Better Water at Lower Cost

Cuf is a continuous flow, 5th Generation Ceramic Membrane Process with proven performance and represents a quantum leap forward in water purification; effectively rendering all other MF/UF membrane processes obsolete in terms of comparative performance. ***Cuf*** has no pre-treatment, no filtrate loss, absolute filtration at its rating over the 25-year design life of the system.

The ***Cuf*** process is a disruptive game changer and challenges conventional engineering, cost structures and performance criteria. ***Cuf*** does more than just filter.

Cuf systems have a much smaller footprint and significant complexity reduction over all other ceramic, hybrid-ceramic or polymeric membrane filtration processes. Low TMP (Trans Membrane Pressure) with unmatched flux (5 times) and duty further contribute to comparable operating and capital cost structure reductions in the 50% range.

Cuf is comprised of patented ceramic membrane and process technology which has been developed and optimized with over 25 years of continuous application and operations experience.

Purification Capability

Removes and/or Recovers Particulate, Color, DOC, Pathogens (>4 log), TSS, VSS, Radium, Turbidity, Hardness, Oil, Cr^{6}, Metals, H_2S, Organic & Inorganic Phosphorous, THM & HAA Precursors, Taste & Odor compounds and Silica. All this is performed in a single ***Cuf*** platform which eliminates conventional pre, auxiliary and post treatments. ***Cuf*** is a complete plant and capable of ZLD (Zero Liquid Discharge).

Applications

Drinking Water Wastewater Reuse IPR/DPR Remediation Solvent Filtration RO Pre-Treatment

Expertise

Purifics has been deploying its proprietary Ceramic Membrane Systems since 1993. Our installed global base (70+) provides unmatched Experience and Leadership in ceramic membrane system technology for Municipal and Industrial applications to Filter, Destroy and Recover (FDR) contaminants in water and other fluids.

Purifics' Experience and Leadership in ceramic membrane technology has let to unique innovations:

1. That Inhibit Fouling
2. Sustained High Flux Rates
3. Continuous Online Duty
4. Marker Based DIT
5. Enhanced Capability, Robustness, Efficiency & Durability

Carbon Capture

Cuf will capture and reduce your carbon footprint.

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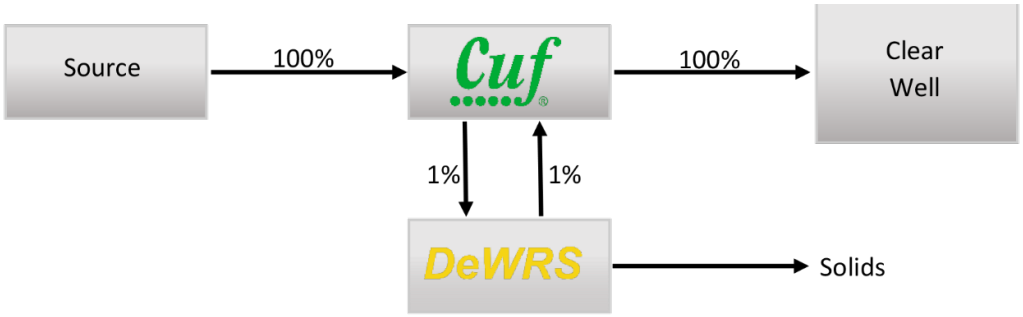
Process Description

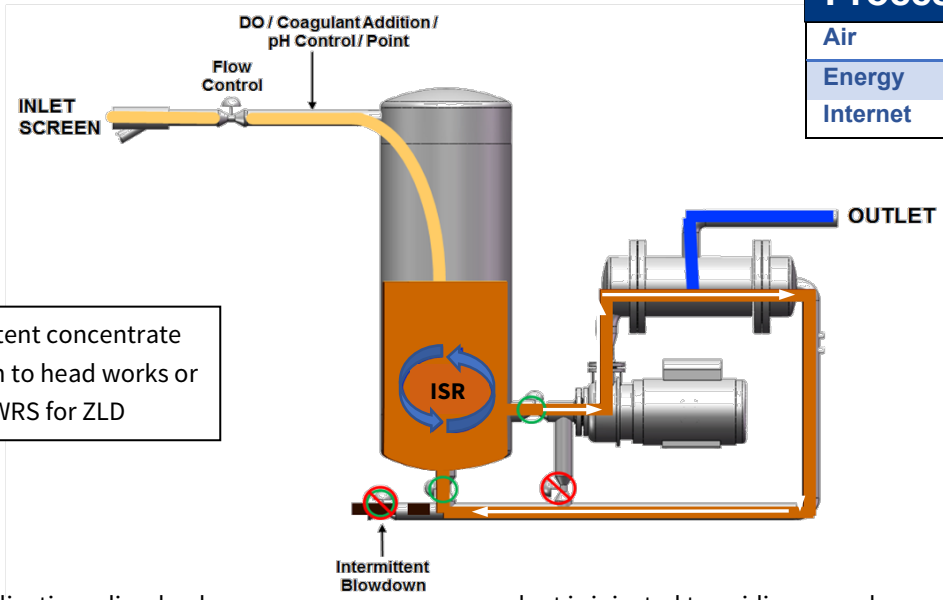
Raw water is screened for “frogs and logs” and processed in a crossflow arrangement, TMP is modulated in the *Cuf* to maintain constant flux over the performance range to ensure that flow rate requirements are achieved. The membrane module is frequently subjected to a dynamic shock to self-clean the membranes which inhibits fouling, allowing continuous online duty (~99%). Over time the concentrate loop will have highly concentrated levels of filtered material that impacts the TMP.



