

7: Troubleshooting

There are generally three categories of problems that can occur with UF membranes:

- Fouling (and obstruction) - the most common problem
- Paint in the permeate
- Physical damage or visible deterioration

These problems can appear slowly over time, with a sudden onset, or confusing variable up and down activity. Recognizing all of the circumstances involved with a problem occurrence helps to identify the cause(s). Good record keeping is a key to identifying the source of most of these problems. Startup problems are usually different in nature than those occurring later.

FOULING

Fouling with paint and/or bacteria accounts for 95% of all of the problems reported by UF customers. It is often (and wrongly) considered a membrane failure, but actually the fouling layer obstructs the passage of permeate through the membrane, resulting in decreased permeate output.

Fouling is a condition that can be avoided most of the time by proper operating procedures, proper system design, and maintenance of paint bath chemistry and UF system parameters. See Section 5.1 for more information on fouling.

Fouling can only be treated by chemical cleaning with the proper formulations, and even then cleaning is not always successful. Severe and untreated fouling can be irreversible in worst case situations.

OBSTRUCTION

Obstruction can occur in piping or at the inlet or outlet face of the membrane. Dried or hard settled paint is the most frequent, however, anything could cause such blockage. Physical removal and cleaning of this condition is required.

If the inlet face of a membrane is 'blinded' by debris, and the membrane is reversible, often the problem can be remedied by turning the membrane upside-down, and relocating the brine seal if applicable. As much of the debris should be physically removed prior to restarting.

PAINT IN THE PERMEATE

The normal boundary between the paint and the permeate streams is the membrane itself, and any number of O-rings on the Top Cap, Bottom Plug, or Interconnector. A failure of any of these items can result in paint in the permeate. Rare occurrences of out-of-round, or cracked permeate tubes in the membrane can also cause paint in the permeate.

O-rings are inexpensive and relatively easy to replace. In all cases of paint in the permeate, the O-rings should be replaced before replacing the more expensive membrane.

When the point of paint leakage is very small, the leak can often be controlled by throttling the permeate valve, to apply some back pressure to the leak site. Also the paint can produce a 'scab' which can temporarily plug the leak site. This can be permanent or can dissolve at the 1st chemical cleaning. If the leakage cannot be stopped by changing O-rings, then the membrane must be replaced. Contact SUN.

PHYSICAL DAMAGE OR VISIBLE DETERIORATION

Physical damage that has historically been seen would include some of the following examples:

- Flipped, torn, or wrinkled Brine Seals
- Crushed Hard Outer Wrap on the membrane
- Cracked, crumbled, or broken Plastic Seal Carriers
- Chemical attack to Seal Carriers or Hard Outer Wrap (dissolved, warped, etc)

8: Limited Warranty

RisingSun Membrane Inc. (SUN) conditionally guarantees its electrocoating UF membranes elements against failures from material and manufacturing defects, for a period of ninety days after the date of shipment. Excluded from warranty considerations are those elements subjected to the following:

1. Shipping or handling damage
2. Damage from misuse or neglect
3. Operating outside of specified limits of temperature, pressure, concentration, pH, or chemical compatability.
4. Operating without using SUN recommended procedures, including, without limitation, not following SUN cleaning procedures with recommended cleaning agents.
5. Use of unapproved materials in the system.
6. Acts of God
7. Normal wear and tear.
8. Fouling or obstruction of flow, by materials in the process stream

Any claim made by the Customer shall be made in writing to SUN within ninety days of the date that the Customer discovered, or should have discovered with the exercise of reasonable care such defect.

SUN reserves the right to have any failed membranes returned, freight prepaid, for evaluation and/or autopsy. Any membrane element must be returned for autopsy cleaned and properly packaged, with a CAR number on package (obtained from SUN), MSDS sheet on the material being processed, and detailed description of the defect. SUN may also request the required operating records and logs, to aid in determining the disposition of a warranty claim. Customer shall provide reasonable cooperation for the processing of any warranty claim, including the providing of operating logs and records. SUN's disposition of the warranty on any claim is final and non-negotiable.

Additional performance warranties, as stated in the sales order, are subject to the same exclusions and conditions stated above. Credit for performance warranty shortcomings may be awarded on a use-prorated basis.

SUN's liability to Customer is hereby expressly limited to to the repair or replacement of any membrane elements, equipment, or system components found to be defective in material and/or workmanship, or at SUN's election, to the repayment of, or credit for an amount equal to the purchase price for said membrane elements, equipment, or system components. Under no circumstances may SUN be held liable for consequential or indirect damages, including, but not limited to: loss of profits, down-time, or suits by a third party against SUN's customers or users.