

# 3M Purification

## Filter Elements Brochure



# 3M™ DF Series Filter System

## Filter Cartridge Benefits... Filter Bag Economy

- ☑ New name for CUNO DuoFLO
- ☑ Easily retrofits standard bag filter housings
- ☑ Provides up to 4 times or more life than conventional bag filters
- ☑ Eliminates filter media rupture, contaminant by-pass and unloading
- ☑ Simplifies filter installation, removal and disposal
- ☑ Reduces hold-up volume by up to 67% or more





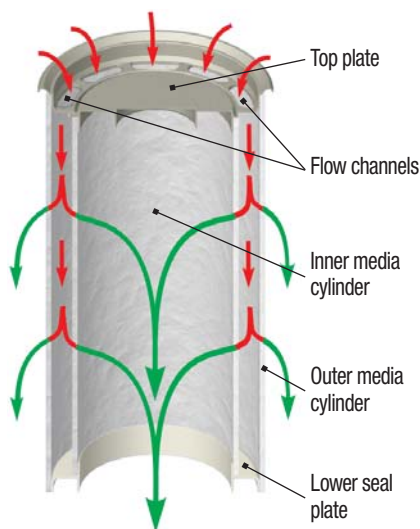
## The 3M™ DF Filter System

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

- up to 4 times or more the service life,
- superior contaminant removal 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 filter system in applications where bag filter housings are currently in use, simply remove the existing bag support basket, replace it with a 3M DF support basket and insert the 3M DF filter. For new installations, 3M Purification offers a full line of filter housings.

Figure 1: 3M™ DF Series flow path



### The 3M DF filter system design

The 3M DF filter 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 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 design incorporates an innovative geometry of both filter element and restrainer basket which provides 100% 3-dimensional support of the 3M DF media. This eliminates the potential for filter element rupture and the resulting gross contamination of the downstream effluent with previously removed particles. The design of the 3M DF element also reduces filter element hold-up fluid volume by 67% compared to conventional bags, helping minimise worker exposure to process fluids.

## Features and benefits

### A 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 - helps minimise product loss, labour, 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 and related disposal costs.
- Used element retains less fluid, making it lighter weight for easier removal.
- Eliminates displacement balloons and associated spillage during change-out.

### 100% downstream support of the filter element

- Eliminates filter rupture, contaminant bypass and unloading.
- Allows operation to higher differential pressures before filter change-out.

### Superior flow characteristics

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

### Approved for food contact use (PP elements only)

-  Complies with European and US regulations

## 3M DF elements provides superior service life

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

### Greater media surface area

The 3M DF filter design helps provide 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:

- Lower 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.

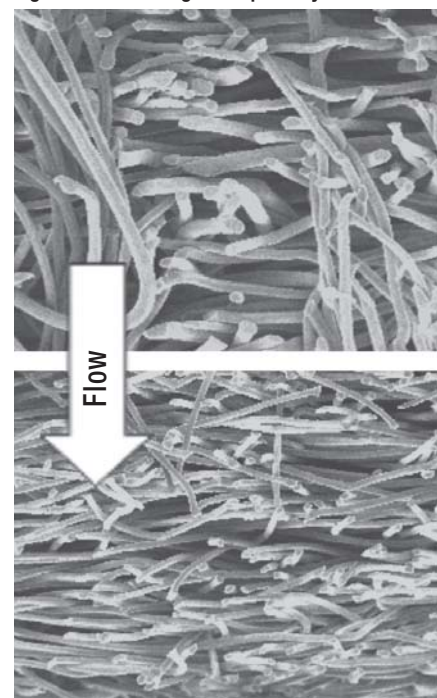
### Greater contaminant holding capacity

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 removing 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 optimised to achieve the longest service life. Media migration is eliminated by thermally bonding the exterior surface of the downstream media layer.

