Dave Weber

Manager Field Tech Service
Separations

Parker Hannifin Corporation
Process Advanced Filtration Division
2340 Eastman Avenue
Oxnard, California 93030 USA

UF Cleaning Procedures

1	Formulas For Cationic (Cathodic) Paints		
	Purpose	**Circ. Time**	**Formulation(% by vol*)**
CC-1	Normal paint fouling	1-2 hours 90 - 120°F	• 91.65% DI or RO Water • 3.0% Butyl Cellosolve • 5.0% Acetic Acid ** • 0.1% Citric Sol'n *** • 0.25% Triton X-100 ****
CC-2	Severe paint fouling	2-4 hours 90 - 120°F	• 93.4% DI or RO Water • 3.0% Butyl Cellosolve • 3.0% Formic Acid ** • 0.1% Citric Sol'n*** • 0.5% Triton X-100 ****

Proprietary	OK To Use *	Proprietary	Do Not Use
Gage	532 or 534	Gage	690 or 699
GM	UF Cleaner	Henkel	2225 or 2229
Henkel	2224	Koch	CPC-6
PPG	Chemkleen 39C or F	Synder	Power Flux
Prochem	EDP UF Cleaner	Yonar	Filter Cleaner 1

* % of ingredient at typical strength in total cleaner volume–see Table 12

** At recommended dilution only - pH not to be below 2.0

*** Citric Acid Solution - 50% by weight powdered Citric Acid in DI Water

**** Triton-X-100 is a product of Union Carbide

Note: Unless otherwise noted, cleaners are assumed to be 37-40% w/w active ingredients-If other products are used, formulas must be adjusted accordingly.

Acids for cathodic cleaning may be substituted - 2.5% Formic, or 2.5% Synthetic or Distilled Natural Lactic, 2.5% Phosphoric, or 5% Acetic

Chemicals not to be used: Inorganic acids, Ketone solvents, Ester Solvents, Chlorinated Solvents, Aromatic Solvents

Dave Weber

Manager Field Tech Service
Separations

Parker Hannifin Corporation
Process Advanced Filtration Division
2340 Eastman Avenue
Oxnard, California 93030 USA

UF Cleaning Procedures - Continued

2 Formulas For Anionic (Anodic) Paints (% by vol*)			
AC-1	Mild fouling or preventive maintenance	1-2 hours	• 99.8% UF Permeate • 0.2% Solubilizing Amine**
AC-2	Severe paint fouling	2-4 hours	• 89.7% UF Permeate • 10.0% Butyl Cellosolve • 0.3% Solubilizing Amine**

* % of ingredient at typical strength in total cleaner volume–see Table 12
** Amine to be specified by paint supplier - ph not to be above 10.5

3 Formulas For Special Conditions			
	Purpose	**Circ. Time**	**Formulation (% by vol)**
SPL-1*	For lead phosphate fouling in Cathodic Paints Only	30 min, Max.	• 0.5% Nitric Acid** • 99.5% DI or RO Water
SPL-2*	For iron fouling in Cathodic Paints Only	30 min, Max.	• 96.0% DI or RO Water • 4.0% Citric Sol'n ***
SPL-3*	For Bacterial / Biotic Fouling	1 - 2 hours	• 99.9% DI or RO Water • 0.1% Chlorox 5.25% • Adj. pH to 10-10.5 with Caustic Soda
SPL-4*	For Bacterial / Biotic Fouling	1 - 2 hours	• 99.95% DI or RO Water • 0.05% Hydrogen Peroxide - 37%

* All Special Cleaning must be preceded by a cleaning to remove paint fouling

** At recommended dilution only - pH not to be below 2.0

*** Citric Acid Solution - 50% by weight powdered Citric Acid in DI Water

Chemicals not to be used: Inorganic acids, Ketone solvents, Ester Solvents, Chlorinated Solvents, Aromatic Solvents

Dave Weber

Manager Field Tech Service
Separations

Parker Hannifin Corporation
Process Advanced Filtration Division
2340 Eastman Avenue
Oxnard, California 93030 USA

4 Recommended Cleaning Procedure

1. Fill cleaning tank with permeate or RO or DI water.

2. Close the following valves of the housings or stage to be cleaned, in this order:

   Paint Feed Isolation Valve
   Paint Return Isolation Valve
   Permeate to RinseRoute Valve

