ZYRAMIC

ULTRAFILTRATION PRODUCT CATALOG · REV03

Scrub UF

Submerged flat-sheet ultrafiltration, kept clean by circulating scrubbing media. No backwash.



AT A GLANCE	
Membrane	Flat-sheet PES UF, about 0.04 µm nominal pore size
Design flux	9–12 GFD (15–20 LMH); may run higher on clean water
Packaged units	861–11,300 ft² (80–1,050 m²) of membrane per unit
Fouling control	Screen-retained media scrubs the sheet surface online
Backwash	None
Typical uses	RO pretreatment · industrial water reuse · surface and drinking water

Local manufacturing capabilities in Poughkeepsie, NY.

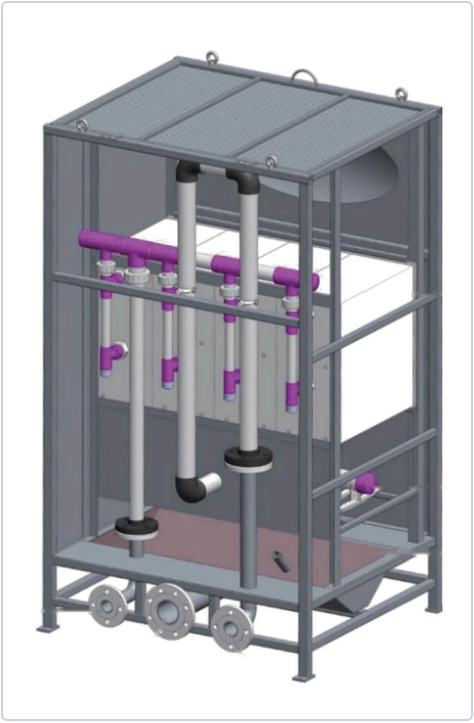
A short UF process in an open tank.

Scrub UF is a submerged ultrafiltration system. Flexible flat-sheet UF membranes sit in an open membrane tank and permeate is drawn off by low-pressure suction. Scrubbing media held in the tank circulates past the sheets and wipes the fouling layer off while the unit runs, so there is no backwash pump, no backwash tank and no backwash cycle.

In many applications the pretreatment ahead of Scrub UF is a fine screen. Where the feed allows, that can replace a coagulation, clarification and media-filter train. Each project is sized on its own water.

TWO WAYS TO BUILD A PLANT

Format	Description
Packaged units	Self-contained tank and cassette, 861–11,300 ft² (80–1,050 m²). Units can share feed, drain and cleaning utilities and are serviced one at a time. Suits small plants, phased capacity and tight access such as basements.
Multi-cell tank	One larger tank divided into cells. Each cell can be taken offline for cleaning or drain while the others keep producing. Built to site space and shipping limits. Scope confirmed per project.



Packaged unit, cutaway. Tank, UF sheet cassette, permeate header and media retention screen.

UNIT COMPONENTS

#	Component	Notes
1	Membrane tank	Stainless steel or polyethylene, per project
2	UF sheet cassette	Flat-sheet PES UF, center-port permeate outlet
3	Permeate header	Low-pressure suction to the permeate pump
4	Media retention screen	Keeps the scrubbing media inside the tank
5	Drain and concentrate outlet	Periodic discharge of concentrated solids
6	Controls	Automated operation; remote monitoring available

What the design is built to deliver.

FEATURE AND BENEFIT		
Feature	**What it does**	**Why it matters**
Stable flux on variable feeds	Continuous surface cleaning helps hold flux between cleanings	Fewer membranes for the duty in many cases
Online media scrubbing	Fouling is removed while the unit runs	Less frequent chemical cleaning and less labor
Open-channel flat sheets	Sheets can be inspected and cleaned directly; no fiber bundle to plug	Tolerates higher-turbidity feeds
Long membrane life	Designed for 5+ years with proper operation	Lower membrane replacement over the plant life
No backwash	No backwash pump, tank or valves	Simpler, shorter process train
Often no coagulant	No chemical sludge from a coagulation step in many designs	Less solid waste, no added chloride, aluminum or iron in the permeate



Multi-unit installation in a treatment building.

