

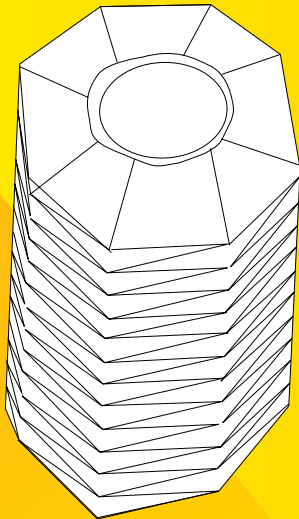


Science.
Applied to Life.™



Separation and Purification Sciences Division

Compound radial pleats. Applied to minimizing your footprint.



The 3M™ High Flow Filter System is a result of 3M's extensive filtration experience applied to delivering high flow filter technology in a compact design. For those customers who want filtration efficiency and a small footprint, 3M High Flow filter system may be the right filtration solution.

High performance media in an innovative design.



Figure 1: 3M™ High Flow single round filter system



Figure 2: 3M™ High Flow Sanitary Design single round filter system

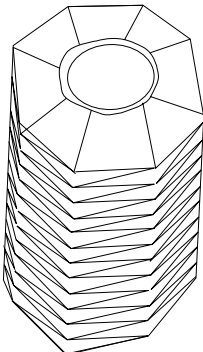


Figure 3: 3M compound radial pleat design

High flow capability

The 3M™ High Flow filter system is designed to accommodate flow rates of up to 500 gallons per minute (gpm) in a single 60" length filter cartridge. The result? Fewer filter elements to maintain your process flow requirements. In fact, 3M High Flow filter systems require as few as one-tenth the number of elements as conventional 2.5" outer diameter (OD) filter cartridges (see Figure 5).

3M High efficiency filter media in a compound radial Pleat structure

3M innovation is at the heart of the 3M High Flow filter. A compound radial pleat design (see Figure 2) helps maximize the usable surface area of each filter. Blown microfiber forms the basis of the filter media, which is manufactured to tightly-controlled fiber diameter specifications, producing a media with absolute-rated particle retention characteristics. The 3M manufacturing process embosses the media to produce a more

uniform pleat pattern, which, in turn, allows greater utilization of the media by evenly distributing the process fluid throughout the entire filter structure. This results in consistent particle retention in a compact, space-saving design. 3M High Flow cartridge's polypropylene end caps, outer sleeve, and core protect the pleat structure integrity and provide a robust filter construction.

Compact system design

Fewer required filter cartridges combined with an outside-to-inside flow path reduces the size of housing required for your application. The 3M High Flow filter housing takes up as little as one-half the size of conventional 2.5" OD filter cartridge housings for a given flow rate. The result is lower capital investment costs and a compact footprint that saves valuable plant space (see Figure 5).

Ease of use with twist-to-lock

The 3M™ High Flow filter system is designed with ease-of-use in mind. From a user-friendly, ergonomically designed handle that makes cartridge installation and removal easier without the use of special tools or other hardware, to a “twist-to-lock” cartridge seating mechanism that provides a positive seal, the 3M High Flow filter system facilitates easy operation and maintenance of your filter system.

3M™ High Flow HFM series filters for organic and/or biological contaminants

The High Flow HFM series filters utilize a 3M microfiber media specifically designed for use in process fluid applications containing organic and/or biological contaminants. The media design helps prevent premature blinding of the filter outer surface, promoting fuller utilization of the media, resulting in an optimum combination of particle removal efficiency and contaminant holding capability.

