Science.
Applied to Life.™

3M™ DF Series
Filter Systems

Filter Cartridge Benefits

Filter Bag Economy

- Retrofits many standard bag filter housings
- Provides long service life
- Reduces chance for filter media rupture, contaminant by-pass and unloading
- Simplifies filter installation, removal, and disposal

3M™ DF Series Filter System

The 3M™ DF Series Filter System is a proven alternative to conventional bag filters. Developed using 3M Separation and Purification Sciences Division's extensive depth filtration experience, the 3M DF series filter features a true graded-porosity media structure.

3M DF series filters provide:

- Long service life
- Efficient contaminant reduction
- Enhanced flow rate per filter element
- Reduced loses associated with frequent filter change-outs (production downtime, disposal, and labor costs)

The 3M DF Series Filter will easily retrofit many standard bag filter housings. To take advantage of the 3M DF series system in applications where bag filter housings are currently in use, simply remove the existing bag support basket, replace it with a 3M DF Series support basket, and insert the 3M DF series filter. For new installations, 3M Separation and Purification Sciences Division offers 3M filter housings illustrated in this brochure.

The 3M DF Series Filter System Design

The 3M DF Series element is comprised of two cylinders bonded to a top plate and a lower seal plate. As shown in Figure 1, the fluid enters the top of the filter through flow channels located in the 3M DF Series filter top plate. The fluid flows between the inner and outer media cylinders, and then passes through the media and support basket into the clean chamber of the filter housing.

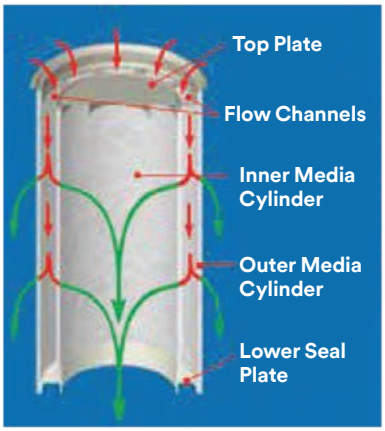


Figure 1. 3M™ DF Series Flow Path

Features & Benefits

Filter design combines a graded-porosity media with generous filter surface area

- Long Service Life
- Used element retains little fluid, making it light weight for easy removal
- No need for displacement balloons and associated spillage during change-out

100% downstream support of the filter element

- Reduces chance of rupture, contaminant bypass and unloading
- Allows operation to higher differential pressures before filter change-out

Superior flow characteristics

- Maximizes utilization of filter surface area and maintains low operating pressure drop
- Reduces flow per unit area (flux) for improved effluent quality

The 3M™ DF Series Filter System design incorporates a geometry of both filter element and restrainer basket, which provides 100% three-dimensional support of the 3M DF series media. This reduces the potential for filter element rupture and the resulting gross contamination of the downstream effluent with previously captured particles.

3M DF Series Elements Provides Long Service Life

The 3M DF series filter element helps optimize both performance and filtrate quality. 3M DF series filter elements are sized to replace conventional #1 and #2 Size bag filters and are available in both polyester and polypropylene materials with nominal ratings from 1 to 200 micron.

Media Surface Area

The graded porosity media of the 3M DF series filter provides the following benefits

- **Low flux (flow rate per unit area):** Since filter life is inversely proportional to flux, reducing the flux increase the filter's life. Additionally, low flux helps improve the retention efficiency of the element.
- **Lower initial pressure drop:** This increases the time before the recommended change-out pressure is reached.

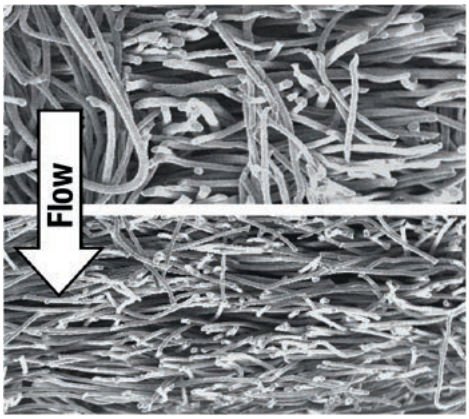


Figure 2. 3M™ DF Series Graded Porosity Media

Contaminant Holding Capacity

3M DF series filters are offered in a graded porosity filter media in which two media layers of different porosities are combined to enhance its contaminant holding capacity. The added capacity is achieved by reducing the larger contaminants in the first layer and the finer contaminants in the tighter, downstream layer (see Figure 2). The configurations of each nominally rated filter media have been optimized to achieve long service life. Media migration is reduced by thermally glazing the exterior surface of the downstream media layer.

