

Semiconductor Rinse Water

Highly purified water (HPW), high purity water or ultrapure water is necessary for various applications including dialysis, pharmaceutical and electronics. Highly purified water is a commonly used term to emphasize the fact that the water is treated to the highest levels of purity, including the removal of: organic and inorganic compounds; dissolved and particulate matter; volatile and nonvolatile, reactive and inert; hydrophilic and hydrophobic; and dissolved gasses.

Electronics and semiconductor fabrication plants use highly purified water as a cleaning agent and for etching processes, so it is important that the water not contain dissolved contaminants that may precipitate or particles that may lodge on the circuits and cause microchip failures. Several organizations and groups develop and publish standards associated with the production of highly purified water. The most widely used requirements for highly purified water quality for electronics and semiconductor fabrication are documented by the American Society for Testing and Materials International (ASTM International) and Semiconductor Equipment and Materials International (SEMI).

A range of advanced water treatment technologies is utilized to treat produce highly purified water including reverse osmosis (RO), ion exchange (IX), electrodeionization (EDI), and further polishing processes such as ultrafiltration (UF), advanced oxidation, ultraviolet (UV) sterilization and degasification. RO, IX and EDI are typically used to remove dissolved solids (TDS), while UF is typically used as a polishing step to remove particles and bacteria. Reduction values for a 10,000 Dalton (Da) molecular weight cut-off (MWCO) membrane have been summarized in Table 1.

TABLE 1. LOG REDUCTION VALUES BASED ON A 10,000 DA MWCO UF MEMBRANE.

Component	Log Reduction Value
Giardia	6
Cryptosporidium	6
Bacteria	6
Viruses	5
Endotoxins	4

HIGH PURITY MEMBRANE ELEMENTS

TurboClean® High Purity elements and TurboClean® High Purity Heat Sanitizable elements are ideal for applications which demand ultrapure water such as dialysis, pharmaceutical and semiconductor rinse water. TurboClean elements feature a unique, sanitary, patented hard-shell construction that offers better value than other sanitary elements.

[TurboClean® High Purity RO elements](#), [TurboClean® High Purity Low Energy RO elements](#) and [TurboClean® Low Fouling RO elements](#) may be used to produce high purity water.

[TurboClean® High Purity Heat-Sanitizable RO elements](#) may also be used to produce high purity water. These elements are typically operated at temperatures between 10-15°C (50-59°F) and are sanitized using a heat-sanitizing procedure at up to 80-90°C (176-194°F).

[TurboClean® High Purity UF elements](#) and [TurboClean® High Purity Heat-Sanitizable UF elements](#) may be used after the RO system to further polish the water.

TECHNICAL APPLICATIONS

ULTRADYN™ Hollow Fiber UF modules, specifically ULTRADYN™ FS10 FS FUST653 and ULTRADYN™ FS10 FC FUST653 modules, may also be used after the RO system to further polish the water. The modules with the 6,000 Da and 10,000 Da MWCO are most commonly used for high purity water applications. These modules are also heat-sanitizable up to 98°C (208°F).

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