| Industries | Applications |
|---|--|
| <p>Municipal Water General Industrial Oil & Gas Chemicals & Petrochemicals Food & Beverage Electronics</p> | <ul style="list-style-type: none"> • Pre-RO Water • Process Waters • Wastewater & Reclaimed Waters • Injection & Produced Waters • DE Trap • Clarification • Amine Sweetening • Catalyst Protection/Recovery • Machine Coolants |
| Features | Benefits |
| <p>High Flow Capability per Cartridge (vs. conventional 2.5” diameter cartridges)</p> | <p>Fewer cartridges required, resulting in:</p> <ul style="list-style-type: none"> • Reduced cartridge handling & disposal • Reduced filter change-out time • Less individual cartridge seal points, reducing chance of fluid bypass |
| <p>Compound Radial Pleat Design using 3M Blown Microfiber Polypropylene Media</p> | <ul style="list-style-type: none"> • High filter loading capacity • Reproducible filter effluent quality throughout life of filter • Broad chemical compatibility |
| <p>Compact System Design</p> | <ul style="list-style-type: none"> • Smaller housing minimizes capital expense requirements • Reduces system footprint |
| <p>Easy to Use</p> | <ul style="list-style-type: none"> • No special tools or hardware required for filter change-out • “Twist-to-lock” cartridge seating mechanism provides positive seal • Ergonomic designed handle facilitates cartridge installation and removal |
| <p>FDA CFR-21 Listed Material</p> | <ul style="list-style-type: none"> • Compatible in applications requiring direct food contact in food and beverage processing |
| <p>WQA NSF/ANSI Std 61</p> | <ul style="list-style-type: none"> • Certified by WQA to NSF/ANSI Std 61 for material safety. |

Figure 4: 3M™ High Flow filter cartridge design features

Ease of use

An ergonomically designed handle facilitates fast and easy insertion and removal without the use of special tools. Cartridges are simply inserted over a built-in guide tube.



Polypropylene construction

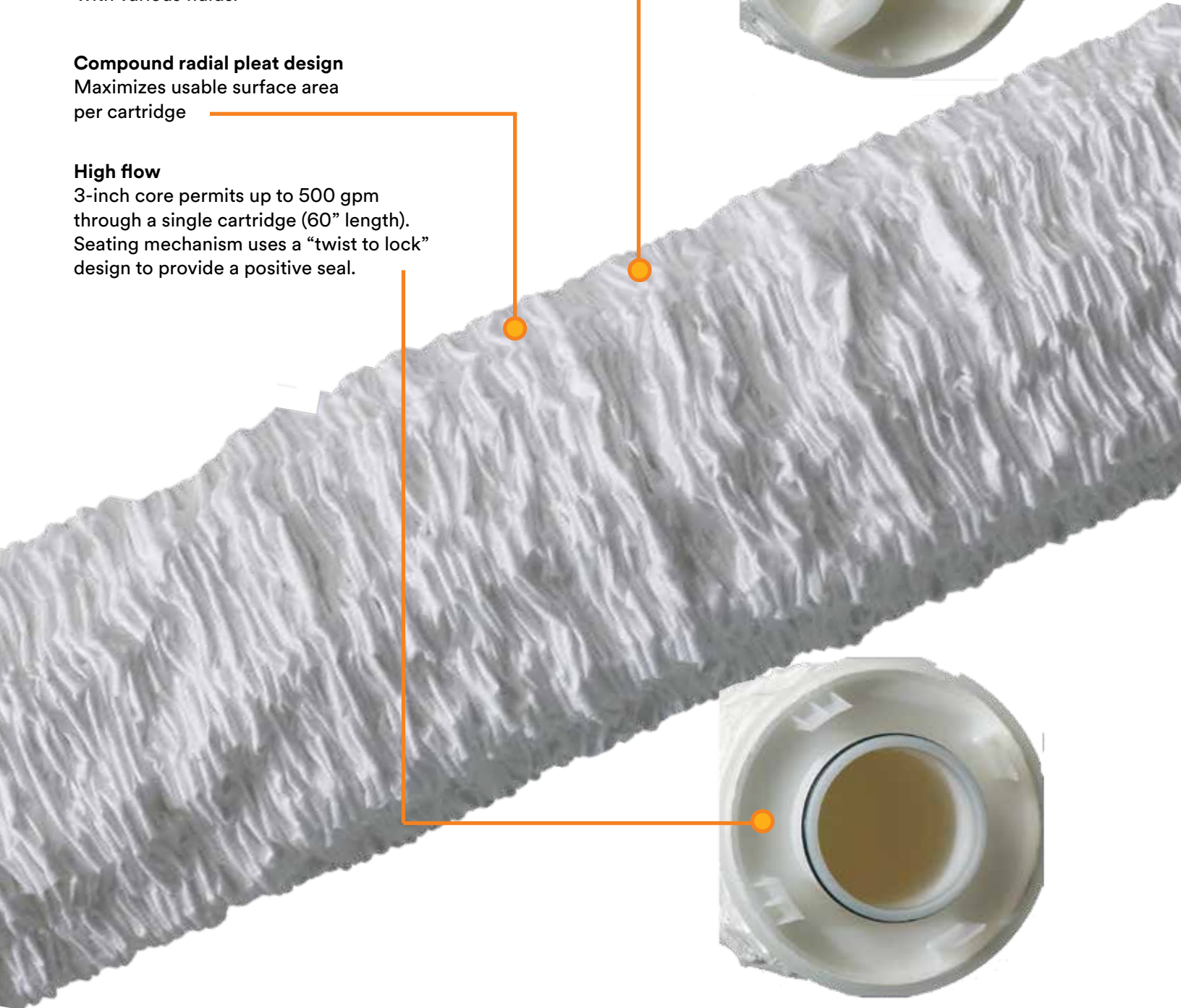
Provides wide range of compatibility with various fluids.