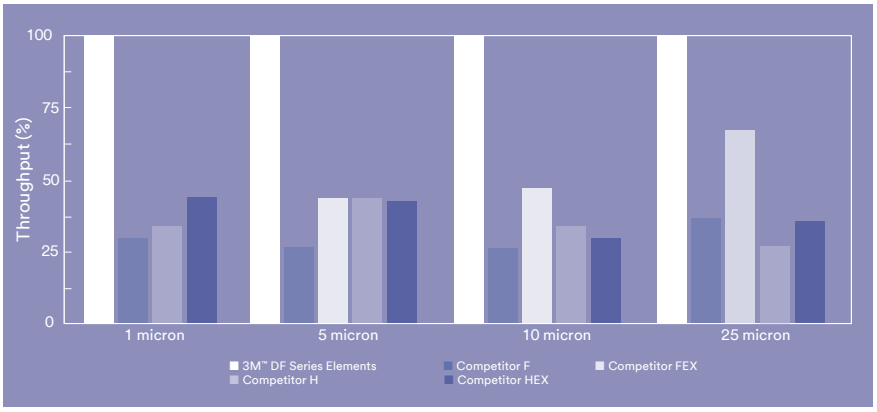
Materials of Construction

Each grade of 3M DF series filter is manufactured from high performance fibers selected based on extensive media performance testing. No adhesives, binders, or silicone are used in the manufacturing process. The 3M DF series filter element is available in an all-polypropylene, all-polyester, or polyester media with polypropylene lower seal and top plate construction. The 3M DF Series "PP" polypropylene element is constructed of FDA 21 CFR compliant materials.

Long Filter Service Life

Extensive testing, supported by field results, has demonstrated the long-life advantage achieved by 3M DF Series elements while obtaining superior efficiencies. As shown in Graph 1, 3M DF Series elements provide for up to 4 times the throughput compared to four equivalently rated conventional bag filters (the life of the filters were measured to the same terminal differential pressure).

Graph 1. Service Life Comparison for 3M™ DF Series Elements and Equivalently Rated Conventional Bag filters*



*polypropylene media

3M™ DF Series Filter Elements

Reduced Hold-Up Volume - a 67% reduction in hold-up volume significantly decreases lost product and disposal cost.

Size	Hold-up Volume	Gallons
#2	3M DF Series	1.4
#2	Standard Bag	4.3

Simple Filter Removal - simply insert the 3M removal tool into the top plate and lift the filter from the housing.

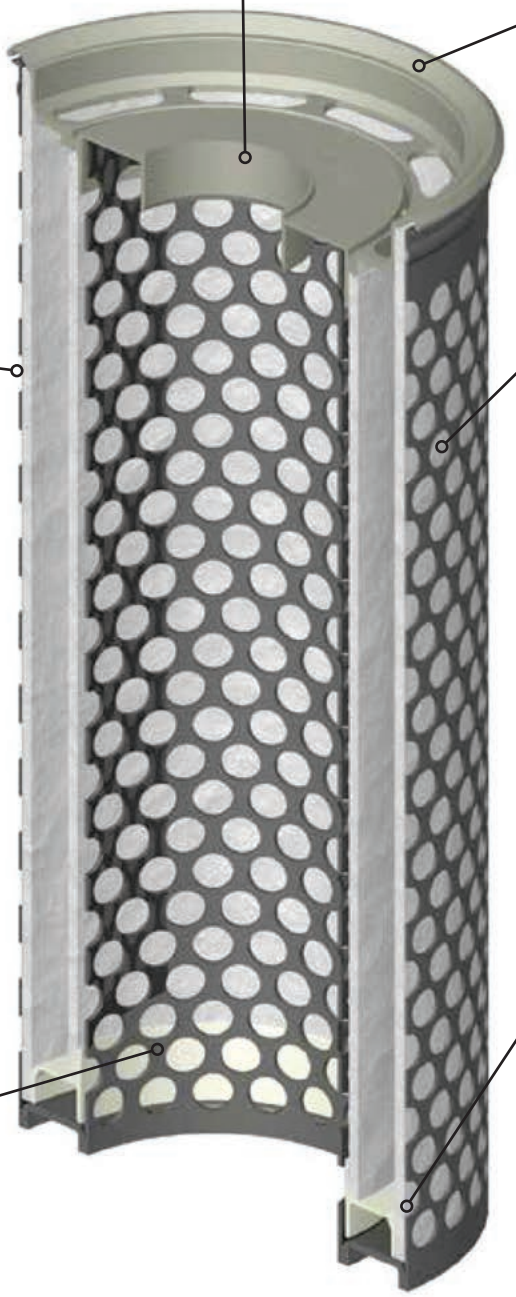
Easy Filter Installation - the 3M™ DF Series Filter element is a rigid cylinder that easily slides into the support basket.

