



HOW TO PICK CARTRIDGE OR CLEANABLE SLEEVE PLATING FILTRATION SYSTEMS

Select materials of construction for compatibility with operating temperature, pressure and the liquid to be in contact with the equipment. Non-metallic solution contact is desirable for most corrosive liquids. Polypropylene is widely used but it has a lower temperature tolerance than CPVC, which is suitable for higher temperatures and most plating solutions. PVDF exhibits the greatest temperature tolerance of the engineered plastics commonly used in plating applications. It also provides a broad range of chemical compatibility and can be used in its pure form. Ethylene propylene "O" rings are standard on most equipment, with Viton® offered on systems processing oxidizing and other solutions where EPDM is inappropriate.

Systems may be selected with seal-less magnetic-coupled pumps which provide protection from vapor and liquid leaks, vertical centrifugal pumps, or single or double mechanical seal pumps. Systems with mechanical seal pumps may be used whenever excessive abrasives or iron particles are present. Double mechanical seals are recommended for high temperature, electroless plating solutions and other solutions which easily precipitate crystalline solids. Pumps are available in a variety of engineering grade plastic materials, beyond those previously mentioned — PVC, glass reinforced polypropylene, Noryl® and Rytoc® , as well as in steel and stainless steel and other "exotic" metals.

Chambers may be constructed of the same materials as the pumps. For alkaline solutions, such as cleaner baths, especially those operating at temperatures of 160°F or higher, cast iron, steel or stainless steel pumps and filter chambers should be used.

Chamber Sizing / Oversizing

Select a filter chamber for its solids holding capacity. The size and amount of dirt in the plating or other solution will determine the number of cartridges or surface area necessary, with one 10" (25 cm) cartridge, or 2/3 sq. ft. of surface for each 50 gallons (200 liters) of solution used as a rule of thumb. The flow rate can range from 2 - 30 or more tank turnovers per hour, depending on the application and the clarity desired. Coarse media and high flows are desirable for high dirt load applications. Increasing the number of cartridges reduces solution flow per cartridge, improves efficiency and reduces cartridge consumption. Filter cartridge dirt holding capacity is increased if flow rate (velocity) through each cartridge is decreased. Therefore, reduced flow rate or velocity through the cartridge reduces the number of filter cartridges exhausted by a given dirt

load. Thus, when 2 cartridges per 50 gallons (200 L) are used, cartridge consumption is reduced by 29% and when 4 cartridges are used, cartridge consumption is reduced by 50%.

Oversizing by a factor of 4 doubles the dirt holding capacity per cartridge. Since the chamber holds 4x the number of cartridges, the filter is opened only 1/8 as often, reducing the labor by 87-1/2% for cartridge changing. Increasing the size of your filter chamber is particularly worthwhile since most filter chambers are offered in larger sizes at only a slight increase in cost. Oversizing also results in a savings in media change downtime and prevents solution loss.

A system should always have a flow control valve between the pump and the filter chamber. When the unit is turned off, the flow control valve should be closed to maintain pump prime during media change.

Chambers can be selected which will accept DOE depth wound, pleated, cleanable sleeve, carbon or optional 222 SOE cartridges. Systems may also be ordered which are fitted with cleanable bags, discs or permanent media. Some chambers allow simultaneous filtration and purification by using both carbon and filter cartridges. Separate purification chambers with a flow control valve are also available.

Determine whether carbon will be required and if so, what is the easiest form to use. Small tanks usually employ SERFILCO 3-in-1 carbon or CARBO-FYNE cartridges instead of standard depth type filter cartridges. Carbon cartridges, refillable canisters or bulk carbon may be employed in separate chambers for series or bypass flow. Larger tanks may employ granular carbon in easily refillable canisters in chambers downstream of the filter for series or bypass flow. Suitable media, such as cleanable sleeves or discs, can be precoated with filter aid or powdered carbon, as required.