TYPICAL PERMEATE QUALITY	
Parameter	**Typical result**
Turbidity	Typically below 1 NTU; often below 0.1 NTU
SDI	Typically below 4, suitable as RO feed in many cases
Suspended solids	Typically below 5 mg/L
Recovery	90% or better, depending on feed and discharge regime
COD and ammonia	Partial reduction; not a treatment claim
Color	Partial; plan a polishing step where color limits are tight

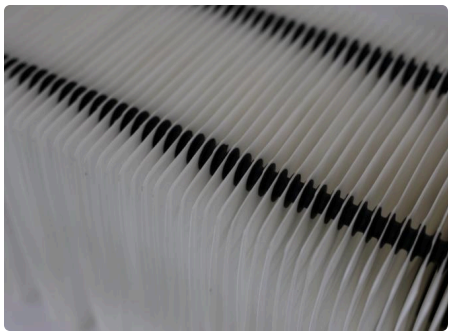
> Typical values from reference installations and test data. Your proposal sets the guaranteed values for your feed.

Flexible flat-sheet UF.

The core of Scrub UF is a flexible flat-sheet ultrafiltration membrane. A high-porosity PES layer with fine, uniform pores sits on a robust support layer, and permeate leaves through a center port so pressure drop across the sheet stays low. The flexible sheet moves slightly in the tank, which works with the circulating media to keep the surface clean.



Single sheet with center permeate port.



Sheet stack in the cassette.



Cassette installed in a tank.

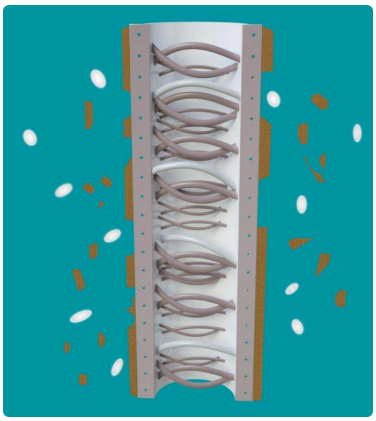
MEMBRANE SPECIFICATION

Item	Value	Note
Membrane material	Polyethersulfone (PES), permanently hydrophilic-modified	
Nominal pore size	About 0.04 µm	Ultrafiltration range
Porosity	Greater than 70% (typical)	
Permeate outlet	Center port	Low pressure drop
Construction	Support layer laminated in one step; high-strength sheet seams	Built for long operation
Sheet families	0.14 in (3.5 mm): UF80 / UF260 / UF350 · 0.16 in (4.0 mm): UF210 / UF280	Family set by project
Filtration mode	Submerged, outside-in, low-pressure suction	

Scrubbing media does the cleaning.

A small volume of purpose-sized scrubbing media is held in the membrane tank. Mixing in the tank carries the media up across the sheet faces, where gentle particle contact strips the fouling layer from the membrane while it filters. The media then flows down around the cassette, settles and is carried up again, in a continuous loop.

A retention screen keeps the media in the tank. Media size and density are matched to the cassette, so it cleans without damaging the membrane. Periodic tank drain and refill removes concentrated solids.



Media moving past the sheet faces (schematic).