Graded Porosity Media - 3M DF Series media consists of two layers. The first layer, or upstream zone, is "open" to capture the larger contaminant, while the downstream zone is "tighter" to capture the smaller contaminant. This design provides greater contaminant holding capacity and longer life than conventional single layer media.

Increased Surface Area - the media design provides 62% more area than a commonly available standard bag filter for longer life and fewer filter change-outs.

Size	Filter Area	ft²
#2	3M DF Series	6.7
#2	Standard Bag	4.1

Thermally-treated Media Surface - many filter bags release fibers that end up in the filtered product. The 3M DF Series filter media is thermally treated to reduce loose fibers.



Sealing Collar - constructed from molded polypropylene or polyester, with an advanced sealing lip that provides a dynamic spring-like seal, the 3M DF Series design reduces contaminant bypass.

Support Basket - full support of the filter element provides filter integrity even under the most demanding conditions by eliminating the potential for media stretching which can open the pore structure and allow larger particles to pass.

Thermal Side Seam - using a thermal sealing process, the 3M DF Series seam does not have the large needle holes present in stitched bags.

Integral Media to Plate Seal - an integral seal between the plastic components and the filter media is accomplished with ultrasonic welding.

3M™ DF Series Filter Specifications & Operating Parameters

Filter Element Size and Ratings Available

3M™ DF Series elements are available in sizes and ratings to replace standard #1 and #2 filter bags as follows:

3M™ DF Series Filter Element Specifications

Dimension	3M™ DF Series Filter Elements	
	#1 Size	#2 Size
Nominal Reduction Ratings (micron)	1, 5, 10, 25, 50, 100 and 200*	
Filter Diameter (inches/cm)	7/17.8	
Filter Length (inches/cm)	14.3/36.3	27.8/70.6
Media Area (ft.²/m²)	3.4/0.32	6.7/0.62
Hold Up Volume per Filter (Gallons/Liter)	0.7/2.6	1.4/6.2

* available in polyester only

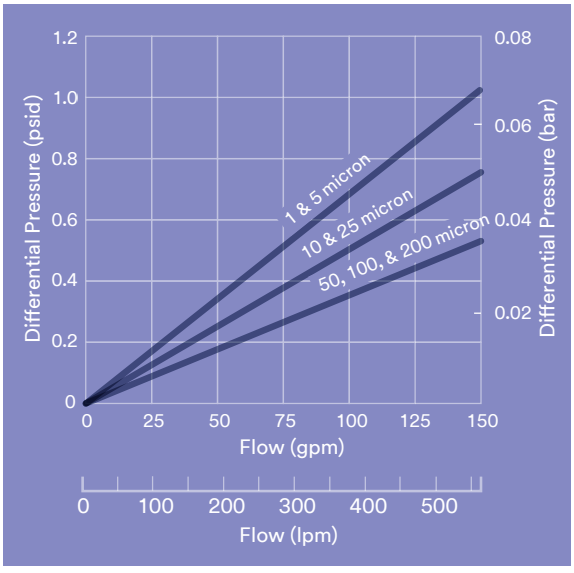
Operating Parameters by Material and Size