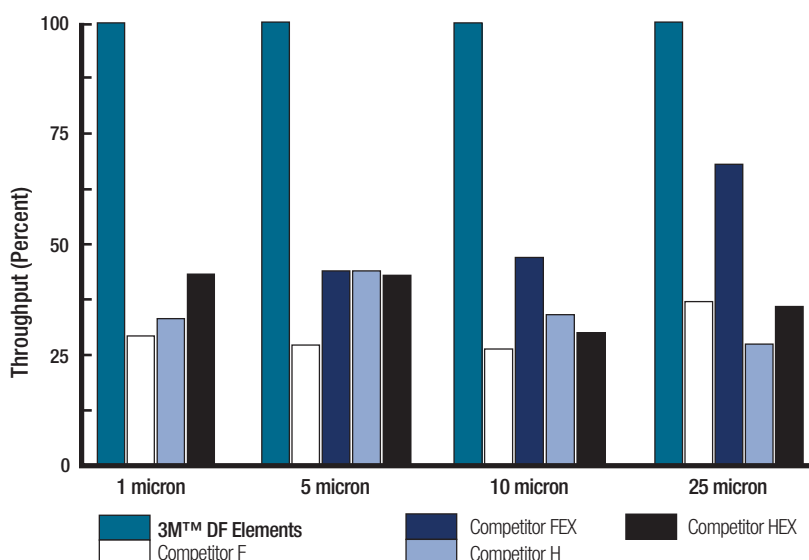
### Superior filter service life

Extensive testing, supported by field results, has demonstrated the superior life advantage achieved by 3M DF elements while obtaining superior efficiencies. As shown in graph 1, 3M DF 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).

Figure 2: 3M™ DF graded-porosity media



Graph 1: Service life comparison for 3M™ DF elements and conventional bag filters (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.



**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 remove the larger contaminant while the downstream zone is “tighter” to remove the smaller contaminant. This design provides greater contaminant holding capacity and longer life than conventional single layer media.

**Increased surface area** - The 3M Purification 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

**Reduced hold-up volume** - A 67% reduction in hold-up volume significantly decreases lost product and disposal costs.

Size	Hold-up volume	(litre)
#2	3M DF series	5.3
#2	Standard bag	16.3

**Superior sealing collar** - Constructed from moulded polypropylene or polyester with an advanced sealing lip that provides a dynamic spring-like seal, the 3M DF design eliminates contaminant bypass.

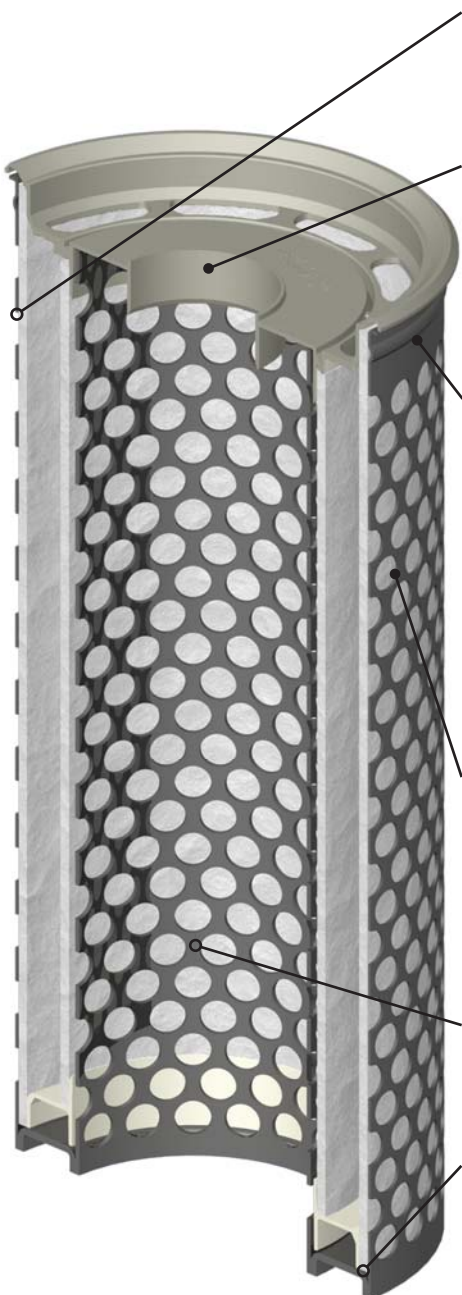
**Support basket** - Full support of the filter element helps provide filter integrity even under the most demanding conditions by eliminating the potential for media stretching which can open the pore structure and allow larger particles to pass.

