

Chemflour® 367 is engineered for high-purity, superior surface smoothness and clarity without compromising the properties of standard fluoropolymers.

Chemflour 367 Fluoropolymer Tubing

Semiconductor manufacturers understand the importance of maintaining integrity of the chemicals used in their production processes, and are using chemically inert fluoropolymer tubings to achieve the required purity levels. Chemflour® 367 Scientific Grade tubing not only maintains fluid integrity, but outperforms tubings made from standard or high-purity PFA resins in many significant ways.

In terms of surface smoothness, Chemflour® 367 is up to six times smoother, which translates to less cross-contamination, greater product yields and easier-to-clean systems.

In extractable tests – in which several different fluoropolymer tubings were filled separately with deionized water and acid - Chemflour® 367 had one of the lowest parts-per-billion counts on trace metals (“Comparative Total Trace Metal Extractables” chart available upon request).

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Trace Metal Ion Removal from Ultrapure Water

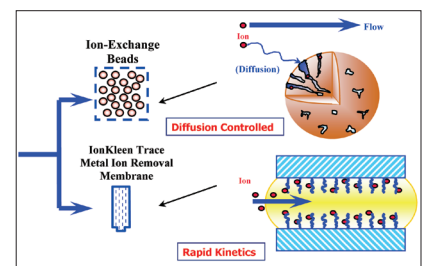
Resistivity measurements of 18.2 MΩ·cm were once considered an indication that ultrapure water (UPW) did not harbor any metal ions or other ionic species. With the advent of ever finer line widths and thinner gate oxides, an increase in defectivity levels was observed. Although the causes are myriad, one of the areas of focus is decreasing the levels of trace metal ions such as sodium, calcium, iron and copper. In fact, the 2006 International Technology Roadmap for Semiconductors (ITRS) has specified < 50 ppt for these contaminants. Obviously ion exchange polishing bottles come to mind as the first choice for removing remaining metal ion contamination not rejected by reverse osmosis or captured by the main mixed resin bed. However, in a number of cases, they have been shown to pass trace quantities of cations. These ions can be effectively captured by membrane purifiers, such as the Pall IonKleen™ family of purifier cartridges. The IonKleen membrane purifiers consist of a microporous ultra-high molecular weight polyethylene substrate with covalently bonded, strong acid cation exchange groups. Configured either into standard cartridges or capsules, they have a very large effective surface area with a small footprint, enabling them to be placed right at the point-of-use.

The IonKleen purifiers are highly efficient because they do not rely on slow diffusion into a resin bead to achieve ionic adsorption. Rather, due to the intimate contact of the water with the densely packed ion exchange groups on the

membrane, rapid kinetics occur with immediate and spontaneous removal of the trace contaminants. This is schematically depicted in Figure 1.

Figure 1:

Ion Adsorption (Resin vs Membrane)



The efficiency of the IonKleen Purifier is relatively independent of flow rate provided its recommended maximum flow rate is not exceeded. The same cannot be said for ion exchange columns or polishers.

Since it is extremely difficult to directly detect these trace ions, their existence and deleterious effects were demonstrated by the following experiments. A Pall IonKleen ion exchange purifier cartridge was examined after six months of service in UPW. The purifier was extracted with 10% HCl. The acid was then analyzed using inductively coupled plasma mass spectrometry (ICP-MS). A variety of cations were detected. The highest concentrations are shown in Table I. These represent significant cations removed from the UPW during the service life of the ion exchange purifier/filter.

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Furon® UPM 1000 Valve



The Furon® UPM Series Valves are available with visual position indicators, permitting easy identification of open and closed positions. Designed for transfer of highly aggressive ultrapure chemicals and de-ionized water, the UPM series is ideal for applications that demand high-pressure capabilities and a high Cv flow factor. The UPM Slurry Valve is designed and tested specifically for aggressive slurry applications and is offered in 2 and 3-way configurations. Call 1.800.848.1141 or 1.925.443.9800 for more info.

Furon® RDVM and SMDVM Self Manifolding Distribution Valves

Furon® high-purity, injection-molded RDV/SMDV Rolling Diaphragm Valves are available in both manual and pneumatic models. Ideal for applications that demand high Cv flow factor, these valves feature the smaller footprint required by cost-conscious customers. Universal fittings allow customers to order one standard valve, which means smaller volume inventory requirements. Primary applications include high-purity chemical and slurry delivery for chip makers, bulk chemical distribution

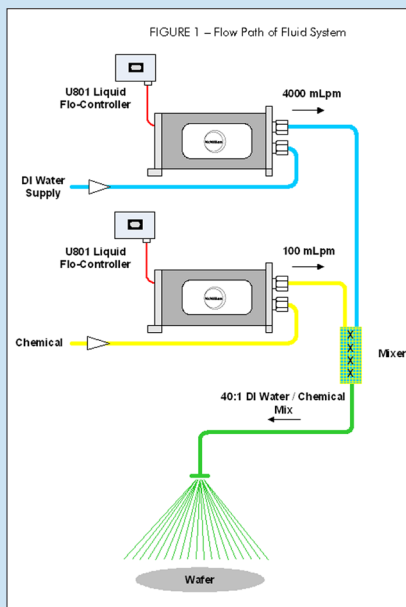
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TECHNOTES



CMP Point of Use Chemical Dilution

Semiconductor manufacturing customers are seeking ways to reduce process costs without impacting the process itself. Semiconductor production facilities have numerous Chemical Mechanical Planarization (CMP) tools that use an abrasive process for polishing the surface of the wafer flat. Planarization areas are opportunities to pursue such improvements.