Compound radial pleat design

Maximizes usable surface area per cartridge

High flow

3-inch core permits up to 500 gpm through a single cartridge (60" length). Seating mechanism uses a "twist to lock" design to provide a positive seal.



3M™ High Flow system vs. conventional 2.5" filter systems comparison basis:

- 40" length cartridges
- Fluid viscosity: 1 cps

Flow rates per cartridge:

- 3M™ High Flow cartridge: 350 gpm
- 2.5" outer diameter (OD) conventional pleated cartridge: 20 gpm
- 2.5" outer diameter (OD) conventional depth cartridge: 15 gpm

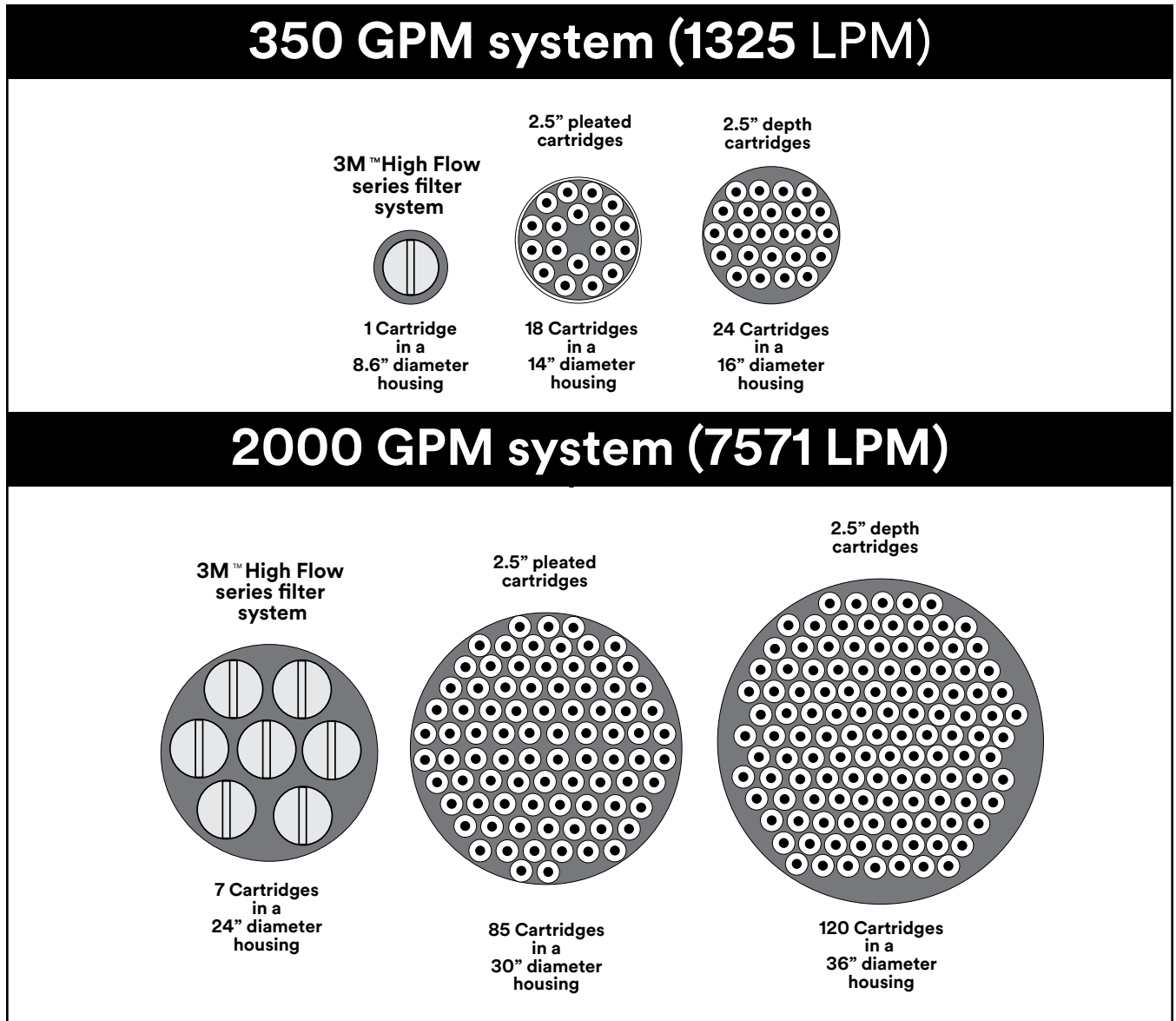


Figure 5 – Comparison of required filter cartridges & housing footprint

The Bottom line:

- The 3M High Flow system requires 90% fewer cartridges as conventional 2.5" OD cartridge systems for a given flow rate
- 3M High Flow series filter housings are 33% to 50% smaller than filter housings for conventional 2.5" OD cartridges for a given flow rate
- Fewer filters and a user-friendly housing design mean easier and faster filter change-outs

3M™ High Flow Series Filter Specifications

| Construction | |
|---|---|
| Absolute Rating (microns) | HF Series: 1, 2, 5, 10, 15, 25, 40, 70 HFM Series: 5, 10, 20, 70* *5 micron nominal |
| Filter Media, Center Core, End Caps, Outer Sleeve | Polypropylene |