This causes a concentrate blow down or optionally the concentrate is sent to a DeWRS (DeWatering Recovery System) where the concentrated material is dewatered to a wet solid to achieve Zero Liquid Discharge (ZLD).

Cuf is not Trans-Membrane Pressure (TMP) limited like conventional membrane processes. *Cuf* is unique and runs at a constant flux and the TMP is modulated to maintain that constant flux. This means that the flux in a *Cuf* process is independent of the fluid temperature and the plant is not de-rated as the fluid temperature drops. This means that a *Cuf* process can respond to changes in viscosity, load and demand and is only limited by the installed TMP pump’s capability.

Process Flow



Intermittent concentrate blowdown to head works or DeWRS for ZLD

Process Utilities

Air	100psig
Energy	480V 3 Phase
Internet	High Speed Static IP

In certain applications dissolved oxygen or a common coagulant is injected to oxidize or agglomerate dissolved contaminants such as metals or DOC. These reactions occur in the ISR (In-Situ Reactor). No upstream coagulation basins or clarifiers pretreatment is required, just the *Cuf* platform.

Dynamic Shock

Purifics' proprietary Dynamic Shock process self-cleans the ***Cuf*** membrane in a continuous online operation. The shock is generated and travels through the water, the membrane, and the module to drive foulants off the membrane surface.

Remote Access & Control

Cuf utilizes a high speed internet connection with a static IP or VPN access to a client supplied network. This allows Remote Control, remote programming/SCADA updates and remote technical support. The connection allows the ***Cuf*** to automatically message pertinent plant personnel in the event of a fault. If no landline access is available, cellular alternatives are available.

Duplex & Redundancy System Options

For system design and regulatory requirement purposes to retain capacity in the event of a component failure, ***Cuf*** systems are available in a Duplex or Dual Module (DM) platforms. There are two complete and identical membrane module assemblies that operate together or independently in a single platform assembly. To achieve redundancy for pump or PLC related failures, two platforms are required.

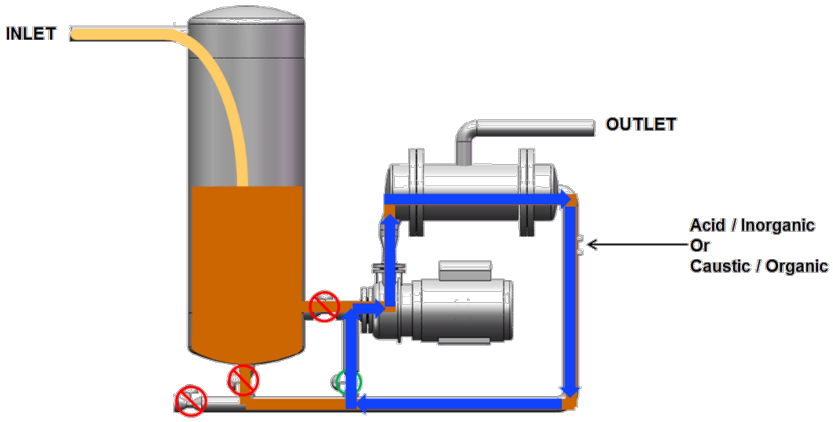
Ratings & Certifications Available

- LT2ESWTR Compliant
- ASME B31.1 & 31.3
- NSF/ANSI 61
- Class I Div 2

Regulatory Compliance

Regulatory Compliance in Multiple Jurisdictions since 2015 with the largest installed base of ceramic drinking water plants in North America.