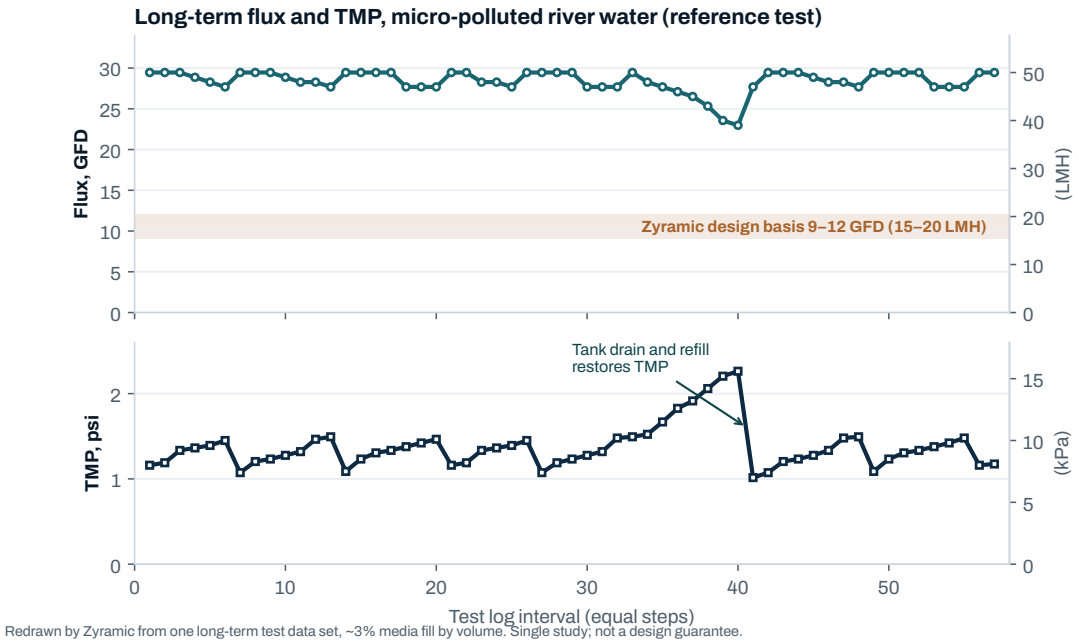
Scrubbing media.

FOULING CONTROL	
Item	**Scrub UF**
Primary cleaning	Circulating, screen-retained scrubbing media; continuous and online
Media fill	About 3% of tank volume in reference testing; confirmed per project
Backwash	None
Solids removal	Periodic tank drain and refill; concentrate to drain or solids handling
Chemical clean (CIP)	Whole-tank soak, typically every few weeks to 2 months on suitable feeds
CIP trigger	TMP near 5 psi (35 kPa) or output down about 10%, in one design study
CIP chemistry	Hypochlorite and acid soak; recipe issued with the project O&M

> Media scrubbing has been tested on this flexible flat sheet. It is not offered as a retrofit for hollow-fiber or rigid flat-sheet modules.

Flux holds; TMP recovers.

The chart below is redrawn from a long-term test on micro-polluted river water with about 3% media fill. Flux held at about 24–29 GFD (40–50 LMH) on that feed. TMP rose slowly through each run and dropped back after each cleaning cycle and tank drain. These test values are well above the Zyramic design basis, which is shown for reference.



Redrawn by Zyramic from one long-term test data set, ~3% media fill by volume. Single study; not a design guarantee.

