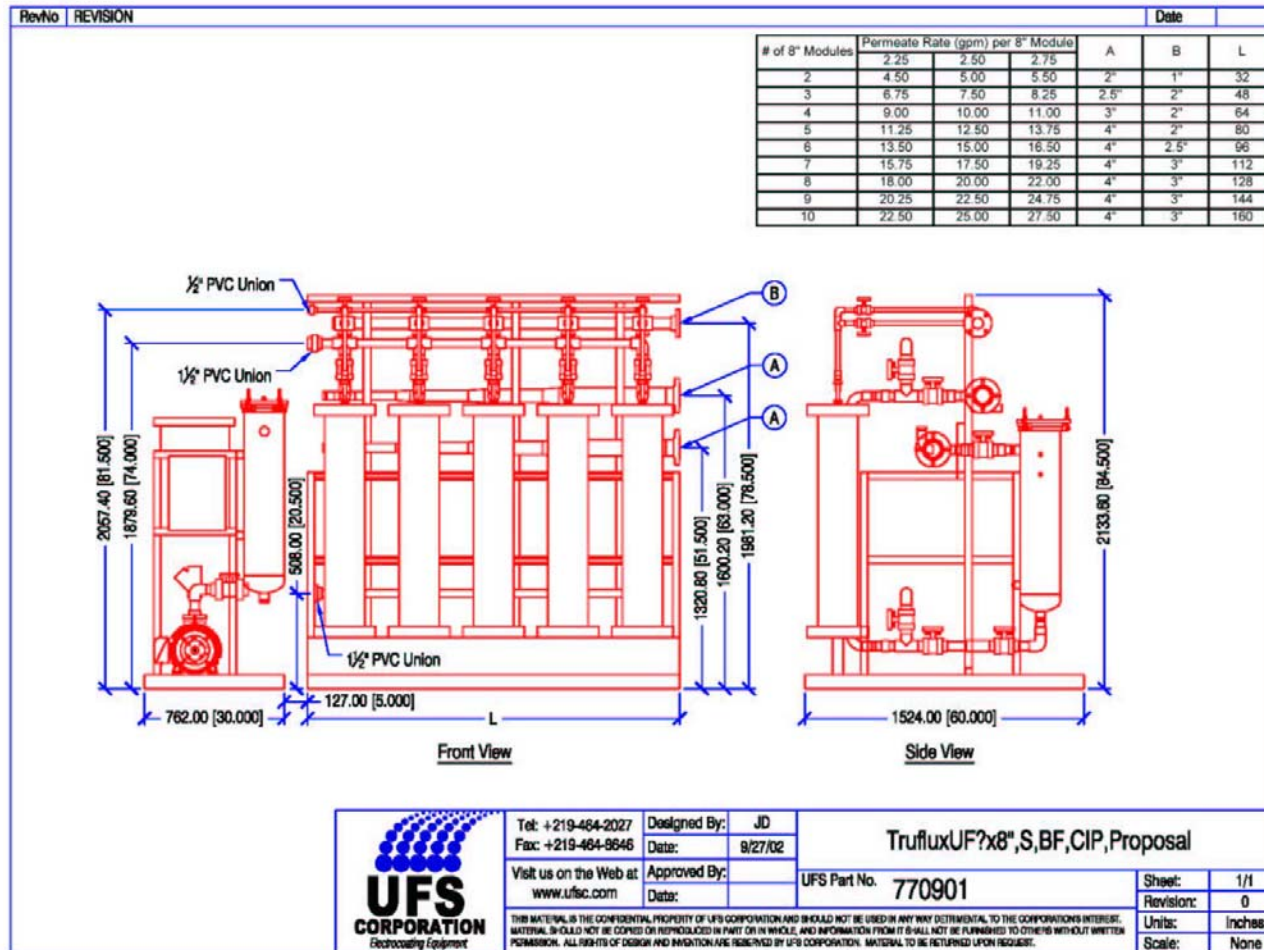


TruFlux UF Training



Single Sided TruFlux UF Machine



Tel: +219-464-2027	Designed By: JD	TrufluxUF?x8",S,BF,CIP,Proposal	Sheet:	1/1
Fax: +219-464-9646	Date: 9/27/02		Revision:	0
Visit us on the Web at www.ufsc.com	Approved By:	UFS Part No. 770901	Units:	Inches
	Date:		Scale:	None