Operating Conditions	3M™ DF Series Filter Polypropylene		3M™ DF Series Filter Polyester	
	#1 Size	#2 Size	#1 Size	#2 Size
Maximum Operating Temperature (°F/°C)	180/82		300/149	
Maximum Recommended Flow Rate (gpm/lpm)	75/284	150/568	75/284	150/568
Maximum Forward Differential Pressure	35 psid @ 68°F (2.4 bar @ 20°C)			
Recommended Change-Out Differential Pressure	20 psid (1.4 bar)			
Regulatory Status (see ordering guide)				
FDA 21 CFR Compliant	All component materials of the 3M DF Series "PP" polypropylene element are listed for food contact per FDA 21 CFR 177.1520			

Flow Characteristics and Sizing Options

Flow vs. differential pressure for a 3M DF Series #2 size element and support basket in water is depicted in Graph 2. A typical filter system is often sized for an initial differential pressure of 0.5 to 1 psi (0.04 to 0.07 bar). A lower flow rate per element typically extends the life of the filter system.

Graph 2. 3M™ DF Series Water Flow Data*



* #2 Size Element and Support Basket Pressure Drop Only, housing pressure losses are not included.

Chemical Compatibility Table

Chemical	3M™ DF Series Filter Polypropylene	
	Polypropylene	Polyester
Mineral Acids	Excellent	Good
Organic Acids	Excellent	Excellent
Alkalines	Excellent	Poor
Oxidizing Agents	Fair	Fair
Organic Solvents	Fair	Good

The thermal and chemical resistance data presented in this brochure is for guidance only. Factors such as duration, degree of concentration of a substance in a fluid and temperature should also be considered. Thermal and chemical resistance should also be considered when choosing all materials exposed to fluids.

3M™ BH Series ASME Code Filter Housings

3M™ BH series bag housings, for use with conventional bag filters or 3M™ DF Series Filter elements, are available in single filter element configurations for either #1 or #2 filter sizes. The 3M BH Series are constructed with 316L Stainless Steel and stamped to comply with the ASME code.

3M™ BH Series ASME Code Filter Housing Specifications

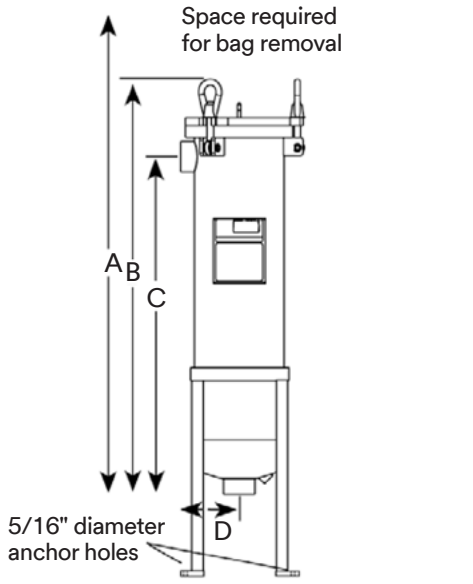
Size	Material	Connection Size/ Type	Maximum Pressure & Temperature	Housing Weight lb/kg	Basket Weight lb/kg	Leg Weight lb/kg
#1	Carbon Steel and 316L SS	2" ANSI Flange or 2" NPT	150 psi @ 300°F* (10.4 bar @ 194°C)	Model 1BHS1: 50/23	8/3.6	4/1.8
#2				Model 1BHS2: 95/43	12/5.4	

* Maximum temperature with Nitrile gasket is 250° F (121° C). Consult factory for other gasket options.

3M™ BH Series ASME Code Filter Housing Dimensions

Model	Vessel OD	Dimensions (inches/cm)			
		A	B	C	D
1BHS1	8.6 in (21.9 cm)	38/96.5	27.6/70.6 (max.)	21.2/53.8 (max.)	5.7/14.5
1BHS2		65/165.1	42.8/108.7 (max.)	36.2/91.9 (max.)	5.7/14.5

Models 1BHS1/1BHS2



Leg Anchor Bolt circle is 10.5" (26.7 cm) diameter
Legs are adjustable to a distance of 12" (30.4 cm)