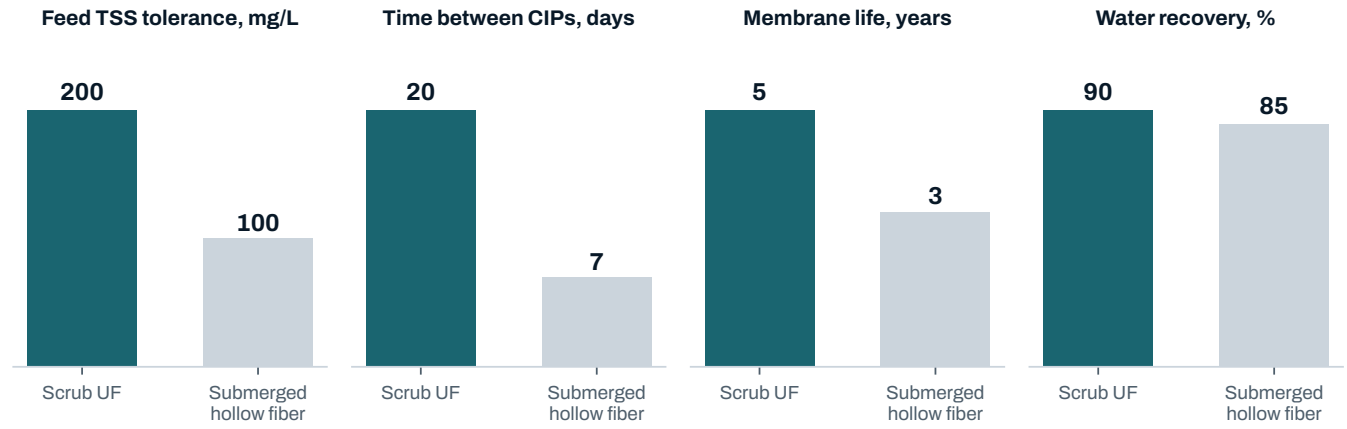
TEST BASIS AND HOW TO READ IT

Item	Value	Note
Feed	Micro-polluted river water	One test site
Observed flux	About 24–29 GFD (40–50 LMH)	Clean surface water; not a design value
Observed TMP	About 1.1–2.3 psi (7–16 kPa)	Rises during a run, recovers after drain
Zyramic design flux	9–12 GFD (15–20 LMH); peak 15 GFD (25 LMH)	Basis for proposals
Higher flux	May run higher on clean water	Confirm by pilot before design

Three ways to do UF.

Pressurized UF, submerged hollow fiber and submerged flat sheet all reach UF-grade water. They differ in how much pretreatment they need, how they are cleaned and what they cost to run. The table summarizes one engineering design study for about 264,000 gpd (1,000 m^3/d) of pretreated low-solids industrial water.

ONE DESIGN STUDY: 264,000 GPD (1,000 M^3/D), PRETREATED INDUSTRIAL WATER			
Item	**Scrub UF (submerged flat sheet)**	**Submerged hollow fiber**	**Pressurized UF**
Filtration	Submerged, suction	Submerged, suction	Pressure
Pretreatment	Fine screen	Fine screen	Coagulation, flocculation, sand filter and screen
Design flux in the study	About 33 GFD (56 LMH)	About 24 GFD (40 LMH)	About 31 GFD (53 LMH)
Membrane area	About 8,600 ft^2 (800 m^2)	About 12,400 ft^2 (1,150 m^2)	About 9,150 ft^2 (850 m^2)
Backwash	None	Yes	Yes, with a dedicated pump
Chemical clean	About every 1–2 months	Daily maintenance clean plus monthly CIP	About every 7 days
Specific energy	About 0.5 kWh/kgal (0.13 kWh/m^3)	About 0.6 kWh/kgal (0.15 kWh/m^3)	About 1.4 kWh/kgal (0.36 kWh/m^3)
Coagulant and sludge	None needed in the study	Per process design	Coagulant required; chemical sludge
Membrane life	5+ years	3+ years	3+ years