TMP Maintenance



There is no Clean-In-Place (CIP) or backwash with the ***Cuf*** process. Over time or extended shut down or an upset event the TMP may increase. When this occurs an automated TMP Maintenance Rinse Cycle (chemical rinse) is activated and the concentrate recirculation loop (in blue) is isolated from the process, the Loop pump recirculates high cross-flow, the temperature may be raised, and the pH shift chemical is injected. Acid is used for inorganic and caustic is used for organic fouling. The combination of heat, crossflow velocity and pH shift is used to scour and dissolve residual foulants from the membrane. The TMP maintenance fluid is discharged through the blowdown line. When this 30 minute cycle is complete, full TMP recovery is achieved and the system is brought back online.

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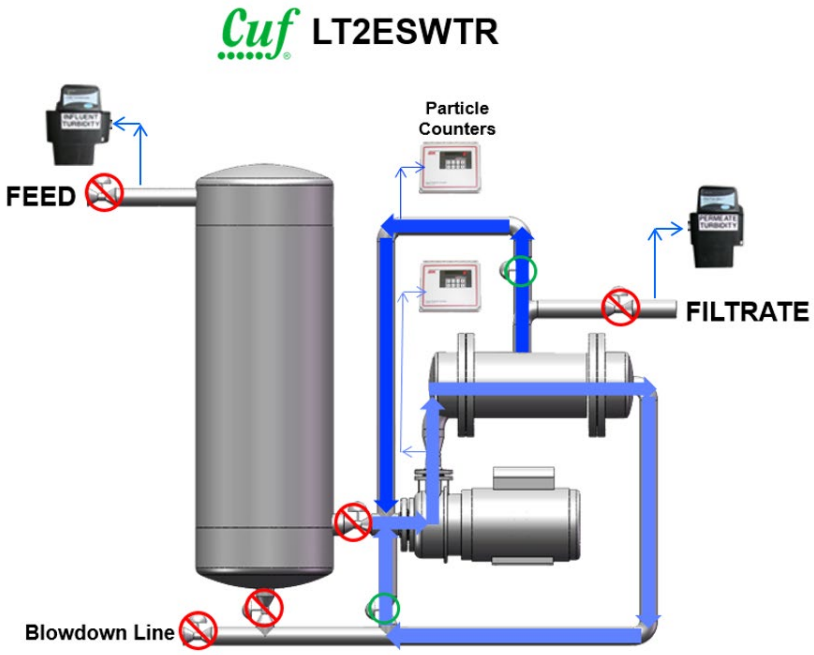
LT2ESWTR Compliance for Membrane Integrity Verification

LT2ESWTR “Long Term 2 Enhanced Surface Water Treatment Rule” identifies the requirements for log removal of Cryptosporidium and the verification method to ensure the membrane integrity. This is achieved in the *Cuf* process by the following procedure.

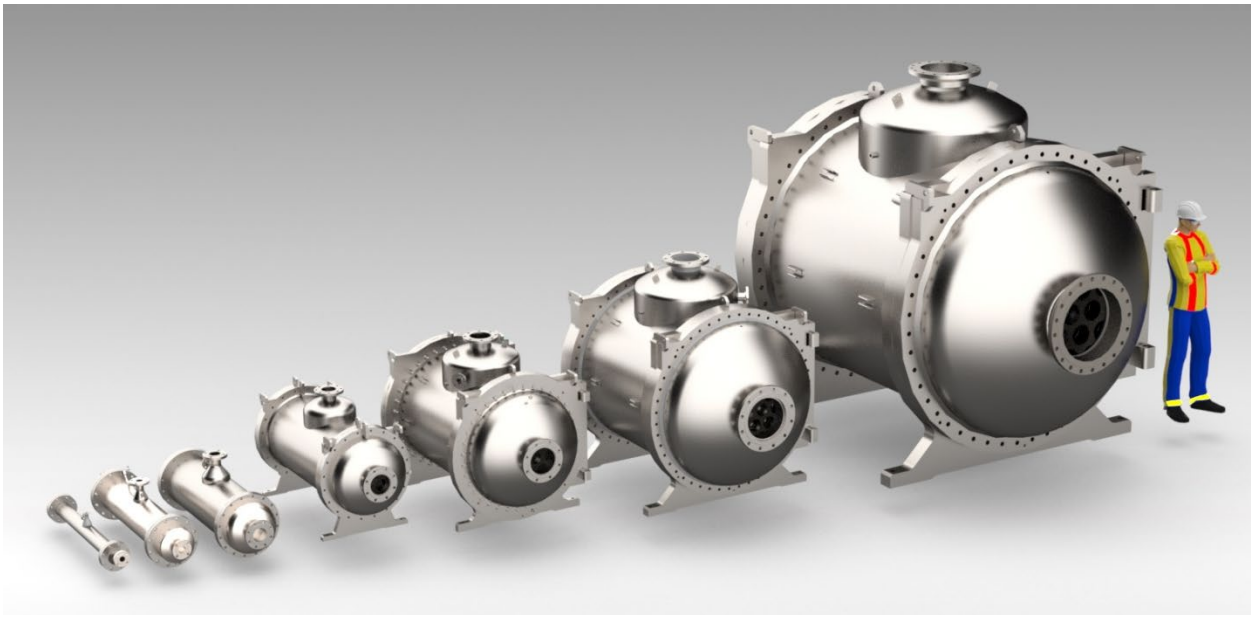


Full details on *Cuf* LT2ESWTR compliance is provided in Document DOC2040 (LT2ESWTR Compliance & Verification).

