

# 3M Purification

## 3M™ DF Series

### Filter System & Accessories



#### Features & Benefits

##### Unique filter design combining a graded-porosity media with 62% greater filter surface area

- Longer Service Life- up to 4 times or more that of conventional felt filter bags
- Reduced Filter Usage- minimizes product loss, labor, disposal costs, and operator exposure
- Increased productivity- less down time for filter change-out

##### Hold-up volume reduced by 67% compared to conventional bag filters

- Reduced product loss & related disposal costs
- Used element retains less fluid, making it lighter weight for easier removal
- Reduces displacement balloons and associated spillage during change-out

##### 100% downstream support of the filter element

- Reduces filter 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

#### Filter Cartridge Benefits...Filter Bag Economy

- Easily retrofits standard bag filter housings
- Provides up to four times or more life than conventional bag filters
- Reduces filter media rupture, contaminant by-pass and unloading
- Simplifies filter installation, removal and disposal
- Reduces hold- up volume by up to 67% or more

#### 3M™ DF Series Filter System

The 3M™ DF series filter system is an advanced proven alternative to the use of standard bag filters. Developed using 3M Purification's extensive depth filtration experience, the 3M™ DF series filter features a true graded-porosity media structure an 62% increase in the filter surface area. Compared to conventional felt filter bags, 3M™ DF series filters provide:

- Up to 4 times or more the service life
- Superior contaminant reduction efficiency
- Enhanced flow per filter element
- Reduced losses associated with frequent filter change-outs, (production downtime, disposal, and labour costs)

The 3M™ DF series filter will easily retrofit most existing 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 Purification offers a full line of 3M™ DF series filter housings (page 5).

#### The 3M™ DF series Filter System- A Unique 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.



The 3M™ DF series design incorporates an innovative new geometry of both filter element and restrainer basket which provides 100% 3 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 reduced particles. The unique design of the 3M™ DF series element also reduces filter element hold-up fluid volume by 67% compared to conventional bags, minimizing worker exposure to process fluids.

### 3M™ DF Series Elements Provides Superior Service Life

3M Purification utilizes state-of-the-art technology to produce the 3M™ DF series filter element optimizing both performance and filtrate quality to ensure customer satisfaction. 3M™ DF series filter elements are sized to replace conventional #1 and #2 bag filters and are available in both polypropylene and polyester materials (including 21 CFR listed materials) with nominal ratings from 1 to 200 micron.

### Greater Media Surface Area

The 3M™ DF series filter design provides an increase in filter surface area of 62% when compared to commonly used #1 and #2 bag filters. This additional surface area provides the following benefits:

- Low flux (flow rate per unit area): Since filter life is inversely proportional to flux, reducing the flux by 50% can achieve up to a three-fold increase in filter life. Additionally, lower flux improves the retention efficiency of the element.
- Lower initial pressure drop: This increases the time before the recommended change-out pressure is reached.

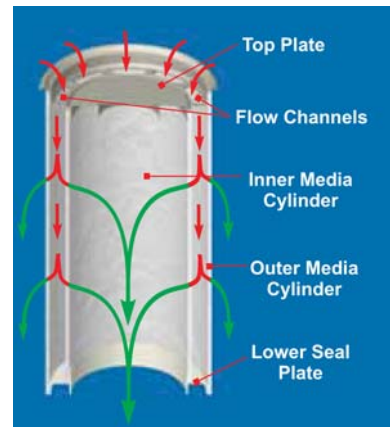
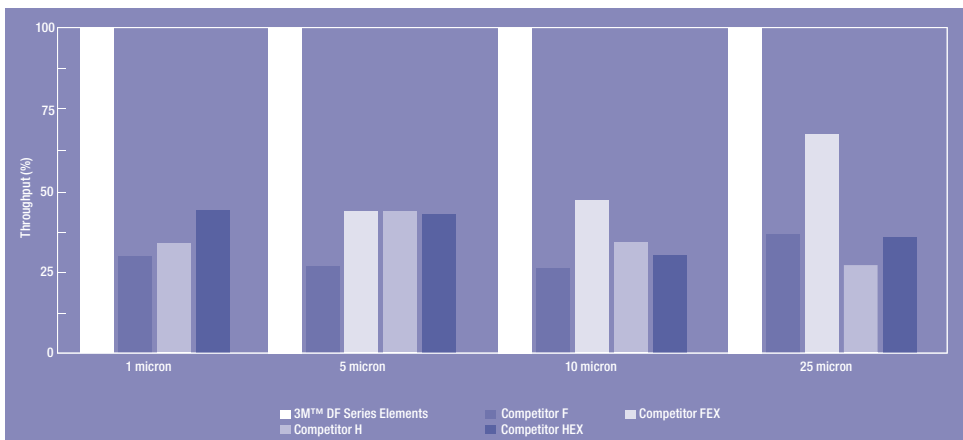
### Greater Contaminant Holding Capacity