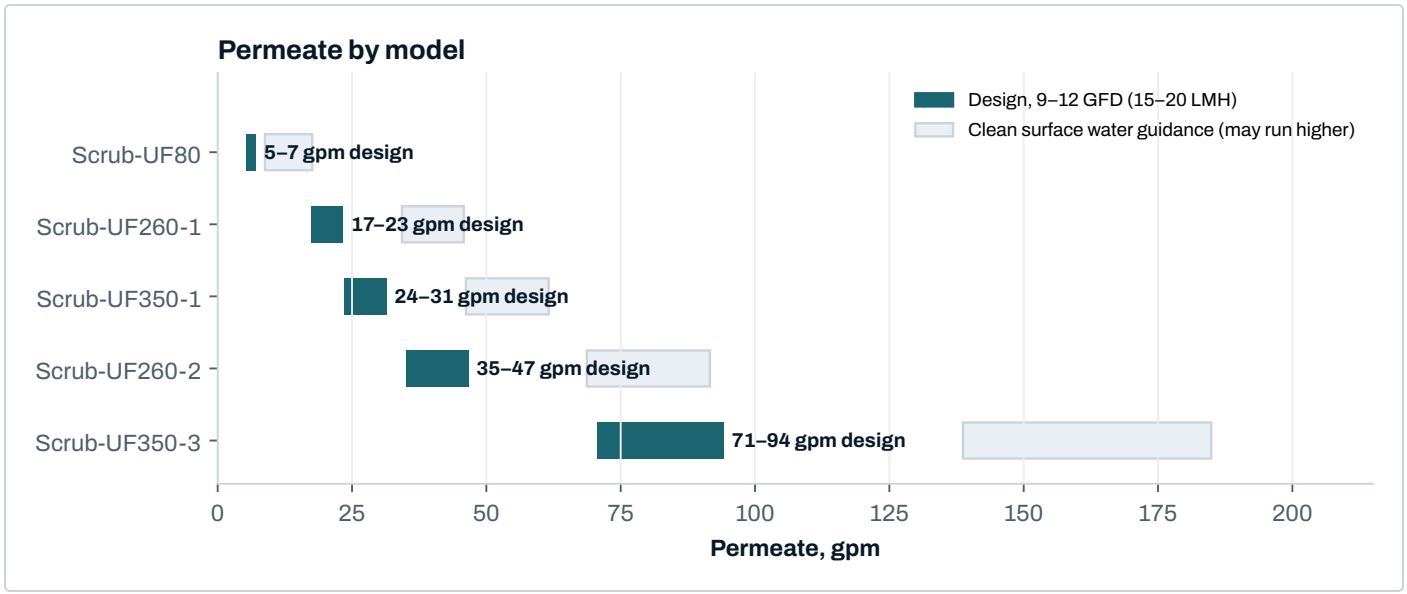
Typical reference values from published test data, redrawn by Zyramic. Feed-dependent; confirm by pilot.

Study figures apply to that feed and design. Zyramic proposals use 9–12 GFD (15–20 LMH) unless pilot data supports more. Hollow fiber can be the better choice on some very difficult feeds, so we size each job on its own water.

Packaged units, 861 to 11,300 ft².

SCRUB UF PACKAGED UNITS · 0.14 IN (3.5 MM) SHEET FAMILY				
Model	**Membrane area**	**L × W × H**	**Design permeate at 9–12 GFD (15–20 LMH)**	**Clean surface water guidance***
Scrub-UF80	861 ft² (80 m²)	3'-3" × 3'-3" × 5'-11" (1,000 × 1,000 × 1,800 mm)	5–7 gpm 7,800–10,300 gpd (29–38 m³/d)	9–18 gpm (2–4 m³/h)
Scrub-UF260-1	2,800 ft² (260 m²)	3'-11" × 7'-3" × 7'-5" (1,200 × 2,200 × 2,250 mm)	17–23 gpm 25,200–33,600 gpd (94–125 m³/d)	34–46 gpm (7.8–10.4 m³/h)
Scrub-UF350-1	3,770 ft² (350 m²)	3'-11" × 7'-3" × 8'-4" (1,200 × 2,200 × 2,530 mm)	24–31 gpm 33,900–45,200 gpd (126–168 m³/d)	46–62 gpm (10.5–14 m³/h)
Scrub-UF260-2	5,600 ft² (520 m²)	7'-7" × 7'-3" × 7'-5" (2,300 × 2,200 × 2,250 mm)	35–47 gpm 50,400–67,200 gpd (187–250 m³/d)	69–92 gpm (15.6–20.8 m³/h)
Scrub-UF350-3	11,300 ft² (1,050 m²)	11'-0" × 7'-3" × 8'-4" (3,350 × 2,200 × 2,530 mm)	71–94 gpm 101,700–135,600 gpd (378–504 m³/d)	139–185 gpm (31.5–42 m³/h)

*Published surface-water bands; flux may run higher on clean water and is confirmed by pilot or reference data. Wastewater and reuse duty is designed at 9–12 GFD (15–20 LMH), peak 15 GFD (25 LMH). A 0.16 in (4.0 mm) family is also available as Scrub-UF210 and Scrub-UF280. Certified dimensions come with the quotation and submittal.



