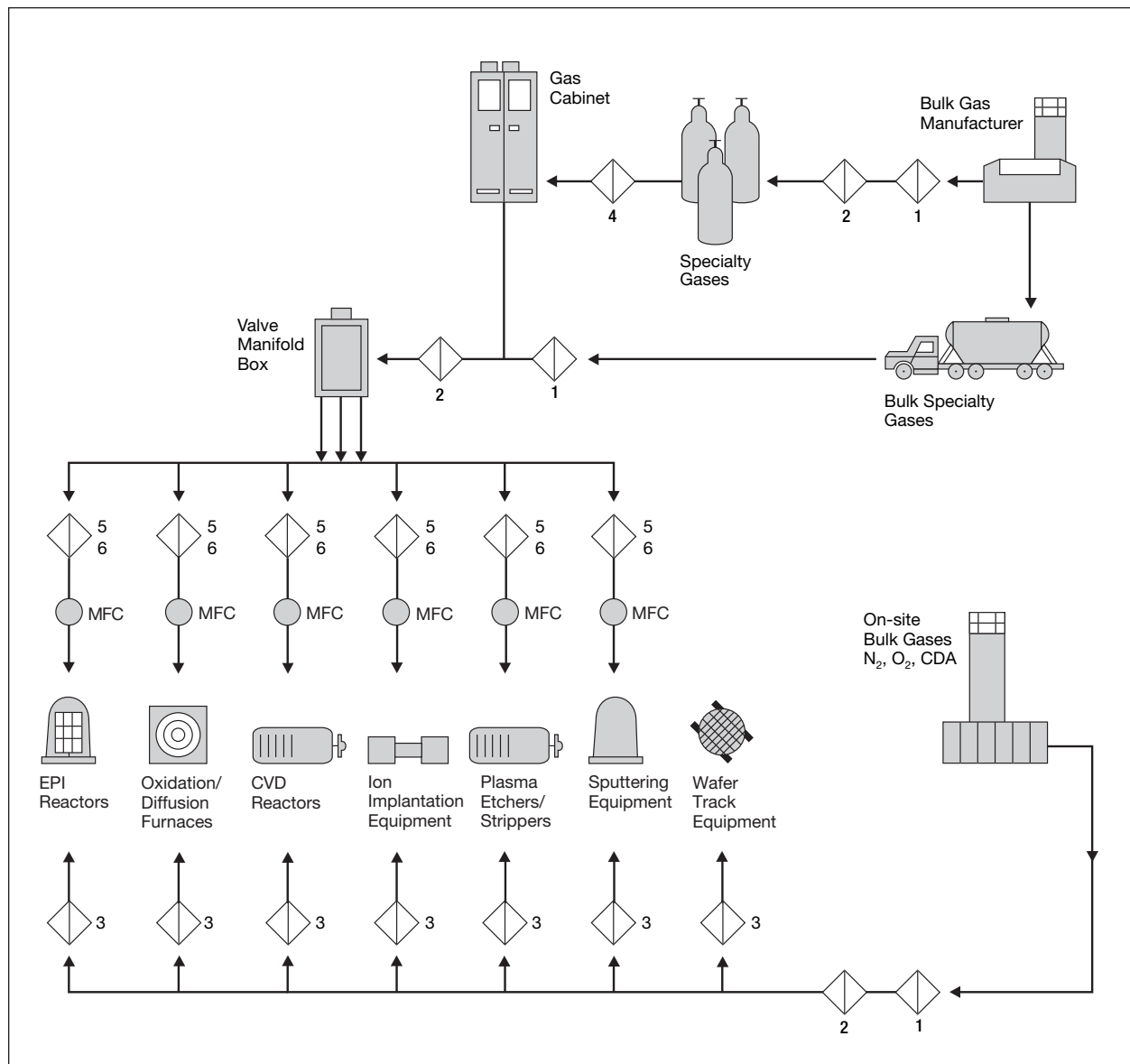
The following table contains a list of gases that can be purified with our AresKleen materials. All Pall purifier assemblies are available with each of the AresKleen materials listed in this table. Please refer to individual purifier product data sheets for part numbers.

Gas Family	AresKleen Purification Materials	Effluent Specification <sup>1</sup>
Nitrogen, argon, helium, xenon, krypton, neon	INP	<1 ppb H <sub>2</sub> O, O <sub>2</sub> , CO <sub>2</sub> and CO
Silane, hydrogen, methane, cyclopropane, propane, dimethyl ether	SIP	<1 ppb H <sub>2</sub> O, O <sub>2</sub> , CO <sub>2</sub> and CO
Carbon monoxide	SIP	<1 ppb H <sub>2</sub> O, O <sub>2</sub> , CO <sub>2</sub> , Ni(CO) <sub>4</sub> , and Fe(CO) <sub>5</sub>
Fluoromethane, difluoromethane, trifluorine, tetrafluoroethane, pentafluoroethane, heptafluoropropane, carbon tetrafluoride, perfluoropropane, perfluorocyclobutane, hexafluoroethane	FCP	<1 ppb H <sub>2</sub> O, O <sub>2</sub> , CO <sub>2</sub> and CO
Ammonia	NH3P	<1 ppb H <sub>2</sub> O, O <sub>2</sub> , CO <sub>2</sub> and CO
Germane	GEH4P	<1 ppb H <sub>2</sub> O, O <sub>2</sub> , CO <sub>2</sub> and CO
Sulfur hexafluoride	SF6P	<1 ppb H <sub>2</sub> O, O <sub>2</sub> , CO <sub>2</sub> and CO
Air, carbon dioxide, oxygen, nitrous oxide	OXF	<10 ppb H <sub>2</sub> O
Boron trichloride, chlorine, trichlorosilane, dichlorosilane	CLXP	<100 ppb H <sub>2</sub> O
Hydrogen chloride	HCLP	<15 ppb H <sub>2</sub> O
Hydrogen bromide	HBRP	Contact Pall Microelectronics

<sup>1</sup> As tested in inert gas.

Please contact Pall Microelectronics for recommendations for specific applications.

## Gas Flow Schematic



## General Gas Purifier Recommendations

Application	Diagram Number	Filter Type	Description of Application
Bulk Non-Toxic	1	PG Series Gaskleen® purifier assemblies	Supply consistent gas purity to the facility up to 1,000 slpm.
Chase / Core	2	PG Series Gaskleen purifier assemblies	Purification and filtration for flow rates up to 500 slpm.
Process Equipment Non-Toxic	3	PG Series Gaskleen purifier assemblies	Purification and filtration for flow rates up to 75 slpm
Specialty Gas Cabinets	4	PG Series Gaskleen purifier assemblies	Purification and filtration for flow rates up to 75 slpm.
Gas Panels / Sticks	5	Maxi Gaskleen purifier assembly	Purification and filtration for flow rates up to 50 slpm.
		Gaskleen ST purifier assembly	Purification and filtration for flow rates up to 10 slpm.
		Gaskleen II purifier assembly	Purification and filtration for flow rates up to 5 slpm.
		Mini Gaskleen purifier assembly	Purification and filtration for flow rates up to 2 slpm.
		Top Mount purifier assembly	Filtration and purification for integrated gas delivery systems up to 15 slpm.
Equipment	6	Gaskleen ST purifier assembly	Purification and filtration for flow rates up to 10 slpm.
		Gaskleen II purifier assembly	Purification and filtration for flow rates up to 5 slpm.
		Mini Gaskleen purifier assembly	Purification and filtration for flow rates up to 2 slpm.
		Top Mount purifier assembly	Filtration and purification for integrated gas delivery systems up to 15 slpm.



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Gas Purification Intro.