THIS MATERIAL IS THE CONFIDENTIAL PROPERTY OF UFS CORPORATION AND SHOULD NOT BE USED IN ANY WAY DETRIMENTAL TO THE CORPORATION'S INTEREST. MATERIAL SHOULD NOT BE COPIED OR REPRODUCED IN PART OR IN WHOLE, AND INFORMATION FROM IT SHALL NOT BE FURNISHED TO OTHERS WITHOUT WRITTEN PERMISSION. ALL RIGHTS OF DESIGN AND INVENTION ARE RESERVED BY UFS CORPORATION. MATERIAL TO BE RETURNED UPON REQUEST.

Close-up of UF



Function of Ultrafiltration

- A process for separating high molecular weight materials or fine solids by filtration through a membrane.
- For E-Coat: Separates the paint into:
 - Permeate: Used for rinsing
 - Feed: Passed back into paint tank

Keys to UF Success

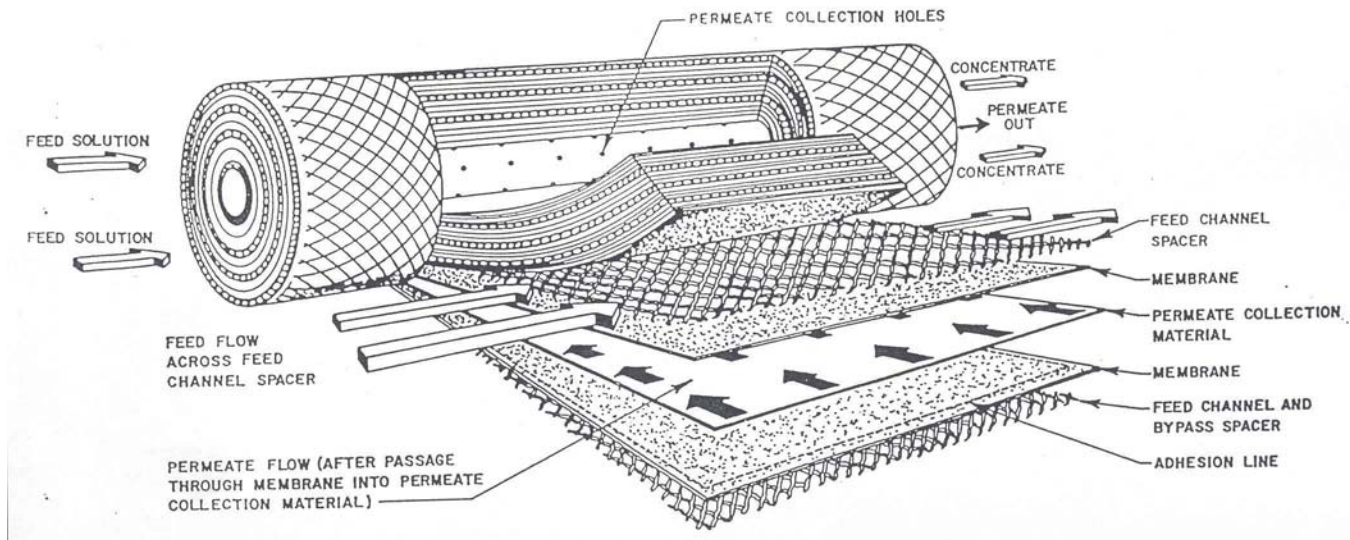
- Paint Flow
- Inlet/Outlet Pressure
- Temperature
- pH
- % Solids
- Pre-filtration