3M™ BH Series ASME Code Model Housings

BHN Series Non-Code Model Housings for the 3M™ DF Series Filter System

3M™ BHN Series Non-Code Model Housing

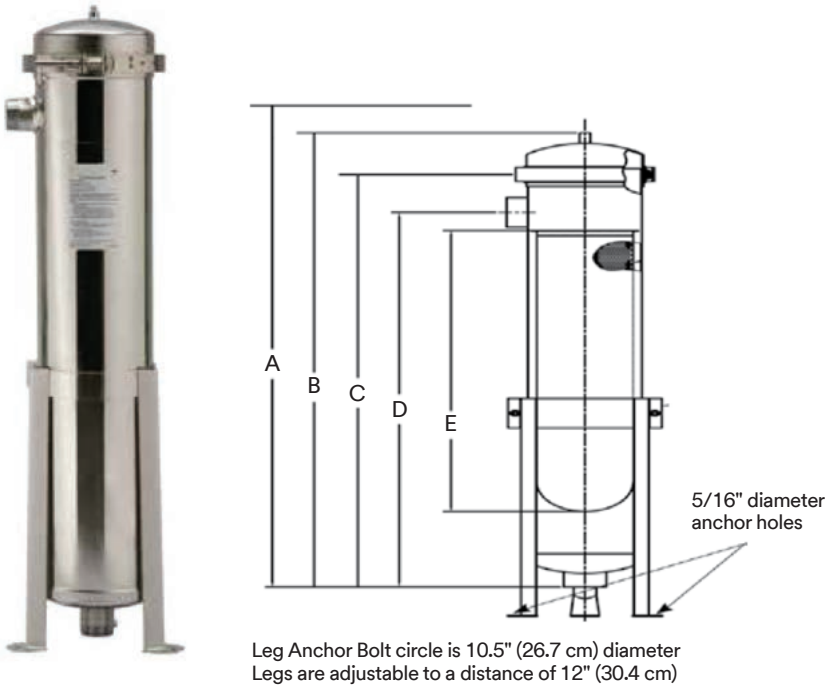
For those applications not requiring code housings, 3M Separation and Purification Sciences Division offers the economical 3M BHN Series bag housing product line. BHN series housings, for use with #1 and #2 Size standard bag filters or DF series elements, are available in single-round configurations. The BHN series filter housings are constructed from stainless steel materials, which include a stainless steel support basket and a hold-down device for proper filter seating. BHN housings are rated for operation up to 150 psi @ 250°F (10.4 bar @ 121.1°C. Filter housing installation in new or existing systems is simplified by the band clamp legs which can accommodate up to a 12 inch (30.5 cm) adjustment in floor to outlet height.

3M™ BHN Series Non-Code Filter Housing Specifications

Specifications	Housing Size	
	#1	#2
Material	304 SS and 316L SS	
Gasket(s)	Nitrile Standard	
Connection Size/Type	2" NPT	
Maximum Pressure & Temperature	150 psi @ 250°F (10.4 bar @ 121.1°C)	
Shipping Weight (lbs/kg)	45/20.4	60/27.2
Basket Weight (lbs/kg)	3.5/1.6	6.0/2.7
Leg Weight (lbs/kg)	7.5/3.4	

3M™ BH Series Non-Code Filter Housing Dimensions

Model	Vessel OD	Dimensions (inches/cm)				
		A	B	C	D	E
1BHN1	8.6 in (21.9 cm)	42/109.2	31/78.7	27.5/69.9	23/58.4	13/33.0
1BHN2		72/182.9	46/116.8	41.5/105.4	38/96.5	28/71.1



3M™ BHN Series Non-Code Model Housing

3M™ DF Series Filter Support Basket

3M offers a complete line of 3M™ DF series 316 stainless steel support baskets for use in existing bag filter housings or in the 3M DF series filter housing. The 3M DF series filter element utilizes a basket for proper element support. The 3M DF series filter basket has two concentric stainless steel cylinders to support both the inner and outer filter element sleeves. This design supports media integrity and consistent effluent quality. 3M DF series baskets provide the optimum combination of strength and open area for proper media support, excellent flow characteristics, and minimal pressure drop.

The 3M DF Series filter support basket ordering guide (below) cross references the competitive filter bag housing manufacturer and model to the correct 3M DF series support basket needed to upgrade to the 3M DF series filter element.