ECONOMICS OF FILTER CHAMBER OVERSIZING

Oversizing Factor	Number of Cartridges in Chamber*	Dirt Holding Factors per Cartridge	Time Between Cartridge Change	Cartridge Consumption/ Cost Reduced by:	Labor Cost Downtime/ Solution Loss Reduced by:
1	C	D	T	0	0
2	2xC	1.4D	3T	29%	67%
3	3xC	1.7D	5T	42%	80%
4	4xC	2D	8T	50%	87½%

For example...

using a	instead of a	reduces cartridge consumption by
12 cartridge filter	9 cartridge filter	13%
9 "	6 "	18%
6 "	3 "	29%
9 "	3 "	42%
12 "	3 "	50%
15 "	3 "	55%

*Based on average sizing (i.e. 1 - 10" (25cm) cartridge per 50 gallons (200 L)

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Determine whether an in-tank or external unit will be most convenient to use with regard to mounting location and available space. If carbon treatment is required, the plater is limited on an in-tank unit to the use of carbon cartridges or carbon canisters.

When using out-of-tank pumps, we recommend seal-less magnetic coupled pumps, mechanical seal pumps or vertical centrifugal pumps.

On mechanical seal pumps, an external type seal is the most cost effective. A silica-free ceramic seal is preferred for use with solutions which contain fluorides. Specify the double seal assembly with continuous water flush where abrasives are present and to prevent the solution from crystallizing in the pump seal. Also use the double seal on electroless solutions, and any time you want the double protection which they afford for complete containment of the solution being pumped. Special metals are not required due to the fact that they are not in contact with the pumped liquid.

Unlike the horizontal centrifugal pumps of the magnetic-coupled and mechanical seal types listed above, vertical centrifugal pumps with a cantilevered shaft eliminate bearings and conventional pump seals so these pumps can run dry for a period of time without damage. In addition, vertical centrifugal pumps will self-prime when liquid is at impeller level. These pumps are suitable for in-tank as well as out-of-tank applications.

Review the list of optional equipment which is available with each system...

Motor starters provide safe starting on-the-spot on/off overload protection. A slurry tank provides for chemical addition, easy pump priming, and a convenient means for precoating. Flow control valves help maintain pump prime and control agitation. A suction pipe with strainer and siphon breaker is recommended to prevent solution loss during shutdown.

How to Select the Proper Filter Cartridge

To be assured of trouble-free filtering, cleaner solutions and better plating at lower cost, it is important that the proper filter cartridge be selected and installed in your filtration system. Follow these three steps to make the proper selections for the particular type of solution you are planning to filter.

1) Select a cartridge material that is compatible with the solution to be filtered.

2) Select a cartridge core material that is compatible with the solution to be filtered.

3) Select porosities which are compatible with the dirt load involved. Porosities vary from 1 micron for fine filtration to 100 micron for coarse filtration. (When selecting the porosity of depth type cartridges, bear in mind that the coarser the cartridge, the more dirt it will retain before replacement is necessary. The coarser the cartridges, the lower the pressure drop will be and the higher the flow rate will be from the filtration system's pump, making it possible to get the dirt into the filter quicker. This, in turn, often makes it possible to use even coarser cartridges to accomplish the same degree of clarity that was previously thought possible only with a dense cartridge.)

Cartridges of 50, 75 or 100 micron should be used during initial cleanup of a dirty tank where no filter-aid is to be used with the filter.

Cartridges of 15 and 30 micron are average porosity and most commonly used where continuous filtration will be employed. 30 micron cartridges would more likely be used on an alkaline solution and the 15 micron on an acid solution. Again, much depends on the dirt load encountered by the filter on a day-to-day basis. 15 micron cartridges may also be used as the support surface for any commercially available filter-aid. This cartridge, after precoating, may be manually washed and re-coated for reuse. In some cases, backwashing of the cartridge may be successful, depending upon the type of contaminant and ability of the filter-aid to retain it.

FILTER CARTRIDGE POROSITY		
Cartridge porosity	Micron	Winding No.
Extra Coarse	100	8R
Very Coarse	75	10R
Coarse	50	11R
Medium	30 (25)	13R
	20	15R
Fine	15	17R
Extra Fine	10	19R
	7	21R
	5	23R
Dense	3	27R
Medium Dense	2	—
Extra Dense	1	39R