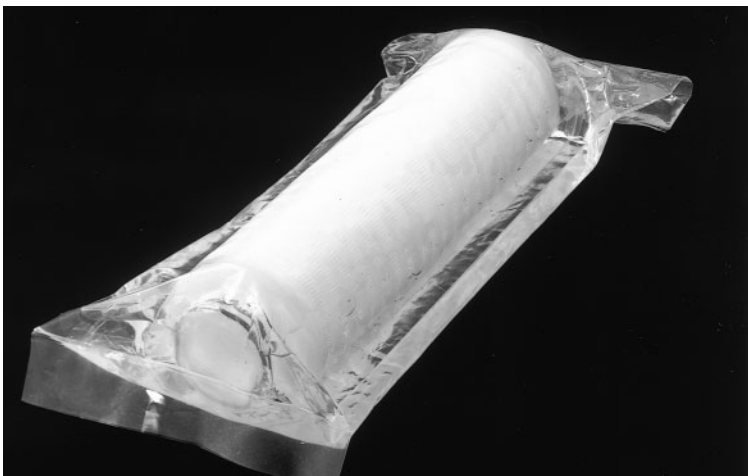


## Prewet UltiKleen™ and Kleen-Change® Filters



### Description

Filter cartridges made from all fluoropolymer components are used to filter high purity chemicals in today's semiconductor fabrication processes. The strict requirements for clean materials, as well as compatibility issues, often necessitate the use of all fluoropolymer materials. PTFE is an excellent material for filter membranes, and is widely used for bulk distribution and point-of-use applications.

Many applications involve the filtration of aqueous chemicals, which include etching, cleaning, photoresist development, etc. Since the PTFE membranes are hydrophobic, prewetting with low surface tension fluids such as isopropanol (IPA) is required. Recent environmental regulations limiting the amount of organic vapors in the workplace air are forcing users to reduce the utilization of IPA and other solvents for prewetting purposes.

Attempts at wetting hydrophobic filters by submerging the filters in water pressurized above the bubble point of the filter have had limited success. Until now, providing hydrophobic filters, prewet, to be installed directly into tools and distribution systems, has been hampered by packaging, fluid shipment and purity issues.

*The Prewet filter cartridge option is the latest development in eliminating the need to IPA-soak hydrophobic membrane filters. Pall is focused on the greening of today's semiconductor fabs, while also minimizing the time required for cartridge changeout.*

#### Benefits

- 1. Low Level Extractables:** Typical extractable levels for the prewet cartridge are low ppb.
- 2. No Added Anti-stats or Surfactants:** Our proprietary process for the prewetting of hydrophobic elements does not require the use of anti-stats.
- 3. Packaged in High Purity DI Water:** Our cartridges are packaged in 18 Megohm-cm DI water. Not only is this water of a high quality, it is also sterile.
- 4. Integrity Testable:** As with all of the cartridges that we supply to the semiconductor industry, our cartridges are 100% integrity testable in IPA.
- 5. Quick Rinse Up:** Relative to the performance standards of these products, we are providing a product that will rinse up to 18 Megohm-cm DI water, as well as single digit ppb TOC levels in  $\leq 30$  minutes.
- 6. Manufactured in a Cleanroom Environment:** These products are manufactured in a cleanroom environment.
- 7. 100% Integrity Tested:** These elements are 100% integrity tested.

### The Prewetting Process

Pall Prewet filter cartridges are packaged using a patented process. The filters are prewet conventionally, using an alcohol containing fluid, followed by an ultra high purity DI water (UPW) flush. The filters are then packaged in an all fluoropolymer bag, and *in-situ* sterilized. The sterilization process does not involve any additives to the UPW, so the filter is in contact with and packaged in only 18 Megohm-cm UPW.

#### Sterility of the UPW

Validation of the *in-situ* sterilization procedure was confirmed by the use of Kilit<sup>1</sup> ampules, which are sealed ampules supplied by Becton Dickinson. The Kilit<sup>1</sup> ampule contains a suspension of *Bacillus stearothermophilus* in a culture medium, containing a pH sensitive indicator solution. After the packaging and sterilization process, the ampules were removed from the packaged filter, incubated, and the presence of growth (also indicated by the indicator color change due to acid production from microorganism growth) or lack of growth was used to determine the proper process conditions. Since these ampules contain a much higher concentration of microorganisms than is contained in UPW, the validation process was a stringent one.

<sup>1</sup> Kilit is a trademark of Becton Dickinson & Co.

To confirm sterility of the water in packaged filters, samples of the water were cultured utilizing standard microbiological procedures at time periods of 3, 6, 9, 12 and 24 months. The water samples were all found to be sterile, with no viable microorganisms observed after the storage period.

### Purity of the UPW

The 18 Megohm-cm UPW used for filter flush and packaging is semiconductor grade water, containing only trace levels of ionic contaminants as determined via ion chromatography. Since the UltiKleen filters and Kleen-Change assemblies are constructed solely of all fluoropolymer materials, including the packaging materials, minimal contamination, other than fluoride ions, is expected to leach into the water, even with long term packaging exposure.

Sampling of UPW from bags containing prewet filters yielded the following levels of ionic species in the water, as determined utilizing ion chromatographs:

Specie	Level (PPB)
F	Low single digit ppm
Cl	Single digit
NO <sub>3</sub>	Single digit
HPO <sub>4</sub>	Single digit
SO <sub>4</sub>	Single digit
Na	Low double digit
K	Low double digit
Mg	Single digit
Ca	Low double digit
Fe	Single digit
Cu	Single digit
Ni	Single digit
Zn	Single digit
Co	Single digit

Unit conversion: 1 bar = 100 kilopascals

Since the UPW is of a high purity, start-up with the filter is rapid. For instance, installation of the filter in a water stream flow yielded < 30 ppb TOC in less than 5 minutes, and < 2 ppb TOC in less than 30 minutes at a flow of 2 gpm with a ten inch prewet UltiKleen cartridge, determined using an Anatel A1000 analyzer. Therefore, the purity of oxidative acids such as sulfuric acid will not be compromised due to reactions with organic species.

### Guarantee

We are guaranteeing that our prewet filter cartridges and assemblies are fully prewet and free from bacteria, for as long as the packaging remains integral.

Our unlimited shelf life guarantee is assured by extensive shelf life testing. If the package is no longer integral we no longer guarantee the product is wetted out or sterile. The filter can still be utilized by simply prewetting the cartridge.

### Transportation

As our prewet elements are packaged in 18 Megohm-cm DI water, the possibility that they may freeze while being transported in the winter months does exist.

Our testing has revealed that even when these elements are frozen and then thawed, they maintain integrity. In other words, the question of the elements freezing does not affect the integrity of the filter element, nor does it have an effect on the prewetting process. Nevertheless, precautions should be taken to avoid exposing the elements to freezing conditions prior to use.

### Filter Cartridge Specifications

<b>Current Available Cartridge Types:</b>	UltiKleen and Kleen-Change filters
<b>Part Number:</b>	K3 suffix to standard part numbers
<b>Removal Ratings:</b>	0.2 µm, 0.1 µm and 0.05 µm
<b>Flow Characteristics:</b>	See current UltiKleen and Kleen-Change filter flow curves

### Summary

Pall prewet filter cartridges provide users with the ability to immediately install the filters in bulk, distribution, and point-of-use applications without the need to prewet the filters utilizing low surface tension solvents. This reduces down time and minimizes environmental exposure to prewetting fluids.

The water in the packaging has been proven to be sterile. The water is also of a high purity, enabling the filters to be used immediately after removal from the packaging without the need for preconditioning.



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