**Thermal side seam** - Using advanced thermal sealing processes, the 3M DF seam eliminates the problem of contaminants passing through large needle holes.

**Singed media surface** - Many filter bags release fibres that end up in the filtered product. The 3M DF filter media is thermally treated to eliminate loose fibres.

**Integral media to plate seal** - An integral seal between the plastic components and the filter media is provided by using state-of-the-art ultrasonic welding techniques.

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



## 3M DF specifications and operating parameters

### Materials of construction

Each grade of the 3M™ DF series filter is manufactured from high performance fibres selected based on extensive media performance testing. No adhesives, binders or silicone are used in the manufacturing process. The 3M DF filter element is available in all-polypropylene, all-polyester or polyester media with polypropylene lower seal and top plate construction.

**Table 1: Operating parameters by material and size**

Operating conditions	3M™ DF polypropylene		3M™ DF polyester	
	Size #1	Size #2	Size #1	Size #2
Maximum operating temperature	82 °C		149 °C	
Maximum recommended flow rate	284 lpm	568 lpm	284 lpm	568 lpm
Maximum forward differential pressure	2.4 bar at 20 °C			
Recommended change-out differential pressure	1.4 bar			
Regulatory compliance	3M™ DF polypropylene “PP” filter elements comply with the requirements of Regulation (EC) 1935/2004 for their intended food contact applications (see table 5). The materials of construction for the “PP” elements and “FE” (1, 5 and 10 µm) elements comply with the requirements of the Food and Drug Administration’s (FDA) Code of Federal Regulations (CFR), Title 21 parts 170-199 for contact with food.. Contact 3M Purification for further information.			

### Filter Element Size and Ratings Available

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

**Table 3: 3M™ DF filter element specifications**

Dimension	3M™ DF series elements	
	Size #1	Size #2
Nominal removal ratings (micron)	1, 5, 10, 25, 50, 100 and 200*	
Filter diameter	17.8 cm	
Filter length	36.3 cm	70.6 cm
Media area	0.32 m²	0.62 m²
Hold-up volume per filter	2.6 l	6.2 l

\*available in polyester only

### Flow characteristics and sizing options

Flow vs. differential pressure for a 3M DF #2 size filter element and support basket in water is depicted in graph 2. A typical filter system is often sized for an initial differential pressure of 0,04 to 0,07 bar. A lower flow rate per element typically extends the life of the filter system.

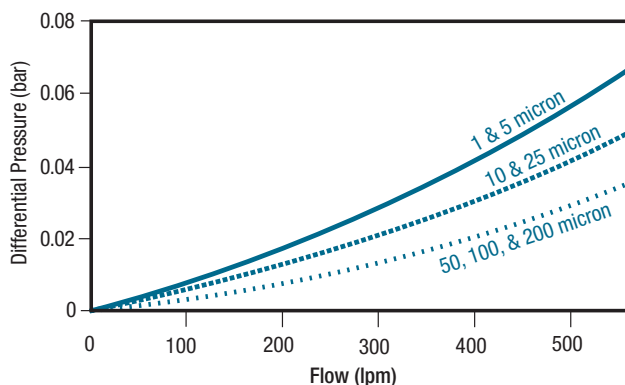
**Table 2: Chemical compatibility table**

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	poor

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.

### 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 support basket

3M Purification offers a complete line of 3M™ DF 316 stainless steel support baskets (many available in 316 L stainless steel) for use in existing bag filter housings or in 3M Purification filter housings. The 3M DF element utilizes a basket for proper element support. The 3M DF filter basket has two concentric stainless steel cylinders to support both the inner and outer filter element sleeves. This 3M Purification design helps provide 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 support basket needed to upgrade to the 3M DF filter element.