3M™ DF series filters are offered in a graded porosity filter media where two media layers of different porosities are combined. The result is superior 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 the longest service life. Media Migration is reduced by thermally bonding

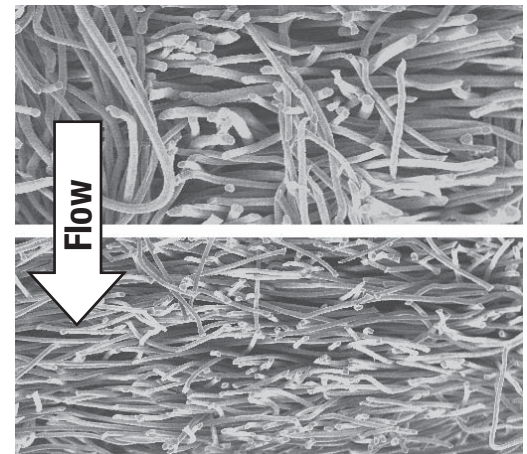
### Superior Filter Service Life

Extensive testing, supported by field results, has demonstrated the superior 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 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 Conventional Backfilters\***



**Figure 1. 3M™ DF Series Flow Path**



**Figure 2. 3M™ DF Series Graded Porosity Media**

\*polypropylene media

# 3M™ DF Series Filter Elements

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



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

Size	Hold-Up Volume	(litres)
#2	3M™ DF series	5.3
#2	Standard Bag	16.3

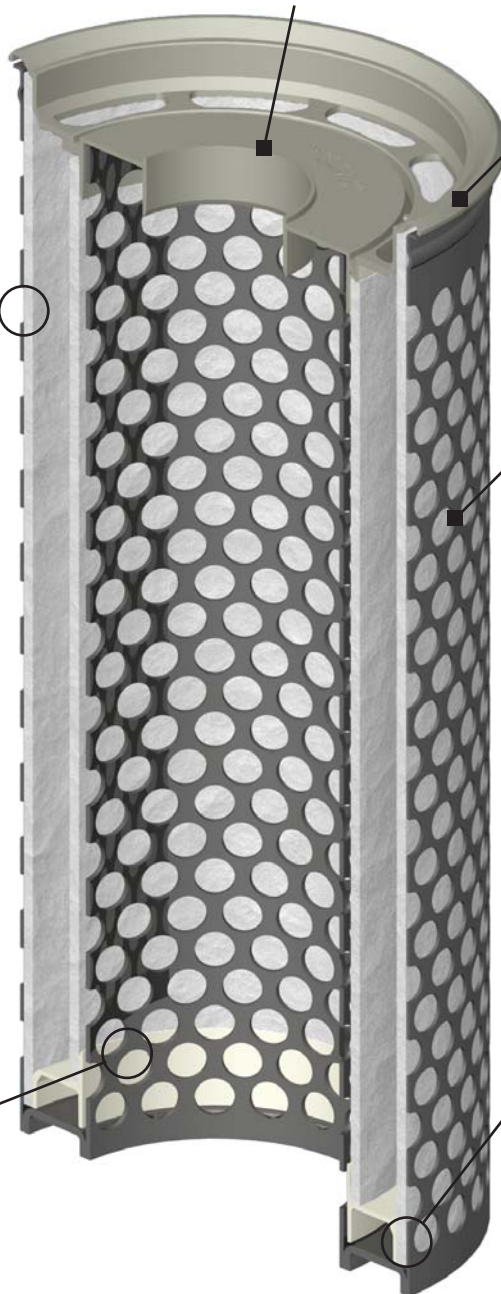
**Easy Filter Installation**- the 3M™ DF series filter element is a rigid cylinder that easily slides into the support basket.