Glossary of UF Terms

- Key Components: UF Housing, UF Element, Pait Manifolds, Permeate Manifolds, CIP (tank, pump, cooling and valves), Bag filters
- Key Terms: cross flow, molecular weight cut-off,

Spiral Element Construction

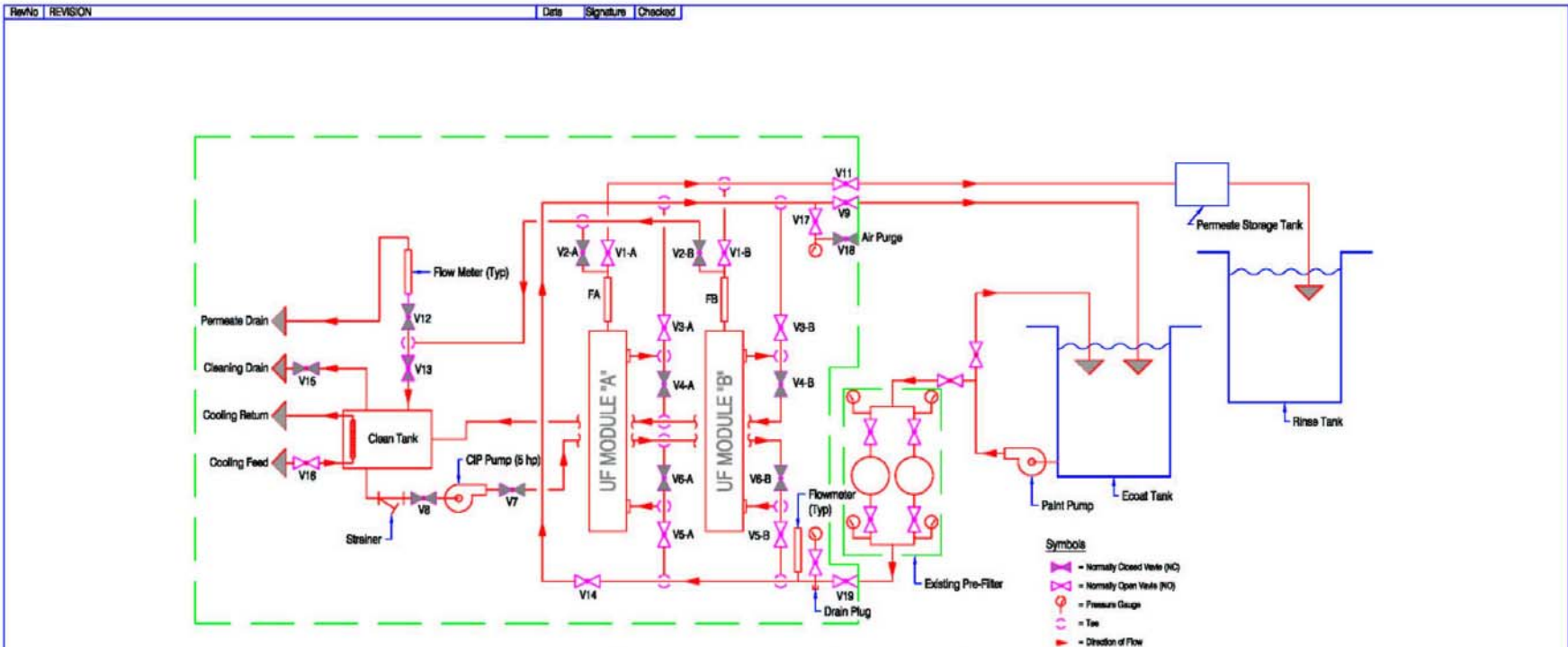
ANATOMY OF A SPIRAL WOUND FILTRATION ELEMENT



UF Membrane

- Look at sample
- Carrier layer
- Cast UF polymer layer on one side that has ‘shiny’ appearance
- ED paint is always on the polymer side
- Permeate on carrier side

UF Flow Schematic Single Pass



Flow Schematic and Valve Locations

Design Data:

- Maintain 8-12 ft/sec Paint Flow.
- All calculations used water as the fluid.
- No Paint "Dead Legs" Piping Segments.
- Use PVC Schedule 80 Piping and Fittings.
- Avoid Excessive Pressure Drop.
- Follow PPG ED Guide Specifications.