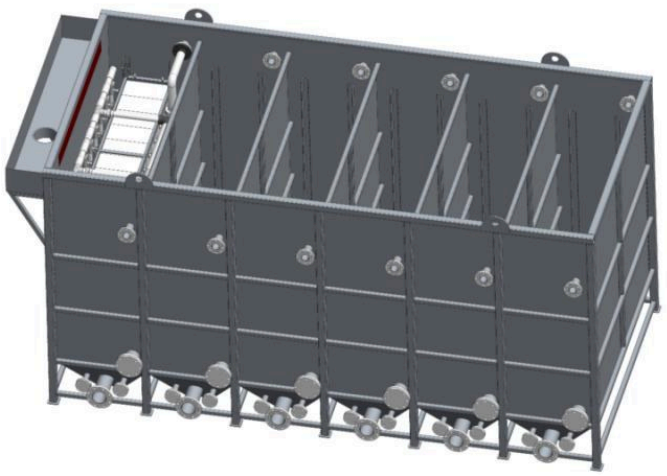


Packaged unit family, small to large (renders).

PILOT AND TRIAL	
Item	**Detail**
Trial unit	Scrub-UF80, 861 ft² (80 m²)
Pilot output	About 5–7 gpm at design flux
Pilot goal	Confirm flux, cleaning interval and permeate quality on your water

Design basis and operating envelope.

DESIGN AND OPERATING GUIDANCE		
Item	**Guidance**	**Note**
Design flux, wastewater and reuse	9–12 GFD (15–20 LMH)	Same basis across Zyramic products
Peak flux	15 GFD (25 LMH)	Short peaks only
Clean surface water	May run higher, about 24–29 GFD (40–50 LMH) seen in testing	Confirm by pilot
Feed suspended solids	Reference tolerance up to about 200 mg/L	Feed-dependent; pilot recommended
Feed pH	About 6–9 (design study basis)	Wider ranges by review
Operating TMP	About 1–2.5 psi (7–17 kPa) typical	Low-pressure suction
Pretreatment	Fine screen, typically 0.04–0.08 in (1–2 mm)	More if oils, grit or fibers are present
Cleaning	Media scrubbing online; periodic drain; CIP soak	No backwash
Tank material	Stainless steel or polyethylene	Per project
Controls	Automated PLC; remote monitoring available	Scope per proposal



Multi-cell tank concept for larger plants (render).

Larger plants

For larger flows, cells in one tank can be isolated one at a time for cleaning or drain while the others keep producing. Ask us about configuration, shipping limits and site layout.

WHAT SETS THE SIZE	
Input	**Why**
Daily flow and peak	Sets membrane area
Feed TSS, turbidity, temperature	Sets design flux
Permeate target	RO feed, reuse or drinking water
Site and shipping limits	Packaged units or multi-cell tank

Surface, spring and groundwater.

Surface water or groundwater → Fine screen → **Scrub UF** → Disinfection → Potable water

Scrub UF can replace a flocculation, sedimentation and sand-filtration train for producing clean water from surface or groundwater. It provides a physical barrier with good microbial removal, handles high-turbidity raw water, uses fewer chemicals and has a small process footprint. Compared with submerged hollow fiber, the reference data show higher flux, longer life, less frequent CIP and better tolerance of turbid feed. Treatment for potable use must meet the applicable state and federal requirements; certification needs are reviewed per project.



Small packaged unit on mountain spring water.

REFERENCE CASE: VILLAGE SPRING WATER

Item	Result
Capacity	About 26,000 gpd (100 m^3/d)
Source	Surface mountain spring water
Raw turbidity	11–40 NTU
Permeate turbidity	Below 0.3 NTU
Use	Daily household water after disinfection

One reference case. Results on other sources will differ.

SCRUB UF VS A CONVENTIONAL TRAIN

Item	Scrub UF	Conventional
Process steps	Screen, UF, disinfection	Coagulation, flocculation, settling, sand filter, disinfection
Coagulant	Often none	Required, dose tracks raw water
Turbidity swings	Tolerated by the barrier	Need dose re-tuning
Sludge	Less, without coagulant chemicals	Chemical sludge

RO pretreatment with a short process.

