

- Metal Finishing Series -BAG IN-TANK FILTRATION SYSTEMS

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This fact sheet, which discusses advantages and disadvantages of bag in-tank filtration, is one in the Metal Finishing series produced by the North Carolina Division of Pollution Prevention and Environmental Assistance (DPPEA). The series also includes <u>In-Tank Filtration Systems</u>, <u>Cartridge Filtration Systems</u>, <u>Disk Filtration Systems</u>, and <u>Identifing and Reducing</u> <u>Contamination in Metal Cleaning</u>, <u>Plating</u>, and <u>Rinsing Baths</u>. These fact sheets are designed to assist industry professionals and others interested in waste and cost reduction opportunities associated with fabricated metal operations. Please contact DPPEA for assistance or additional information.

Introduction

The in-tank open bag filter system consists of a pump connected to a permeable filter bag. The pump is attached to the edge of the tank, and the bag is immersed in the plating/cleaning solution. The solution is pumped into the bag contaminants are trapped by the filter media, and the cleaned solution flows back to the bath through the walls of the bag.

The use of in-tank bag filtration systems or open bag filtration systems is generally restricted to electroless nickel operations, some circuit board plating operations, high-solids cleaning solutions, and any other solutions with a high contaminant concentration that require rapid turnover. Once tank size or flow rates exceed 200 gallons or 9,600 gph, respectively, larger bag chamber systems that sit outside the tank are more suitable.

The following lists compare in-tank open bag systems to traditional filtration systems.

Advantages/Disadvantages of In-Tank Open Bag Filtration Systems Advantages

- ✓ Solution losses are minimized as all apparatus is contained within the tank.
- Easy removal and replacement of bag.
- Possibility that bag can be reused several times before disposal, which decreases filter media costs.¹ This advantage is limited to certain

types of solutions, which manufacturers can identify.

- ✓ Disposal costs may be lower than for some other types of media (e.g., cartridges) as spent bags occupy less volume.'
- ✓ Highly contaminated baths can be filtered without frequent clogging.
- ✓ Potential to combine carbon aids for organic treatment of specified baths.

Potential Disadvantages

- ✗ Larger tank space is required than for other in-tank filters as both pump and bag must be immersed in the solution.
- ★ A single-wall bag does not provide as large a filter surface per tank volume occupied as disk or other in-tank filter media.
- **✗** Bag filters may not remove contaminants as efficiently as other in-tank filter systems.

Comparisons of In-Tank Open Bag Filtration Systems

As is the case with any filtration system, it is important to consider the effective filtering or surface area provided. A useful way to compare systems is to calculate the cost per square foot of filtration surface provided $(cost/ft^2)$. The tables below incorporate these calculations. Table 1 shows the typical costs and filtration area provided by systems with different pump sizes.

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Pump Material	Flow rate, gph	Surface area, ft ²	Motor, hp	Pump Cost, \$
CPVC	1200	1	l/6	580
CPVC	1600	1.5	1/4	495
CPVC	2400	2	l/2	600
CPVC	7200	4	3/4	730

Table 1. Bag Filter Unit Cost Per Flow Rate²,³⁴,⁵

In-tank filter bags of different micron sizes and dimensions are available. Again, when a filter bag size is selected, it is important to consider the filtration rate and area required for the operations. Table 2 shows the range of bags available from four different vendors.

Table 9	Dag	Filton	Cost	Don	Filton	Specifications	2	3	4	5
Table 2.	Dag	гшег	COSL	Per	rnter,	Specifications	,			

Material	Size, microns	Diameter, in.	Length, in.	Surface area, ft ²	Flow rate, gph	cost, \$
Polypropy-	1,5,10,5,	5,7	16.5,20,	1, 1.5,	1,200 -	4.50 -
lene	50,100		30,33	2,4	9,600	13.30

The larger the surface area, the greater the dirt holding capacity. To evaluate the benefit of purchasing different bag filters or other in-tank filters, the cost per square foot of surface area must be determined Table 3 provides a cost-per-surface-area comparison for four different 25-micron bags of different dimensions, and Table 4 provides a list of in-tank filter vendors.

Table 3. Cost of 25-Micron Bag Filters Per Surface Area ² , ³ , ⁴ , ⁵					Table 4. Vendors of In-Tank Filters		
					Vendor	Telephone	
Diameter, in.	Length, in.	Surface p^2	Cost, \$	Cost/ft ²	Serfilco®, LTD	(800) 323-5431	
		alea, li			Flow King	(407) 331-4634	
5	20	1	5.75	5.74	Penguin Pump Industries	(818) 504-2391	
5	30	1.5	11.50	7.65			
7	16.5	2	5.75	2.87	Camac Industries	(201) 575-1831	
7	33	4	11.50	2.87			



The North Carolina Division of Pollution Prevention and Environmental Assistance provides free, non-regulatory technical assistance and training on methods to eliminate, reduce, or recycle wastes before they become pollutants or require disposal Telephone DPPEA at (919) 715-6500 or 800-763-0136 or e-mail nowaste@ovr.ehnr.state.nc.us for assistance with issues in this Fact Sheet or any of your waste reduction concerns.

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