When designing the Paint supply and return manifolds we must maintain 8-12 ft/sec so that no collections of solids occur. The Paint Supply & Return could be designed 2 ways:
 Using a 3" Main with 280 gpm would have 7.33 psi loss ft per 100 ft of pipe and a Velocity of 12.16 ft/sec.
 Using a 4" Main with 280 gpm would have 1.85 friction loss ft per 100 ft of pipe and a Velocity of 7.06 ft/sec.

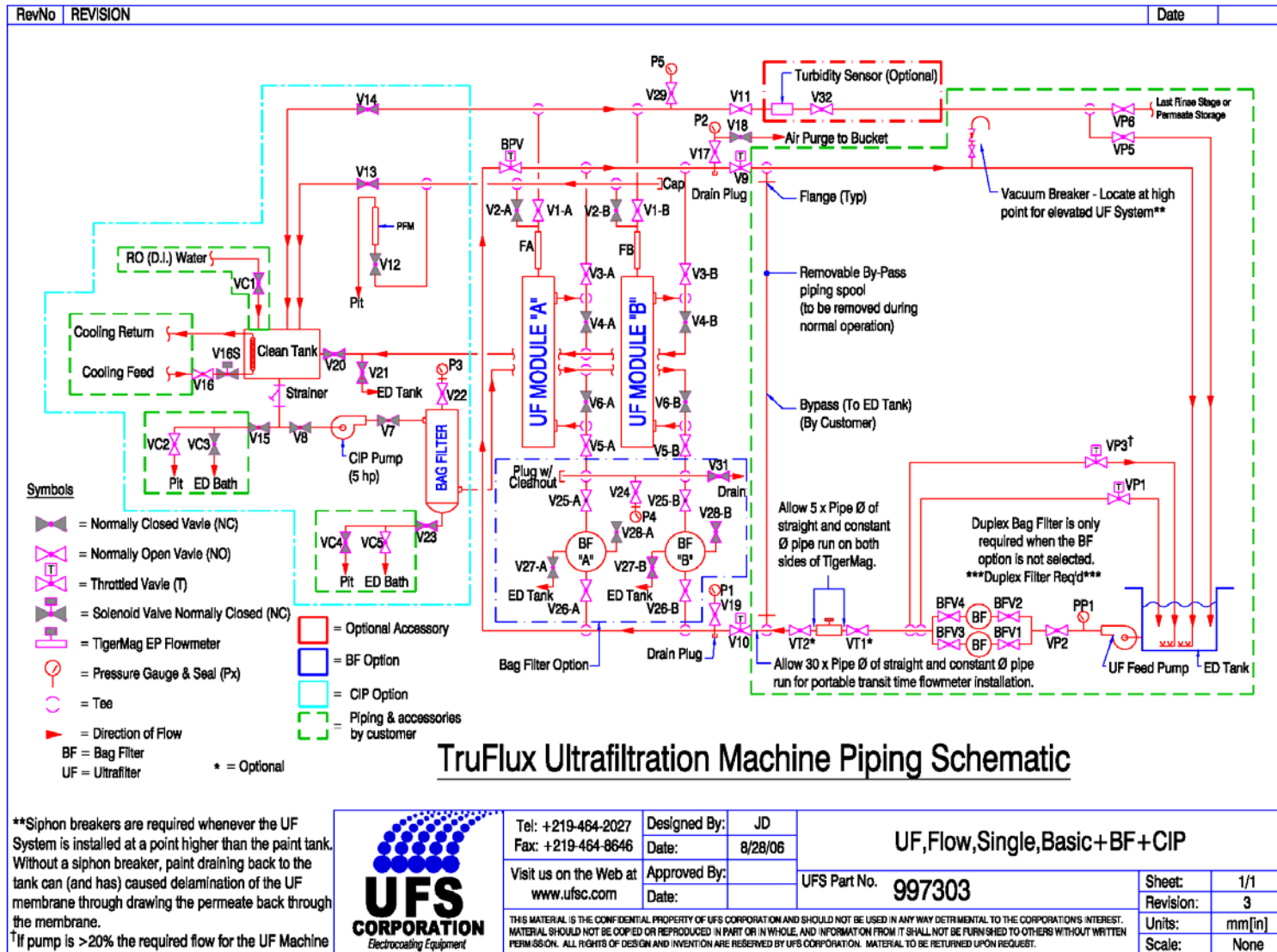
P:\G\996054.dwg, 02/28/02 12:23:07 PM

	Tel: +219-464-2027	Designed By: JD	General Arrangement TruFlux UF System Viasystems Oak Creek, Wisconsin	Sheet: 1/1 Revision: 0 Units: mm Scale: None
	Fax: +219-464-8646	Date: 2/28/02		
Visit us on the Web at www.ufsc.com	Approved By: KB	Date: 2/28/02		

THIS MATERIAL IS THE CONFIDENTIAL PROPERTY OF UFS CORPORATION AND SHOULD NOT BE USED IN ANY WAY OUTSIDE OF THE CORPORATION'S BUSINESS. MATERIAL SHOULD NOT BE COPIED OR REPRODUCED IN PART OR IN WHOLE AND INFORMATION FROM IT SHALL NOT BE FURNISHED TO OTHERS WITHOUT WRITTEN PERMISSION. ALL RIGHTS OF DESIGN AND INVENTION ARE RESERVED BY UFS CORPORATION. MATERIAL TO BE RETURNED UPON REQUEST.

XXXXXX = Part Number

UF Flow Schematic – Basic + BF + CIP



UF Valve Tags Strategy

Valve Tags have a designated shape & color

Normally Closed Valves – Red Hexagon

Normal Open Valves – Green Round

Throttled Valve – White Square

Pre-Filtration

- Use 10 or 25 micron bags, 50 micron max
- Use only glazed or heat treated bag so no fibers can come off and block the flow channels of the spiral UF Element
- Limit the flow of paint to 105 gpm max per #2 bag filter vessel, reduce flow rate when changing out bags.