**Graded Porosity Media**- 3M™ DF series media consists of 2 layers. The first layer or upstream zone is “open” to reduce the larger contaminant while the downstream zone is “tighter” to reduce the smaller contaminant. This design provides greater contaminant holding capacity and longer life than conventional single layer media.

**Increased Surface Area**- the unique design provides 62% more area than typical bag filters for longer life and fewer filter change-outs.

Size	Filter Area	(m <sup>2</sup> )
#2	3M™ DF series	0.62
#2	Standard Bag	0.38

**Singed 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.



**Superior 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 ensures 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 advanced thermal sealing processes, the 3M™ DF series seam reduces the problem of contaminants passing through large needle

**Integral Media to Plate Seal**- an integral seal between the plastic components and the filter media is ensured by using state-of-the-art ultrasonic welding techniques.

**The unique 3M™ DF series element design**- 62% greater area and a unique graded-porosity media structure- provides a service life advantage of up to 4 times greater than conventional filter bags. Other features (sealing collar media treatment, thermal seaming, ultrasonic bonding of plastic parts to media) ensure that the 3M™ DF series filter is unsurpassed in quality and performance.

# 3M™ DF Series Filter Specifications & Operating Parameters

## 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 all-polypropylene lower seal and top plate construction.

### Operating Parameters by Material and Size

Operating Conditions	3M™ DF Series Polypropylene		3M™ DF Series Polyester	
	#1 Size	#2 Size	#1 Size	#2 Size
Maximum Operating Temperature (°C)	82		149	
Maximum Recommended Flow Rate (lpm)	284	568	284	568
Maximum Forward Differential Pressure	2.4 bar @ 20°C			
Recommended Change-out Differential Pressure	1.4 bar			
<b>Regulatory Status (see ordering guide)</b>				
CFR Compliant	All component materials of the 3M™ DF series "PP" polypropylene element and "FE" polyester are listed for food contact per 21 CFR 177.1520.			

### Chemical Compatibility Table

Chemical	3M™ DF Series Material Polypropylene	Polyester
Biological Agents	Excellent	Excellent
Mineral Acids	Excellent	Good
Organic Acids	Excellent	Excellent
Alkalies	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.

## 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.

## Filter Element Size and Ratings Available

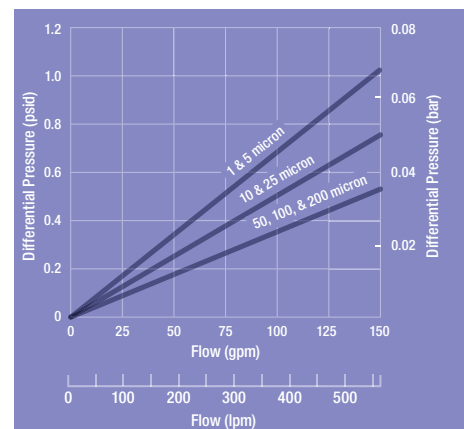
3M™ DF series elements are available in sizes and ratings to replace standard #1 and #2 filter bags as follows:

### 3M™ DF Series Filter Element Specifications

Dimension	3M™ DF Series Elements	
	#1 Size	#2 Size
Nominal Reduction Ratings (micron)	1, 5, 10, 25, 50, 100 and 200*	
Filter Diameter (cm)	17.8	
Filter Length (cm)	36.3	70.6
Media Area (m²)	0.32	0.62
Hold Up Volume per Filter (Litres)	2.6	5.3

\* available in polyester only

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



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

## 3M™ DF Series Filter Housings

3M™ DF series filter housings are designed and manufactured to economically meet demanding applications. The housings are available for #1 and #2 size 3M™ DF series filters and are constructed from 304 or 316L stainless steel. 3M™ DF series ASME code housings are designed, fabricated, and "U" stamped in accordance with ASME Section VIII, Division 1 for 150 psi @ 300°F. For those applications not requiring ASME code housings, an economical "DFN" version is available.

The 3M™ DF series filter housing allows the user to realize all of the benefits of the 3M™ DF series filter element. A positive element sealing mechanism reduces bypass of unfiltered fluid into the effluent stream. Since the 3M™ DF series filter element has more surface area and better flow characteristics, larger conventional bag housings can be eliminated in favour of smaller 3M™ DF series housings – reducing up-front capital expenditures and installation costs. In addition, the true "in-line" configuration of the inlet and outlet connections allow for installation without the additional piping and elbows required by conventional filter bag housings.

The unique flow configuration of the 3M™ DF series housing reduces the "dirty chamber" that is common in bag filter housings, thus reducing the potential for cross contamination of dirty fluid into the clean effluent during filter element change-out. 3M™ DF series housings incorporate a design that results in environmental, health, and safety benefits by allowing used 3M™ DF series filter element removal without the spillage of, or contact by the operator with, the process fluid. Exterior housing surfaces are bead blasted to provide a smooth and easy to clean finish.



## Features & Benefits

### Positive element sealing mechanism

- Ensures no bypass of unfiltered fluid into the effluent stream

### No dirty fluid chamber

- Reduces unfiltered fluid from contaminating the clean effluent side of the housing during filter change-out
- Reduces operator contact with the fluid

### Inline piping configuration

- Significantly reduces installation time and costs
- Ease of piping for series or parallel installation

### Excellent flow characteristics

- Reduces capital investment since fewer filter elements are required for a given flow rate

## 3M™ DF Series Filter Piping Systems

The inline bottom inlet and outlet connections offer tremendous flexibility in manifolding the housings for series or parallel filtration. This concept allows for enhanced adaptability in achieving both short and long term flow and process requirements. Manifold piping systems (with and without valves) are available for installing 3M™ DF series housings in duplex, triplex, and quadplex configurations. Consult your 3M Technical Representative for further information.

## 3M™ DF Series ASME Code Filter Housings

**Minimized Dirty Fluid Chamber-** the 3M™ DF series filter element extends to the top of the housing cover to significantly reduce the dirty fluid volume compared to conventional bag filter systems.