**Table 4: 3M™ DF Series filter support basket ordering guide (contact 3M Purification for manufacturer models not listed)**

Existing bag filter housing					3M™ DF Series basket information			
Manufacturer	Model	# of bags	Inlet entry ***	Size	Adapter part #	Basket gasket part #	US basket part # (316 st. steel)	US basket part # (316L st. steel)
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****	N/A
FSI	FSP - 40	1	Side	#1	N/A	N/A	60382-32****	N/A
FSI	FSP - 85 & Up	1 - 24	Side	#2	N/A	N/A	60382-31****	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*	N/A	60382-32	N/A
GAF/AFFCO	RB (1,2 or 4) L	1 - 4	Over the top	#2	60339-31xx*	N/A	60382-31	60382-39
GAF/AFFCO	RB1 SE	1	Side	#1	N/A	60334-3x442**	60382-34	N/A
GAF/AFFCO	RB1 L-SE	1	Side	#2	N/A	60334-3x442**	60382-33	N/A
GAF/AFFCO	RB (2 - 12) C2L	2 - 12	Side	#2	N/A	60334-3x442**	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*	N/A	60382-32	N/A
Parker	SB1 or 4	1 or 4	Side	#2	60340-31xx*	N/A	60382-31	N/A
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	UF1-180	1 - 12	Side	#2	N/A	N/A	60382-31	60382-39

### \*\*US basket gasket part number

Gasket	Part Number
nitrile	60334-36442
EPR	60334-37442
fluorocarbon	60334-38442
PTFE encapsulated fluorocarbon	60334-39442

### \* US adapter part number (includes gasket)

Gasket	GAF/AFFCO	Parker
nitrile	60339-31GA	60340-31GA
EPR	60339-31GB	60340-31GB
fluorocarbon	60339-31GC	60340-31GC
PTFE encapsulated fluorocarbon	60339-31GD	60340-31GD

\*\*\* Hold down spring (part # 70020092089) required for all side entry one bag housings

\*\*\*\* Seal ring & FSI installation tool (part # 70020091545) required

## 3M DF Series filter system accessories

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

### 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 provide no damage is done when inserted into the element.

### Element removal tool (part # 70020091545):

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 element.

### Element hold-down spring (part # 70020092089):

Constructed from 316 stainless steel, this spring assembly helps provide for the proper seating of the 3M DF series element in side-entry housings to prevent fluid bypass.

### Magnet assembly (part # 70020091974):

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 and is fully supported when inserted into a 3M DF element.



Application Category	Substrate	Media	Fluids
Coatings	Electrodeposition Trade paint Can coatings Dispersions	Paper coatings Adhesives Automotive paint Architectural paint	Printing ink Resins Coil coatings
Industrial	Parts washing Pulp and 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 Biofuel
Food and beverage (PP elements only)	Vegetable oil Syrups Edible oils Soft drinks Wine	Spirits Fruit juice Beer Honey Vinegar	High fructose corn syrup Liquid sugar Bottled water Ready to drink tea Sports drinks
Pharmaceutical	Catalyst recovery Vitamin extracts Bulk pharmaceutical chemicals	Solvents Active pharmaceutical ingredients Carbon removal	Water systems Salt recovery Lotions
Electronics	Etching baths Process water / RO prefiltration	CD's / DVD's Photochemicals	Solvents Printed circuit manufacturing
Water treatment	Cooling water Process water	Well water Ground water	Waste water RO prefiltration

## 3M™ DF Series filter elements - Ordering guide

Filter designation	Nominal removal rating (micron)	Material (media/plastic components)	Element length (inches)	Connection style
DFG – 3M™ DF graded-porosity	001 - 1 µm	PP - polypropylene/polypropylene	1 - 14.3 nominal	C - open (3M™ DF Series housings) R - closed (Standard bag housings)
	005 - 5 µm	EE - polyester/polyester	2 - 27.8 nominal	
	010 - 10 µm	EP - polyester/polypropylene		
	025 - 25 µm	FE - polyester/polyester **		
	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 only

Note: 3M™ DF Series Filters is new name for CUNO DuoFLO filters.

## 3M™ DF Series filter accessories

3M™ DF element hold-down spring - part # 70020092089



3M™ DF element removal tool - part # 70020091545



3M™ DF magnet part # 70020091974



3M™ DF element installation tool - part # 70020091958



### Important Notice

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