3M™ DF Series Filter Support Basket Ordering Guide (contact factory for manufacturer models not listed)

Existing Bag Filter Housing					3M Separation and Purification Sciences Division Basket InformationMFG	
MFG	**Model**	**# of Bags**	**Inlet Entry[1]**	**Size**	**Adapter #**	**Basket Part # (316 S.S.)**
Filtrek	BMB	1 - 17	Side	#2	N/A	60382-35
FS1	FS - 85 & Up	1 - 24	Side	#2	N/A	60382-38
FS1	FSP - 40	1	Side	#1	N/A	60382-32
FS1	FSP - 85 & up	1 - 24	Side	#2	N/A	60382-37
Filtration Systems	112	1	Over the top	#1	60343-31	60382-32
Filtration Systems	122	1	Over the top	#2	60343-31	60382-37
GAF/AFFCO	RB (1,2, or 4)	1 - 4	Over the top	#1	60339-31GA	60382-32
GAF/AFFCO	RB(1,2, or 4) L	1 - 4	Over the top	#2	60339-31GA	60382-37
GAF/AFFCO	RB1 L-SE	1	Side	#2	N/A	60382-33[2]
GAF/AFFCO	RB (2-12) C2L	2 - 12	Side	#2	N/A	60382-33[2]
Hayward	TOPLINE TBF 0101	1	Over the top	#1	N/A	60382-32
Hayward	TOPLINE TBF 0102	1	Over the top	#2	N/A	60382-37
Hayward	MAXILINE MBF	3 - 24	Side	#2	N/A	60382-37
Hayward	MAXILINE SEMB	3 - 24	Side	#2	N/A	60382-37
Krystil Klear	M88302 (OEM)	1	Side	#2	60346-31	60382-37
Krystil Klear	L8815	1	Side	#1	N/A	60382-32
Krystil Klear	L8830	1	Side	#2	N/A	60382-37
Rosedale	8 - 15	1	Side	#1	N/A	60382-36
Rosedale	D8-15 (Duplex)	2	Side	#1	N/A	60382-36
Rosedale	8 - 30	1	Side	#2	N/A	60382-35
Rosedale	D8-30 (Duplex)	2	Side	#2	N/A	60382-35
Rosedale	16 - 48	2 - 23	Side	#2	N/A	60382-37
Strainrite	U F1-180	1 -12	Side	#2	N/A	60382-37

* [1]Hold down Spring (Part # 64254-31) required for all side entry one-around bag housings

[2] Basket Gasket Part Number needed for 60382-33	
Gasket	**Part Number**
Nitrile	60334-36442
Fluorocarbon	60334-38442

3M™ DF Series Filter Element Ordering Guide

Filter Designation	Nominal Reduction Rating (Micron)	Material (Media/Plastic Components)	Element Length (inches)	Connection Style
DFG - 3M DF Series Graded-Porosity	**001** - 1 µm **005** - 5 µm **010** - 10 µm **025** - 25 µm **050** - 50 µm **100** - 100 µm **200*** - 200 µm	**PP** - Polypro/Polypro **EE** - Polyester/Polyester **EP** - Polyester/Polypro	**1** - 14.3 nominal **2** - 27.8 nominal	**R** - Closed (Standard Bag Housings)

*Available in single layer polyester material (Code EE) only.

3M™ DF Series Filter cartridges have been tested and certified by WQA against NSF/ANSI/CAN 61 for material safety only.**

** For material EE & EP, please consult factory.

Cold Water Only:
Install this product in accordance with the instructions provided by the housing manufacturer.

3M™ BH Series ASME Code Filter Housing Ordering Guide*

Number Around	3M™ DF Series	Housing Type	Filter Size	Material	Connection Type	Basket Type
1 - Single Filter	**BH** - Bag Housing	**S** - Side Entry, Code	**1** - #1 Size **2** - #2 Size	**C** - 316L Stainless Steel	**1** - 2” ANSI Flange **2** - 2" NPT	**B** - Bag Basket **D** - DF Series Basket

* Housing come standard with Nitrile Gaskets, other gasket materials available, consult factory.