**3 Eye Nuts-** reduce the need for special tools and allows for quick and easy filter element installation and removal.

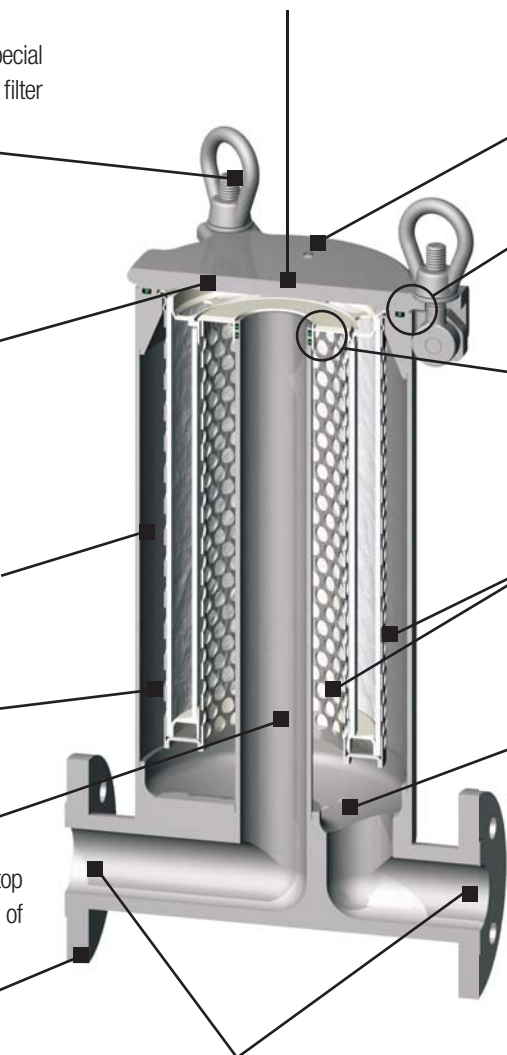
**Light weight cover-** remains attached to the housing and pivots open to allow easy access for filter change-out. Can be rotated for ideal pivot orientation.

**304 or 316L Construction-** provides compatibility with a wide range of fluids. Shot blast exterior finish improves appearance and allows for easy cleaning.

**ASME Code-** meets local and state design requirements for pressure vessels.

**Inlet Stand Pipe-** directs fluid to the top of the filter housing and inlet channels of the 3M™ DF series filter element.

**Available Connections-** include 2" ANSI flange (shown), 2" NPT, 2" DIN flange or 2" BSPT<sub>r</sub> to satisfy most common piping requirements.



**1/4" NPT Connection-** for easy vent valve or pressure gauge installation.

**O-ring Housing Seal-** to provide a positive seal between the housing and the cover when the system is in use.

**Double O-ring Element Seal-** seals the 3M™ DF series filter element to the top of the stand pipe (inlet) ensuring no by-pass.

**Support Basket-** full support of the filter element ensures filter integrity even under the most demanding conditions. Reduces media stretching which can open the media pores and allow larger particles to pass.

**Dished Bottom-** drains the clean liquid to the housing outlet for better product recovery and cleaner system operation.

### Optional Legs

Adjustable legs can accommodate an inlet/outlet centerline height adjustment of up to 11 inches.



**In-line Bottom Inlet & Outlet-** provides easy and cost effective installation by reducing the complexity of the piping scheme. Both the inlet and outlet piping have 1/2" NPT connections for drains, sample ports or pressure gauge installation.

## 3M™ DF Series Filter Support Basket

3M Purification offers a complete line of 3M™ DF series 316 stainless steel support baskets (many available in 316 L.S.S.) for use in existing bag filter housings or in the 3M™ DF series filter housing. The 3M™ DF series element utilizes a unique 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 unique design ensures media integrity and consistent effluent quality. 3M™ DF series baskets include the optimum combination of strength and open area to provide 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.