| Sealing O-ring options | Nitrile, ethylene propylene rubber (EPR), silicone, fluorocarbon |
| O-Ring Size/End Cap Connection | 338 (Special Thread Design) 3.0" (76.2 mm) |
| Cartridge Dimensions | |
| Inside Diameter (nominal) | 3.0" (76.2 mm) |
| Outside Diameter (nominal) | 6.5" (165 mm) |
| Length (nominal) | 10" (254 mm) 40" (1016 mm) 60" (1524 mm) |
| Operating Conditions | |
| Maximum Recommended Flow Rate in Water (@70° F) | 85 gpm (19.3 m3/hr) – 10" Length 350 gpm (79.5 m3/hr) – 40" Length 500 gpm (113.6 m3/hr) – 60" Length |
| Maximum Continuous Operating Temperature | 160 °F (71 °C) |
| Maximum Hot Water Sanitization Temperature | 194 °F (90 °C) |
| Maximum Forward Differential Pressure | 50 psid @ 68°F (3.4 bar @ 20 °C) |
| Recommended Change-out Differential Pressure | 35 psid @ 68°F (2.4 bar @ 20 °C) |
| Clean Pressure Drop | See Page 8 and 9 |
| Regulatory | |
| FDA CFR-21 Listed Materials of Construction | |
| Certified by WQA to NSF/ANSI Std 61 | |



3M™ High Flow system filter housings

3M™ High Flow system filter housings are specifically designed to deliver all of the system's benefits in a compact footprint in your production site. Housings are available in ASME code or Non-Code standard designs, as well as customizable configurations to suit your specific needs. The surface finishes available for the housings are glass bead blasted, painted or polished.