SCRUB UF PROCESS

Feed water → Fine screen → **Scrub UF** → RO

CONVENTIONAL PRESSURIZED UF PROCESS

Feed water → Flocculation → Clarification → Sand filter → Fine filter → **Pressurized UF** → RO

Conventional pretreatment doses coagulant and polymer ahead of the UF. As raw-water quality swings, dose often rises, adding chloride or sulfate that concentrates in reuse loops and can load the UF, NF and RO stages. The chemical sludge it produces can also be costly to dispose of. Scrub UF can often pretreat RO feed without a coagulant, which shortens the train and cuts the sludge.

REFERENCE CASE: STORM WATER TO RO

Item	Scrub UF	Pressurized UF train
Pretreatment ahead of UF	Fine screen	Flocculation, clarification, sand filter, activated carbon, fine screen
Raw water suspended solids	15–100 mg/L	15–100 mg/L
UF filtrate suspended solids	Below 5 mg/L	Below 5 mg/L
Chemical cleaning interval	About 20 days	About 7 days
Solid waste	About 2.8 US tons/month (2.5 t)	About 8.3 US tons/month (7.5 t)

One reference case on storm water. Results on other feeds will differ.

TYPICAL RO FEED TARGETS

Parameter	Scrub UF permeate
SDI	Typically below 4
Turbidity	Typically below 0.1–1 NTU
Coagulant carry-over	None where no coagulant is dosed

Industrial process water and reuse.

Scrub UF suits reclaimed water, industrial process water and near-zero-discharge schemes: high recovery, simple pretreatment, low energy and a compact process. One common example is textile wash water.

Wastewater collection tank → **Scrub UF** → **Decolorizing or desalting, if required** → **Plant reuse**

REUSE AND POLISHING TRAINS	
Goal	**Example train**
Textile wash water	Collection → Scrub UF → color or salt polishing if required → reuse
Municipal or industrial supply	Final clarifier → Scrub UF → NF or RO → reuse water
Lower TSS and phosphorus	Final clarifier → coagulant dose → Scrub UF
Lower TSS and COD	Final clarifier → Scrub UF → ozone or catalytic oxidation
Lower COD and total nitrogen	Final clarifier → denitrification filter → Scrub UF → advanced oxidation



Industrial installation with walkway and headers.

Color: UF removes particulate and colloidal color but not all dissolved color. Where the color limit is tight, plan a polishing step after UF, such as ozone, GAC or NF.

DISCHARGE UPGRADE	
Item	**Typical result**
Effluent TSS	Typically below 10 mg/L after UF
Fit	Polishes secondary effluent; pairs with phosphorus, COD and nitrogen steps above

Send us your water. We will size it.

WHAT TO SEND FOR SIZING	
Item	**Detail**
Flow	Average and peak, gpd or gpm
Source and duty	Surface water, RO pretreatment, reuse or discharge upgrade
Feed quality	TSS, turbidity, temperature range, pH, oil and grease, color, COD
Permeate target	RO feed (SDI), reuse spec, discharge permit or potable requirements
Site	Indoor or outdoor, footprint, access and shipping limits
Project needs	Domestic-content, BABA or other documentation requirements

HOW WE WORK	
Step	**What happens**
1. Review	We review your data and recommend packaged units or a multi-cell tank
2. Pilot	Scrub-UF80 trial unit where the feed needs confirming
3. Proposal	Design flux, cleaning plan, layout and permeate quality for your feed
4. Supply	Local manufacturing capabilities in Poughkeepsie, NY
5. Support	O&M manual, CIP recipe, spare sheets and media

ZYRAMIC

Zyramic, Inc.
14 Tucker Dr, Suite 4, Poughkeepsie, NY 12603
845-402-6318 · tom@zyramic.com · zyramic.com

Typical values in this catalog come from reference installations, test data and design studies and are not guarantees. Flux and capacity are Zyramic design guidance; your proposal sets the design point for your feed. Specifications may change as the line improves. Local manufacturing capabilities in Poughkeepsie, NY. Domestic content: tell us your requirements and we will review what we can document.