

# How to Select a Bag Filter Housing

## Important design differences to consider

By: Chris Pasquali, CEO Factory Direct Pipeline Products, Inc.

There are many different styles of bag filter housings to choose from and this article will help you determine which is the best fit for your application.

Let's begin by providing an overview of the simplex bag filter designs we offer, listed by least expensive to most expensive. The complexity of the bag filter vessel design (directly related to their capabilities/features) influences cost the most.

### SIMPLEX DESIGNS

Simplex bag filter vessels require the flow rate to be interrupted or diverted to safely access the filter bag chamber(s).

#### ECOLINE

Used for "light duty" applications and rated for a maximum pressure of only 100 PSI, the Ecoline has a clamp style closure and is only available in 316SS material with FNPT threaded connections. It does have some notable features, such as an investment cast concave chamber cover which displaces some fluid so that when the chamber is opened the fluid level is below the edge of the vessel. We can modify the vessel to have differential pressure ports, but that is about as much "customization" this design offers. The Ecoline cannot be ASME code stamped and a separate internal spool, which transfers the downward pressure of the lid closure across the circumference of the filter bag, assists filter bag sealing. This type of sealing is characteristic of all our housing designs EXCEPT the Topline and therefore applications requiring high efficiency particle retention (greater than 65%) and especially for particle retention <50 microns, the Topline design should be utilized.



#### MINILINE

A version of the Ecoline above designed for smaller size filter bags (#3 and #4 sizes). Reserved for low flow rate applications when a compact size/footprint is desired, they are not much different in cost from the "full size" (#1 and #2 size) Ecoline and Flowline II bag filter housings.

#### Flowline II

This is an inexpensive version of the Flowline housing design, having some additional material options compared to the Ecoline (carbon steel, 304SS and 316SS), Flowline II vessels are rated to 150 PSI due to its swing bolt closure and are offered with flanged or threaded connections. Their body is hydro-formed, reducing the number of weld areas, promoting a smoother internal finish. While the manufacturing process reduces

the cost of the Flowline II, it also means that customizations such as adding differential pressure taps, surface polishing and non-standard connections are not available. As with the Ecoline, this entry-level housing is designed to use nominally rated filter bags where an ASME code stamp is not required.

#### FLOWLINE

This entry-level housing is used for industrial applications that require an ASME code stamp. Since the manufacturing technique involves additional welding, it is more expensive than the Flowline II but it also enables non-standard connection types, differential pressure taps and surface polishing.



#### SIDELINE

These filter bag housings can be customized more than the previously mentioned filter bag housings, to include features such as steam jacketing, side outlet location and they can be ASME UM or U stamped (CRN registration is also supported with this design). Features such as concave displacement cover and a hold down spool are standard and similar to the other designs mentioned above.

#### TOPLINE

Featuring a "goose neck" or "over-the-top" inlet design, the Topline style housing represents the best sealing capability of all bag filter designs. This is because a hold-down spool is not required to seal the filter bag to the vessel; rather the chamber cover directly interfaces with the bag sealing ring, forming a bypass-free seal. This direct seal with the filter bag is only possible with this inlet configuration as it enables the filter bag to be placed at the top rim of the vessel. The additional complexity of this design contributes to its higher cost, but for applications requiring efficient retention of particles smaller than 50 microns, it is the best design to use. This ASME code stamped vessel can be polished internally or externally as well as customized with special connections, a steam jacket or differential pressure connections.



#### POLYLINE & FLV

Our non-alloy designs (PVC, CPVC and PVDF) are used for non-alloy pipelines and thus have some limitations; they cannot be ASME code stamped, polished or steam jacketed and their flow rates are

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typically limited to a maximum of 100 GPM. Although they are made of "plastic", they are more expensive than their alloy counterparts and chosen for aggressive chemistries which otherwise require expensive, "exotic" alloys.

All of the bag filter vessels above are single chamber, simplex designs. Therefore the flow rate is limited to the capacity of the single filter bag used within it and the process needs to be interrupted to change-out the filter bag.

To accommodate flow rates above 180 GPM, using specialty filter bags having a reduced flow capacity or for viscous fluids, using multiple chambers (filter bags) simultaneously is required.

### MULTIPLE CHAMBER DESIGNS

Multiple Bag Filter Housings (MBFH) contain 2 to 24 chambers that hold #2 size filter bags in support of flow rates up to 4,200 GPM at 150 PSI although most MBFH applications only require 3 to 8 filter bag chambers in support of flow rates up to 1,400 GPM.

### DOULINE

This design has two bag filter housings connected by a common inlet and outlet manifold and thus having double the capacity of a single chamber design; there are no valves to divert flow, flow passes through both chambers simultaneously.



Within the 3, 4, 6 and 8 chamber range there are several design options offered.

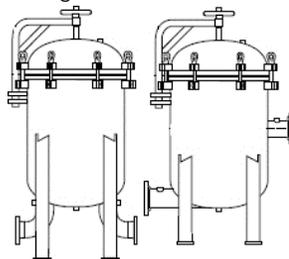
The most common MBFH design offered by at least three North American manufacturers has a side inlet and a bottom elbow outlet with handwheel cover lift davit assembly used to lift the cover and swing it aside during filter bag changes.



This MBFH is generally the least expensive design, available in a wide range of materials and is the only option for 10+ chamber models.

Some Manufacturers offer the outlet nozzle welded tangentially to the bottom dish as compared to using an elbow at the

bottom of the dish and this significantly reduces the height of the MBFH assembly. This reduction in height often eliminates a requirement for ladders and scaffolding around the housing and it is actually safer to be located firmly on the



ground without having to strain for filter bag access.