5 Drain and Purge

1. Open the following valves and drain the paint from the system:

   Permeate to CIP Valve
   Permeate to CIP Tank Valve
   CIP Feed Isolation Valve
   CIP Return Isolation Valve
   Paint Purge / CIP to Drain valve

2. Start the cleaning pump and **slowly** open discharge valve. Watch the cleaning tank level.

3. Stop the cleaning pump when the cleaning tank level is about 2 to 3 inches from bottom.

4. Close CIP to drain and pump discharge valves.

6 DI or RO Water Rinse

1. Open the following valves:

   Permeate to CIP Valve
   Permeate to CIP Tank Valve
   CIP Feed Isolation Valve
   CIP Return Isolation Valve
   CIP Tank Isolation Valve

2. Open DI or RO Water Supply Valve, and fill cleaning tank with water

Dave Weber

Manager Field Tech Service
Separations

Parker Hannifin Corporation
Process Advanced Filtration Division
2340 Eastman Avenue
Oxnard, California 93030 USA

3. Start the cleaning pump and **slowly** open the CIP Pump Discharge Valve. Circulate the flush water through the elements and back to the cleaning tank for 5 minutes. Dump and repeat if necessary with clean DI or RO water or until the water is clear returning to the cleaning tank.

4. An alternative way to flush paint from the elements is to follow step 1 above, providing your system has the appropriate valves and piping. Open the Paint Purge / CIP to Drain Valve. Slowly open the DI or RO water Flush Valve, and flush the elements to drain until the flush water is clear. You must be able to see the flush water in order to follow this alternative procedure.

7 Cleaning

1. Prepare the CIP tank for cleaning by adding the recommended cleaners to the tank as outlined in charts above while re- circulating and heating within the tank Circulate into the elements with the tempered (110-120F) cleaning solution for the prescribed time outlined in the cleaning formula table, with the pressure profile at 25 PSI In, and 0 PSI Out (Return valve open).

2. At the end of the cleaning time, slowly close the CIP Pump Discharge Valve and stop the cleaning pump.

8 Drain and Refill Tank

1. Open the CIP Tank Drain Valve, and the CIP Drain Valve, to drain the cleaning tank and elements. Close valves when the cleaning tank is empty. Open the DI or RO Water Supply Valve to fill cleaning tank.

9 Circulation DI or RO Rinse and Drain

1. With cleaning tank full, start the cleaning pump and **slowly** open pump discharge valve. Circulate the DI or RO Water for 15 minutes. Slowly close pump discharge valve and stop the pump. Open the CIP tank and drain valves and drain the elements and CIP tank.
2. Most paint baths are very sensitive to pH and as such, the final rinse should be adjusted in pH to match the bath, using an appropriate acid. **Failure to do so may result in paint fallout and heavy fouling on start up.**

Dave Weber

Manager Field Tech Service
Separations

Parker Hannifin Corporation
Process Advanced Filtration Division
2340 Eastman Avenue
Oxnard, California 93030 USA

10 Cleaning Complete

1. Close the following valves:

   CIP Tank Drain
   CIP Drain Valve
   CIP Return Isolation Valve
   CIP Feed Isolation Valve

11 Return to Paint

1. To go back on paint, **slowly** open the following valves, in the order outlined below:

   Paint Return Isolation Valve
   Paint Feed Isolation Valve

2: After the element has been on paint for 10-15 minutes, **slowly** open the Permeate to Rinse Valve, while **slowly** closing the Permeate to CIP Valve. Check and record the permeate flux rates after the element has been on-line for an hour.

Table 12	Volume Equivalence Chart (% vol/ Gal)	
500gal	.1%	½ Gal
	.25%	1.25 Gal
	.5%	2.5 Gal
	3%	15 Gal
	5%	25 Gal
1000 gal	.1%	1 Gal
	.25%	2.5 Gal
	.5%	5 Gal
	3%	30 Gal
	5%	50Gal

Note: When considering internal volume, be certain to also sum the volume from piping and housing hold up in addition to Cleaning tank IE: 8” pipe is 2.6 gal/ft and 8” housings contain ~ 9 gal each.