Existing Bag Filter Housing					3M Purification Basket Information			
MFG	Model	# of Bags	Inlet Entry <sup>3</sup>	Size	Adapter Part #	Basket Gasket Part #	Basket Part # (316 S.S.)	Basket Part # (316L S.S.)
Filtrek	BMB	1 - 17	Side	#2	N/A	N/A	60382-35	N/A
FSI	FS - 85 & Up	1 - 24	Side	#2	N/A	N/A	60382-38 <sup>4</sup>	N/A
FSI	FSP- 40	1	Side	#1	N/A	N/A	60382-32 <sup>4</sup>	N/A
FSI	FSP- 85 & up	1 - 24	Side	#2	N/A	N/A	60382-31 <sup>4</sup>	60382-39
Filtration Systems	112	1	Over the top	#1	60343-31	N/A	60382-32	N/A
Filtration Systems	122	1	Over the top	#2	60343-31	N/A	60382-31	60382-39
GAF/AFFCO	RB(1,2, or 4)	1 - 4	Over the top	#1	60339-31xx <sup>1</sup>	N/A	60382-32	N/A
GAF/AFFCO	RB(1,2, or 4) L	1 - 4	Over the top	#2	60339-31xx <sup>1</sup>	N/A	60382-31	60382-39
GAF/AFFCO	RB1 SE	1	Side	#1	N/A	60334-3x442 <sup>2</sup>	60382-34	N/A
GAF/AFFCO	RB1 L-SE	1	Side	#2	N/A	60334-3x442 <sup>2</sup>	60382-33	N/A
GAF/AFFCO	RB(2-12)C2L	2 - 12	Side	#2	N/A	60334-3x442 <sup>2</sup>	60382-33	N/A
Hayward	POLYLINE FLT 4202	1	Side	#2	60362-31	N/A	60382-31	60382-39
Hayward	TOPLINE TBF 0101	1	Over the top	#1	N/A	N/A	60382-32	N/A
Hayward	TOPLINE TBF 0102	1	Over the top	#2	N/A	N/A	60382-31	60382-39
Hayward	MAXILINE MBF	3 - 24	Side	#2	N/A	N/A	60382-31	60382-39
Hayward	MAXILINE SEMB	3 - 24	Side	#2	N/A	N/A	60382-31	60382-39
Krystil Klear	M88302 (OEM)	1	Side	#2	60346-31	N/A	60382-31	60382-39
Krystil Klear	L8815	1	Side	#1	N/A	N/A	60382-32	N/A
Krystil Klear	L8830	1	Side	#2	N/A	N/A	60382-31	60382-39
Parker	SB1 or 4	1 or 4	Side	#1	60340-31xx <sup>1</sup>	N/A	60382-32	N/A
Parker	SB1 or 4	1 or 4	Side	#2	60340-31xx <sup>1</sup>	N/A	60382-31	60382-39
Rosedale	8 - 15	1	Side	#1	N/A	N/A	60382-36	N/A
Rosedale	D8-15 (Duplex)	2	Side	#1	N/A	N/A	60382-36	N/A
Rosedale	8 - 30	1	Side	#2	N/A	N/A	60382-35	N/A
Rosedale	D8-30 (Duplex)	2	Side	#2	N/A	N/A	60382-35	N/A
Rosedale	16 - 48	2 - 23	Side	#2	N/A	N/A	60382-37	N/A
Strainrite	U F1-180	1 - 12	Side	#2	N/A	N/A	60382-31	60382-39

<sup>1</sup> Adapter Part Number (includes gasket)			<sup>2</sup> Basket Gasket Part Number	
Gasket	GAF/AFFCO	Parker	Gasket	Part Number
Nitrile	60339-31GA	60340-31GA	Nitrile	60334-36442
EPR	60339-31GB	60340-31GB	EPR	60334-37442
Fluorocarbon	60339-31GC	60340-31GC	Fluorocarbon	60334-38442
TEV	60339-31GD	60340-31GD	TEV	60334-39442

<sup>3</sup> Hold down Spring (Part # 64254-31) required for all side entry one bag housings  
<sup>4</sup> Seal Ring & FSI installation tool (Part # 74132-31) required

## 3M™ DF Series Filter System Accessories

The following accessories are available for use with the 3M™ DF series filter system:



**3M™ DF Series  
Element Installation  
Tool**

**Element Insertion Tool (Part # 70020091958):** 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 ensure no damage is done when inserted into the element.

**Element Reduction Tool (Part # 70020091545):** Constructed from 316 stainless steel, this tool facilitates reduction 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 element.