- Use at least one #2 vessel for each 8” UF Element so you are always using a ‘duplex’ strategy where flow is never stopped to the UF Elements.
- Use bag filters that feature a plastic lip that insure no paint is allowed to bypass the filter and not be filtered before going to the UF element.

Magnetic Paint Flow Meter

- This only required 3 x pipe diameters upstream and downstream of straight and level pipe.
- Offers at a glance what the paint flow is.
- Confirms proper paint flow to the UF elements. Low paint flow is a major cause for low permeate production.
- Use the output of the flow meter to act as an input for a VFD to automatically adjust the pump rpm to get the proper flow rate.

Starting and Stopping Paint Flow

- Starting - If there is no ED paint flow
 - Open permeate before other valves
 - Open outlet valve (always have a place for paint to go to)
 - Slowly Open inlet valve last
- Stopping - If there is ED paint flow
 - Close inlet first in a quick smooth turn
 - Quickly close outlet in the same fashion
 - Close permeate valve last (never any back pressure)

Bringing a UF Element On line

- Other UF Elements are operating
- Open permeate valve(s)
- Crack open ED paint outlet first
- Slowly open ED inlet and outlet at same time

New UF Element Start Up

- Use buffered DI or RO water
- Set up Element for CIP operation
- Slowly open CIP and flush for 5 minutes
- Repeat steps & flush again a second time
- Close CIP and slowly bring on line

Do Not back pressure permeate

- Always maintain a path for permeate to LEAVE the UF Element.
- Back pressure the membrane envelope may cause damage to polymer coating allowing paint solids to pass into permeate.