MBFH designs are further differentiated by the design of the cover and how it seals.

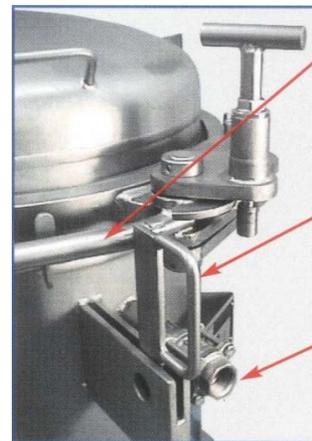
### COVER DESIGN

Counter weighted spring assisted hinged covers can be opened and closed safely by a single individual. This fantastic feature costs about 10% more when compared to the lifting davit style, justified with its reduced footprint and improved ergonomics.



While swing bolts provide relatively quick access to the filter vessel, access is further improved with a gear operated clamp closure which ensures positive and equal sealing across the chamber cover sealing area.

The handwheel-operated closure automates an important safety procedure, opening of a vent valve. As the cover clamp opens, the vent valve control handle automatically opens the integral vent valve and thus preventing a sudden burst of pressure at the seal interface.



Cover operating lever

Vent control handle

Vent valve



### COVER SEAL

The latest innovation for MBFH sealing is the "flat" cover design with direct flow to each individual filter bag chamber.

The flatness of the cover enhances sealing while reducing product loss and overall contributes to a "cleaner" filter bag changing process.

The direct feeding of each filter bag chamber provides a laminar flow and thus optimal cake formation, helping to



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maximize the efficiency of the filter bags.

### ECONOMY MODELS

Some manufacturers offer "economy models" which reduce the customization options in support of mass manufacturing techniques that ultimately result in reduced cost and lead times. Once such example is comparing the MAXILINE HE-T to its "economy" version the PROLINE 150 HE-T.

MAXILINE and PROLINE vessels have the same basic features and flow capacity. However, the PROLINE is only available in 304L SS and is not available with an ASME code stamp. If your application is compatible with less expensive carbon steel material or requires 316L SS (or other customizations with or without an ASME code stamp), then the MAXILINE design is the way to go.

When 304L SS material is acceptable and an ASME code stamp is not required, you'll save 28% on average utilizing the PROLINE 150 HE series multiple bag filter housing as compared to the MAXILINE HE series.

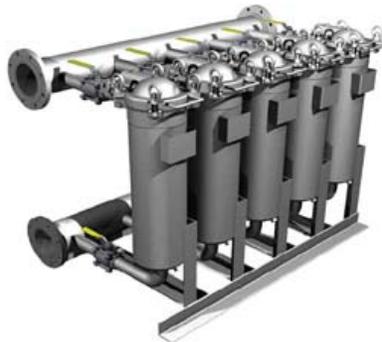


	PROLINE HE	MAXILINE HE
3, 4, 6 & 8 #2 size bag filter chambers:	YES	YES
Quick-Opening eyebolt style closure:	YES	YES
316SS filter bag support baskets included:	YES	YES
Low Profile Design enables full drainage & improved ergonomics:	YES	YES
Positive o-ring seal:	YES	YES
3-point filter bag hold-down rings:	YES	YES
Counter balanced spring assisted hinged cover:	YES	YES
Stainless steel mounting legs:	YES	YES
O-ring materials Buna-N, EPDM, Viton or PTFE encapsulated Viton:	YES	YES
Materials of Construction, Body:	304L SS	304L SS 316L SS Carbon Steel
ASME Code Stamped:	NO	YES
Additional inlet/outlet connections can be added:	NO	YES
Customization of fittings, surface finish and special coatings are possible:	NO	YES
Available with a shell side outlet:	NO	YES

### ALTERNATIVE DESIGNS: MODULINE

Another way to approach high flowrate filtration applications is using several standard single filter bag vessels connected to a common inlet and outlet/drain manifold.

An advantage of this approach is that, when properly sized, individual housings can be isolated and filter bags replaced without needing to shut down or "duplex" the system and thus can significantly reduce initial costs.



The filter housings

can be oriented on both sides of an inlet/outlet header to shorten its length and if you extend these headers, it will enable adding additional filter stations in the future.

### DUPLEXED FILTER HOUSINGS

When your process cannot be interrupted to change filter bags and you are not using the Moduline configuration above, we can supply a pair of simplex housings connected by a common manifold having diverting valves to isolate the chamber to be serviced.



### FLOW RATE

The size of the bag filter vessel (number of filter bag chambers) depends upon the diameter and length of the filter bags required for your specific application. The four "industry standard" filter bag sizes are referred to as being #1, #2, #3 or #4 sizes, with #1 and #2 sizes being the most common for industrial applications.

Selecting the most appropriate filter bag involves more than just knowing the flow rate; other characteristics of the fluid (viscosity, specific gravity & temperature) combined with the desired efficiency, volume of particles to be removed and the size of particles to be removed guide the selection of the filter bag. Once you have selected a filter bag and identified its maximum flow rate you can determine the number of filter bag chambers required.

Some filter bags have a larger removal capacity than others, thus you might compare the use of expensive media in a smaller housing (minimizing initial costs) to using a larger housing with less expensive media (minimizing operation costs).

When you complete our inquiry form or otherwise contact us by email or phone, our filtration experts will gather information about the filter bag aspect of your application to ensure the most appropriate bag filter housing is suggested. Our filter bag website provides detailed information and specification sheets for a variety of filter bag types, complementing our filter bag housing website, both can be accessed at <http://www.fdpp.com>.

*Chris Pasquali has been trained by Hayward Flow Control and Eaton Filtration, having provided sales and engineering support since 2001.*