**Element Hold Down Spring (Part # 70020092089):** 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.



**3M™ DF Series  
Element Hold Down  
Spring**



**3M™ DF Series  
Element Removal Tool**

## 3M™ DF Series Filter Applications

<b>Coatings</b>	Electrodeposition, Trade Paint, Can Coatings, Dispersions, Paper Coatings, Adhesives, Automotive Paint, Architectural Paint, Printing Ink, Resins, Coil Coatings
<b>Industrial</b> Transformer Oil	Parts Washing, Pulp & Paper, Cooling Water, Ground Water, Waste Water, Hydraulic Fluids, Lubricants, Machine Tool Coolants,
<b>Chemical</b>	Acids, Chemicals, Process Water, Alcohols, Glycols, Fuels, Catalyst Recovery, Resins, Alkalines, Esters, Silicones, Aerosol Products, Mineral Oil, Waxes, Solvents
<b>Petrochemicals</b>	Fuel Additives, Glycols, Lube Oils, Distillation, Enhanced Oil Recovery, Amines, Fuels, Injection Fluids
<b>Food &amp; Beverage</b>	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
<b>Pharmaceutical</b>	Catalyst Recovery, Vitamin Extracts, Bulk Pharmaceutical Chemicals, OTC Solutions, Solvents, Active Pharmaceutical Ingredients, Carbon Reduction, Water Systems, Ophthalmics, Lotions
<b>Electronics</b>	Etching Baths, Process Water / RO Prefiltration, CD's / DVD's, Photochemicals, Solvents, Printed Circuit Manufacturing
<b>Water Treatment</b>	Cooling Water, Process Water, Well Water, Ground Water, Waste Water, RO Prefiltration

## 3M™ DF Series Filter Element Ordering Guide

Filter Designation	Nominal Reduction Rating (Micron)	Material (Media/Plastic Components)	Element Length (cm)	Connection Style
DFG - 3M DF series Graded-Porosity	001 - 1 µm	PP - Polypro/Polypro EE - Polyester/Polyester EP - Polyester/Polypro FE - Polyester/Polyester**	1 - 36.3	C - Open (3M DF series Housings) R - Closed (Standard Bag Housings)
	005 - 5 µm		2 - 70.6	
	010 - 10 µm			
	025 - 25 µm			
	050 - 50 µm			
	100 - 100 µm			
	200* - 200 µm			

\*Available in single layer polyester material (Code EE) only  
\*\* 21CFR Materials, available in 1, 5 and 10 µm

## 3M™ DF Series DF Filter Housing Ordering Guide

Number Around	3M™ DF Series	Size	Housing Material	Connection Type	Support Legs	Support Legs
1 - 1 Around	DF	1 - #1 Size 2 - #2 Size	B - 304 S.S. C - 316L S.S.	2 - 2" NPT	C - Mounting Clips	GA - Nitrile GB - EPR GC - Fluorocarbon

Housing Legs -9884801 (Part Number 70020091743)

## 3M™ DF Series Housing Specifications

Size	Material	Connection (size / type)	Maximum flow (lpm)	Max. Operating Pressure (bar)	Max. Operating Temp (C°)	Housing Weight (kg)
# 1	304 or 316L Stainless Steel	2" (500mm) Flanged 150 lb (ANSI)	284	10	90	20
#2			568			25

### Important Notice

The information described in this literature is accurate to the best of our knowledge. A variety of factors, however, can affect the performance of the Product(s) in a particular application, some of which are uniquely within your knowledge and control. INFORMATION IS SUPPLIED UPON THE CONDITION THAT THE PERSONS RECEIVING THE SAME WILL MAKE THEIR OWN DETERMINATION AS TO ITS SUITABILITY FOR THEIR USE. IN NO EVENT WILL 3M PURIFICATION BE RESPONSIBLE FOR DAMAGES OF ANY NATURE WHATSOEVER RESULTING FROM THE USE OF OR RELIANCE UPON INFORMATION.

It is your responsibility to determine if additional testing or information is required and if this product is fit for a particular purpose and suitable in your specific application.

### Limitation of Liability

3M Purification Pty Limited will not be liable, to the extent permitted by law, for any loss or damage from the use of the Product(s), whether direct, indirect, special, or consequential, regardless of the legal theory asserted, included warranty, contract, negligence or strict liability.



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