3M™ BHN Series Non-Code Filter Housing Ordering Guide*

Number of Filter Elements	Housing Model	Filter Size	Housing Material	Connection Type	Basket Type
1 - Single Filter	**BH** - Bag Housing (Non Code)	**1** - #1 Size **2** - #2 Size	**B -** 304 Stainless Steel **C -** 316L Stainless Steel	**1** - 2" NPT	**B** - Bag Basket **D** - DF Series Basket

* Housing comes standard with Nitrile Gaskets, other gasket materials available, consult factory.

3M™ DF Series Filter Support Basket

The following accessories are available for use with the 3M™ DF Series Filter System:

Element Installation Tool (Part # 60300-31): Constructed from 316 stainless steel, this tool facilitates insertion of 3M DF series elements into the support basket. The tool is designed with curved ends to help avoid damage when inserted into the element.

Element Removal Tool (Part # 74132-31): Constructed from 316 stainless steel, this tool facilitates removal of 3M DF series elements from the support basket. The tool is designed with an easy-to-grip handle and locking tabs for proper support of the element.

Element Hold Down Spring (Part # 64254-31): Constructed from 316 stainless steel, this spring assembly ensures the 3M DF series element is properly seated in side entry housings to prevent fluid bypass.

Magnet Assembly (Part # 60376- 03): Constructed using 12,000 gauss strength magnets inserted into a 304/304 L stainless steel tube, this magnet assembly provides for improved capture of metallic fines from fluid streams. This assembly is designed for easy insertion and removal is fully supported when inserted into a 3M DF series element. One or two magnets can be inserted in each element.

3M™ DF Series Element Installation Tool Part # 60300-31

3M™ DF Series Element Removal Tool Part # 74132-31

3M™ DF Series Element Hold Down Spring Part # 64254-31

3M™ DF Series Magnet Part # 60376-03

Accessories	
Description	**Part No.**
Bag Basket, Size #1, 316 SS	60428-32
Bag Basket, Size #2, 316 SS	60428-31
DF Series Basket, Size# 1, 316 SS	60382-32
DF Series Basket, Size# 2, 316 SS	60382-37

Filter Cartridge Benefits... Filter Bag Economy

Filter Cartridge Benefit	3M™ DF Series Element	Standard Bag Filter
High Dirt Holding Capacity	Yes	No
Rigid construction provided by the media or additional support components (i.e. cage and core)	Yes	No
Installation/Removal convenience-ease of use	Yes	No
Contaminant retention even under elevated differential pressure	Yes	No
Reduced hold-up volume	Yes	No

3M™ DF Series Filter Applications

Coatings	Electrodeposition, Trade Paint, Can Coatings, Dispersions, Paper Coatings, Adhesives, Automotive Paint, Architectural Paint, Printing Ink, Resins, Coil Coatings
Industrial	Parts Washing, Pulp & Paper, Cooling Water, Ground Water, Waste Water, Hydraulic Fluids, Lubricants, Machine Tool Coolants, Transformer Oil
Chemical	Acids, Chemicals, Process Water, Alcohols, Glycols, Fuels, Catalyst Recovery, Resins, Alkalines, Esters, Silicones, Aerosol Products, Mineral Oil, Waxes, Solvents
Petrochemicals	Fuel Additives, Glycols, Lube Oils, Distillation, Enhanced Oil Recovery, Amines, Fuels, Injection Fluids
Food & Beverage	Polypropylene only: Vegetable Oil, Syrups, Edible Oils, Soft Drinks, Wine, Spirits, Fruit Juice, Beer, Honey, High Fructose Corn Syrup, Vinegar, Liquid Sugar, Bottled Water, Gelatin, Ready to Drink Tea, Sports Drinks
Electronics	Etching Baths, Process Water / RO Prefiltration, Photochemicals, Solvents, Printed Circuit Manufacturing
Water Treatment	Cooling Water, Process Water, Well Water, Ground Water, Waste Water, RO Prefiltration

Product Selection and Use:
Many factors beyond 3M's control and uniquely within user's knowledge and control can affect the use and performance of a 3M product in a particular application. As a result, customer is solely responsible for evaluating the product and determining whether it is appropriate and suitable for customer's application, including conducting a workplace hazard assessment and reviewing all applicable regulations and standards (e.g., OSHA, ANSI, etc.). Failure to properly evaluate, select, and use a 3M product and appropriate safety products, or to meet all applicable safety regulations, may result in injury, sickness, death, and/or harm to property.
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