Getting Started with Maintenance

- Flow, Velocity & Inlet Pressure
 - Use a paint flow meter to verify proper flow
 - Paint flow velocity of 8 - 12 ft./second – when faced with a decision between pipe sizes, opt for the higher velocity
 - Maintain paint flow rate of 70gpm +10%/-5% per 8” module
 - Maintain outlet pressure of 10 -15 psi minimum
 - Typical delta P across UF Element is 25 – 30 + psi
- Establish Baseline at Startup
 - Record permeate flux rate once all elements have been in operation for at least 4-6 hrs.
- Set-up routine maintenance procedures
- ALWAYS use the Operator Checklist, even if for the 100th time

Routine Maintenance

- Prefilter bags
- Storage of UF Elements
- Daily checks
- Weekly checks
- Semi annual checks

Regular Preventive Maintenance

- Verify ED Paint Flow
- Verify Temperature Settings
- Inspect Equipment
 - Pumps, soft start ramp up time = 180 sec
 - CIP Strainer
 - Connections
 - Standby Generator

Regular Permeate Flushing

- UF Elements need to be flushed with permeate on a regular monthly basis
- Chemical cleaning can be attempted when flushing is no longer effective
- If Modules are allowed to decline with no regular flushing, chemical cleaning is generally not be effective

Chemical Cleaning UF Elements

- Paint fouling
- Iron fouling
- Pretreatment carry-over fouling
- Electrical power outage

UF Preventive Maintenance

- Daily
 - Check pressure drop across pre-filter vessels
 - Record individual flux rates
- Weekly
 - Flush one UF Module with permeate on Friday & hold in permeate till following Monday. Next Friday continue with a different Module. Each Module is flushed once per month.
 - Flush when permeate rate is 90% of Baseline
- As Required
 - Chemical clean as required any problem UF Modules when permeate rate is 80% of Baseline

Documentation

- Use electronic data sheets to record the important process variables for the UF machine including the daily permeate rate, paint flow, etc
- Take a picture of the inlet face of the UF element and look for items that may be blocking the flow of paint and adversely affecting the production of permeate.

Flushing vs Chemical Cleaning

- It is imperative that UF Modules be flushed with permeate on a regular and on-going basis.
- Once flushing is no longer effective, then chemical cleaning can be attempted.
- If the UF Elements are never flushed and are allowed to decline 20% or 30% from the baseline value, then it is unlikely that chemical cleaning will provide satisfactory results.

PM semi annual

- Verify proper ED paint flow is being delivered to the UF System by using an indirect ED paint flow meter.
- Verify the proper set points for the Low Temperature and High Temperature levels by testing with hot water and a thermometer.
- Lube the electric motor as required by standard practice.
- Clean out the CIP strainer as required.
- Check for loose connections and persistent drips.
- Clean the drip pan underneath the UF System.
- Inspect the UF Feed pump and related subsystems for proper operation.
- Test the Power backup standby generator that powers the UF ED paint pump(s).
- Check the permeate supply pump/motor(s) to the rinse stages and perform required maintenance.

Common FAQ's UF Membranes

- What can cause premature UF Membrane failure?
- How can it be delayed

Common FAQ's

Flow

- Why is a pressure drop important
- How can pressure drop fool you?
- Why is no flow bad?
- What is trans-flow separation
- What happens if power fails and the UF feed pump stops?

Common FAQ's

Cleaning

- Why is it important to flush UF Elements and soak the membrane in fresh permeate?
- What will happen if UF Elements do not get flushed on a regular basis?
- Should the flushing or cleaning flow be opposite to the flow of the ED paint?
- What cleaning chemicals should be used
- How often should cleaning be performed