Cathodic E-Coat Cleaning

Part I. Known Causes of E-Coat Flux Decline

1. Low paint flow through the UF membrane as indicated by low pressure drop.
2. Improper cleaning procedure. Verify cleaning chemicals, concentrations, temperatures, pressure drops and duration of cleaning. If P-3 is used be sure pH adjustment is performed prior to treatment.
3. The system is outside the range of paint parameter specifications. Verify that pH, temperature, total solids, and other paint parameters are within the specifications set by the paint manufacturer. Observe data over an extended period of time.
4. There are changes to the paint product. Even with product supplied by the same paint manufacturer, changes sometimes cause ultrafilter flux problems.
5. There is too large an opening for the UF prefilter. What is the micron rating of the bag filter(s) ahead of the UF? Are there any broken bags? Is there any bypass around the bags?
6. There is an increased rate of dirt generation as indicated by higher frequency of bag filter changes.
7. There are settled paint solids in the feed piping to the UF. This can be caused by low flow in the feed piping, dead legs, and inadequate agitation of the paint bath and/or weir.
8. Paint kick out due to decreased bath stability, increased pump shear, and/or highly restricted valves.
9. Air in paint (i.e., foam) caused by low level in weir, hole in pump discharge piping, or pump cavitations.
10. Fresh paint addition (e.g., paste and resin) near the suction of the UF feed pump. This can result in higher than normal paint solids entering the UF. We recommend that the paint be added away from the UF feed and preferably through the circulation piping which feeds the eductors.
11. Membrane plugging due to deadheading of system and dewatering of paint.
12. Over concentration of paint solids in the loop on feed & bleed systems. Check the temperature in the loop versus that in the tank. The maximum difference is 1° F / 1 ^{o}C approx. Have the plant check the solids level in the tank versus that in the recirculation loop. The design is a feed rate of at least 20 times the permeate rate which leads to a 5% concentration in the loop. If the paint in the tank is at 20% the loop will be 5% greater or 21%.
13. DI water and/or rinse water from pretreatment is too high pH. This can cause paint to coagulate and foul the membranes.
14. Drag in from pretreatment with too high a conductivity (e.g., > 50 micromhos) and/or too high a phosphate level. Be sure to check not only the drippings but also stagnant pockets of liquid from the part and carrier.
15. Too high a level of bacteria in the paint and rinses, which can cause paint to kick out and deposit on the membranes. Plate counts should be done routinely on the paint bath itself, the permeate rinses, and the DI water. A buildup of slime in the tanks or on the spray nozzles is typically an indication of bacteria.

Part II. Cathodic E-Coat Cleaning Procedure

Hollow Fiber, Spiral & Tubular Products on Cathodic Paint

Koch Membrane Systems, Inc. (KMS) recommends performing a chemical cleaning of the membranes when the permeate flux drops to 70% of the previous clean value.

1. Fill the cleaning tank with DI water and flush the water through the UF system back to the paint tank to recover the paint solids in the system.
2. Fill the tank again and flush once through to drain. Repeat several times to remove as much paint as possible.
3. Fill the cleaning tank with DI water at 105 ^{o} F/ 41 ^{o}C - 120° F / 49 ^{o}C.
4. Add 5-8 % KOCHKLEEN® 630 membrane cleaner to the tank to achieve the concentrations given.
5. Circulate this solution through the UF system at full flow. The pressure drop should be the same as experienced on paint. Circulate this solution for 2-4 hours or until the permeate flow no longer increases.
6. At the 2-4 hour point, or when the permeate flow rate no longer increases, add sufficient KOCHKLEEN ® Additive Z membrane cleaner to achieve a 0.5% solution by volume (0.5 gal. /1.9 liter per 100 gal/378.5 liters of water). Then, continue circulating the solution for 30-45 minutes at to 105°F / 41 ^{o}C to 120°F / 49 ^{o}C.
7. Shut the system down and drain the system and cleaning tank.
8. Refill the cleaning tank and flush the water once through the system to drain. Repeat this process several times.
9. The system should now be drained.
10. Pre-treat membrane with KOCHKLEEN® P-3 membrane cleaner: For each 500 gal / 1892.5 liters of holdup volume you need 1 gal / 3.785 liters of KOCHKLEEN® P-3 membrane cleaner. Dilute the KOCHKLEEN® P-3 membrane cleaner with DI water and adjust pH prior to adding it to the cleaning tank - (Pour 1 gal / 3.785 liters of KOCHKLEEN® P-3 membrane cleaner into a clean 5 gal / 18.9 liter pail and mix with 3 gals / 11.4 liters of DI water. Add enough acid, acetic or synthetic lactic, to adjust the pH to match that of the paint bath).
11. Add the prepared solution to the cleaning tank, which already is filled with DI water, and circulate it through the ultrafilter at a pressure drop that is 10% of the inlet pressure for a period of 30 minutes. For example, if the inlet pressure is 40 psi / 2.7 bar the pressure drop would need to be 4 psi / 0.27 bar so that the outlet pressure would be 36 psi / 2.4 bar etc. At the end of 30 minutes stop the system and drain the solution DO NOT FLUSH. Start back on paint.

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Koch Membrane Systems, Inc., www.kochmembrane.com
USA: 850 Main Street, Wilmington, MA 01887-3388, Telephone: 888-677-KOCH, Telephone: 978-694-7000, Fax: 978-657-5208
USA: 10054 Old Grove Road, San Diego, CA 92131, Telephone: 800-525-4369, Telephone: 858-695-3840, Fax 858-695-2176
UK: The Granary, Telegraph Street, Stafford, ST17 4AT, Telephone: +44-1785-272500, Fax: +44-1785-223149
AUSTRALIA: 45 Debussy Place, Mount Ormaney, Queensland 4074, Australia, Tel: +61-7-3279-0926, Fax: +61-7-3279-2767

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