Highest Capacity Membrane Module in the World

Modular Platform Capacity

Cuf is available in different size platforms with single “M” or double “DM” modules to meet your process and capacity requirements. Detailed Platform Specifications Sheets are available in the “Downloads” section at www.Purifics.com. A *Cuf* Sizing and Application document is available upon request.



M6 M10 M16 M24 M36 M52 M92

Cuf Membrane; Elegant but Tough

Purifics patented & patent pending SiC membrane is a unique 5th generation technology providing unmatched performance, efficiency, strength, durability, flux and anti-fouling properties. Once installed the membrane is **NEVER** removed or never sees the light of day again during its operational lifetime.

Why *Cuf* - Features & Benefits

- ✓ The Platform is the Plant
- ✓ Zero Liquid Discharge
- ✓ 300 GFD on Surface Water
- ✓ 600 GFD on Ground Water
- ✓ Lowest O&M Cost Structure
- ✓ Fully Automated
- ✓ >99% On-Line Duty
- ✓ Continuous Self Cleaning
- ✓ System UL Certified to ANSI 61
- ✓ LT2ESWTR Compliant
- ✓ Reduced Complexity
- ✓ > 25 Year Membrane Life
- ✓ 50% Less Coagulant
- ✓ Concentrated Sweep Floc (3x Efficiency)
- ✓ Marker Based DIT
- ✓ Twice the DOC Removal
- ✓ Best Warranty
- ✓ Allows Free Chlorine Use
- ✓ Reduces Cl2 Demand
- ✓ 5.7 LRV Approval
- ✓ THM & HAA Compliance
- ✓ 100% of Filtrate to Distribution
- ✓ Only Level 2 Operator Required
- ✓ Continuous Flow
- ✓ 99% Feed Water Recovery
- ✓ Accepts Feed Pressure 0-150 psi
- ✓ Most Hydrophilic Membrane (SiC)
- ✓ Exceptional Cold-Water Performance
- ✓ Lower TMP & X Pressure
- ✓ Factory Acceptance & Review
- ✓ Factory Training Prior to Shipment
- ✓ Taste & Odor Removal
- ✓ In-Situ Coagulation
- ✓ In-Situ Oxidation
- ✓ In-Situ Reduction
- ✓ Virtually Indestructible
- ✓ Flexible Design Can Incorporate PAC
- ✓ 5th Generation 100% SiC Ceramic Membrane
- ✓ Constant Flux Capability
- ✓ No Backwash Process
- ✓ No Backwash Tank
- ✓ No Clarifier
- ✓ No Flocculation or Polymer
- ✓ No Clean In Place (CIP)
- ✓ No Membrane Replacement
- ✓ No Filtrate Loss
- ✓ No Pre-Treatment
- ✓ No Chloramination
- ✓ No Permanganate
- ✓ No Temperature Constraints
- ✓ No Jar Testing
- ✓ No Bubble Decay Test
- ✓ No DIT Volumetric Concentration
- ✓ No Filter Press
- ✓ No 0.3 Micron Prefilter
- ✓ No Temperature Constraints
- ✓ No Pressure Constraints
- ✓ No pH Constraints
- ✓ No Cleaning Constraints
- ✓ No Prorated Warranty
- ✓ No Irreparable Fouling
- ✓ No Coagulant Breakthrough
- ✓ No Onsite Fabrication
- ✓ No Need for Operator Adjustments
- ✓ No Composite or α Alumina Ceramic
- ✓ No Air Sparging
- ✓ No Intermittent or Batch Processing
- ✓ No Ion Exchange (SIX)
- ✓ No Flux De-Rating Due to Cold Water
- ✓ No Membrane End-of-Life
- ✓ No Dead-End
- ✓ Not Just a Filter
- ✓ No Pinning
- ✓ No Charge Neutralization
- ✓ No Risk of Cross-Contamination
- ✓ Eliminates Complexity/Confusion
- ✓ No UV

Plant Tours

To fully appreciate the benefits of the *Cuf* process for your application, we highly recommend that you tour an existing installation that meets your requirements. Contact us to arrange a tour at your convenience.

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