At various times during the CMP process, fluids are delivered to the wafer for polishing or rinsing using a pressurized chemical system. During the rinse phase a chemical, usually acid or ammonia, is diluted 40:1 with de-ionized (DI) water.

McMillan Liquid Flo-Controllers combine smart electronics with a precision control valve and flow sensor. The output from the flow sensor is analyzed and compared to the flow rate set point. The control valve is then automatically adjusted to achieve the required flow.

The DI water and the chemical are mixed downstream of the Model U801 Flo-Controllers

and delivered to the wafer. The controller uses an external set-point, output signal and standby mode for process control and monitoring. Standby mode overrides control functions and freezes valve position, while still providing flow output signals for monitoring purposes. Normal operation resumes when standby is disengaged.

The Liquid Flo-Controllers provide consistent flow regardless of small pressure changes and can be configured for available system pressure. The control module has an LCD display, status and standby LED indicators for visual reference. DIP switches on the control module allow the user to view flow, choose internal or external set-point and manually activate standby mode. Benefits to our customers include a reduction in process cost, reduced maintenance and improved consistency. Call 1.925.443-9800 for more information or to schedule a visit with a Microelectronics sales representative.

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Trace Metal Ion Removal from Ultrapure Water

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Table 1: Metal Ions Extracted From Used Purifier

Cation	µg per 254 mm/10 in. IonKleen Purifier
Na	85.8 ± 2.7
Mg	277.5 ± 8.9
Ca	147.0 ± 4.7
Fe	267.0 ± 8.5
Ni	75.9 ± 2.4

Tests with silicon wafers revealed that significant levels of metals could be detected on wafers rinsed with standard UPW as compared to the low concentrations on control wafers exposed to equal amounts of membrane purified UPW.

Pall IonKleen™ Purifiers are being used successfully at point-of-use in a number of UPW systems. Because of its high metal ion capacity, typical service life ranges from 1-2 years. Call 1.925.443.9800 for more information or to schedule a visit with a Microelectronics field representative.

Chemfluor 367 Fluoropolymer Tubing

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As far as visual clarity is concerned, Chemfluor® 367 tubing is clearer than virtually all other fluoropolymers. Coupled with its chemical

inertness, this clarity makes Chemfluor® 367 ideally suited for easy identification of just about any chemical. Call 1.800.848.1141 for more info.

Pall Gaskleen® Purifiers Prevent Contamination in Dielectric Plasma Etch Processes

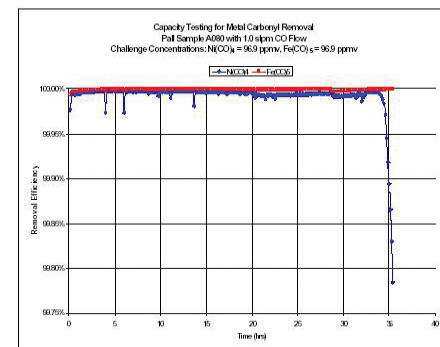
Pall Corporation is featuring the Gaskleen SIP purifier, designed for the removal of metal carbonyls and moisture contamination in Carbon Monoxide (CO) process gas streams used in critical plasma etch processes to remove dielectric layers. Carbon monoxide has inherent molecular contamination that can consist of 1ppm concentrations of both metal carbonyls (Fe(CO)₅, Ni(CO)₄) and moisture. In addition, CO and moisture may react with the iron and nickel in stainless steel piping to form more volatile metal carbonyls. Volatile metals and moisture can not be captured by gas filter assemblies. The CO process gas carries these volatile metal carbonyls, along with moisture, into the dielectric etch process chamber. This results in deposition of the metals and moisture on the wafer.

The Gaskleen CO purifier contains proprietary AresKleen™ SIP medium upstream of Ultramet-L® filtration medium. AresKleen SIP medium is constructed of a highly reactive metal dispersed on an inorganic support.

The SIP medium has performance-enabling properties, including removal of both metal carbonyls and moisture by adsorptive mechanisms, also high capacities of both aforementioned contaminants. Ultramet-

L medium is constructed of 316L SS media that enables 9LRV particulate retention of size 3nm and larger.

Independent laboratory testing performed by APCI show that Pall Gaskleen SIP purifier consistently demonstrate removal of metal carbonyl (Fe(CO)₅, Ni(CO)₄) gaseous impurities to less than 1 ppb levels from CO feedstock gas with much higher concentrations of metal carbonyls than is found in semiconductor grade CO. The graph in the Figure below depicts removal efficiency over purifier lifetime and shows that the Gaskleen SIP purifier removes metal carbonyl gaseous impurities from CO gas to less than 1 ppb levels and that it has a large capacity for metal carbonyls. Call 1.925.443.9800 for more information.



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Saint-Gobain Microelectronics manufactures custom fluoropolymer valve manifolds to provide turn-key solutions to semiconductor OEMs.

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