3M High Flow series filter housings are available in a variety of standard sizes to accommodate from 1 to 19 3M High Flow filter cartridges in 10-inch, 40-inch and 60-inch lengths. Other High Flow housing sizes and configurations are also available upon request.

The outside-to-inside flow pattern of the 3M High Flow system translates into a simpler filter housing design and operation. Alternative inside-to-outside flow designs require the use of a bulky support plate for cartridge sealing. This support plate must be removed during cartridge installation and change-out, and may require the use of special tools. The 3M High Flow housing features a centerpost design for cartridge support, requiring no support plates or special tools, providing a user-friendly cartridge installation and removal process.

3M High Flow series filter housings come with a choice

of standard inlet and outlet connection size options. The "MAX" option uses inlet and outlet connections sized for the maximum design flow through the High Flow cartridges (350 gpm for 40-inch, 500 gpm for 60-inch). For applications where operation at less than 50% of the maximum design flow is preferred (e.g. those having a higher inlet solids level, or where optimizing filter life is a priority), the "STD" option, which uses smaller inlet & outlet connections, may be chosen.

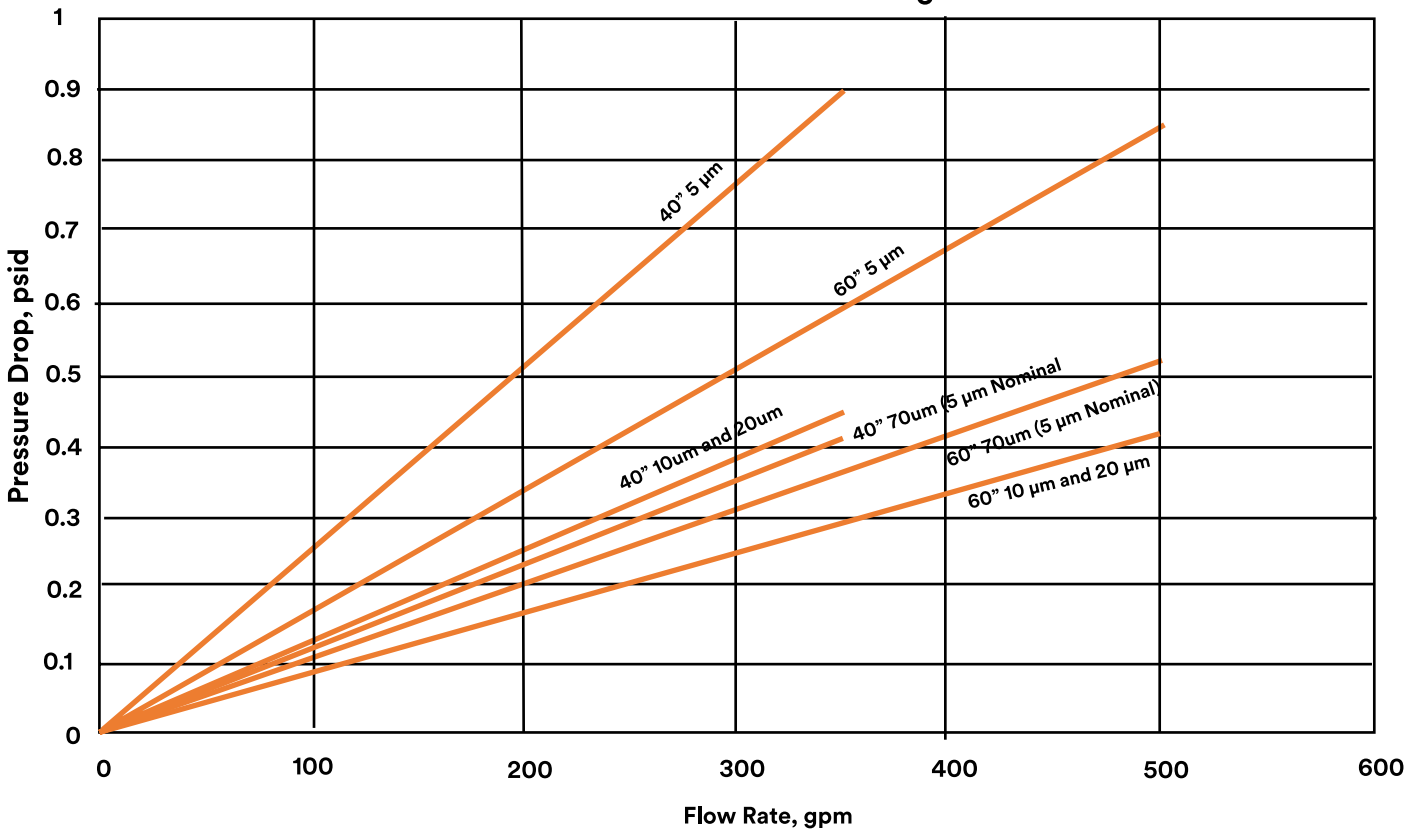


Figure 6: 3M™ High Flow Sanitary Design Housings

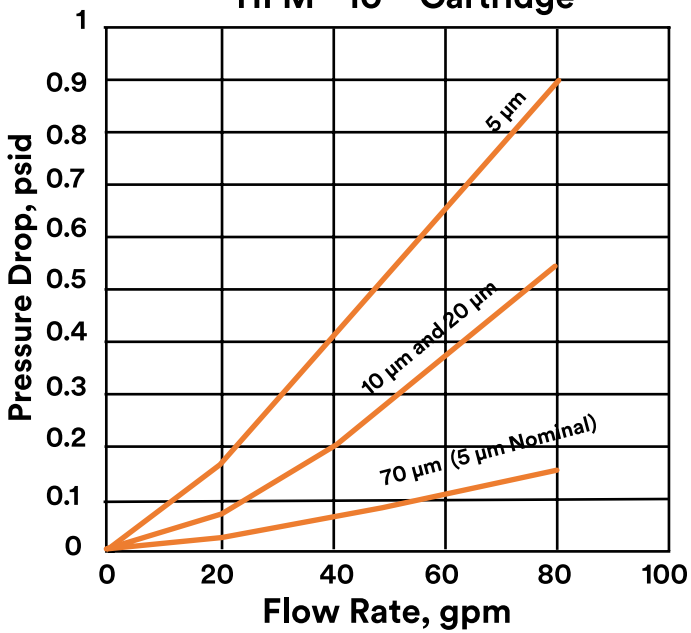


Figure 7: 3M™ High Flow Housings

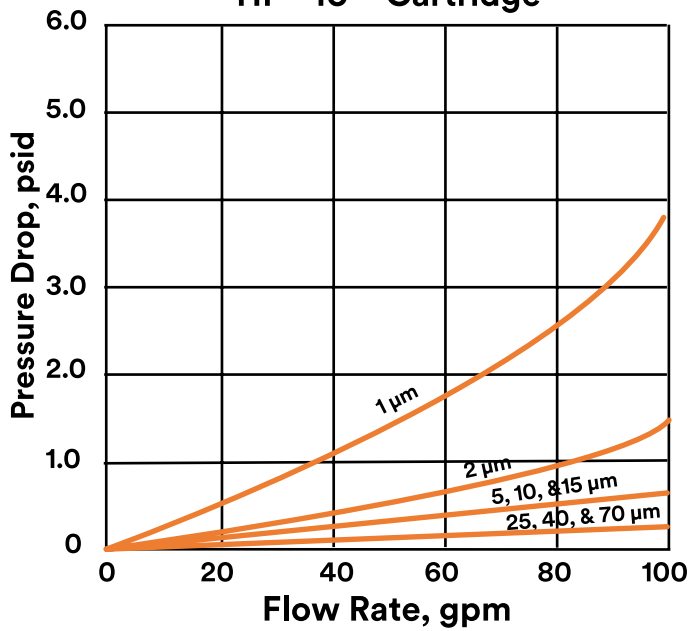
HFM - 40" and 60" - Cartridge



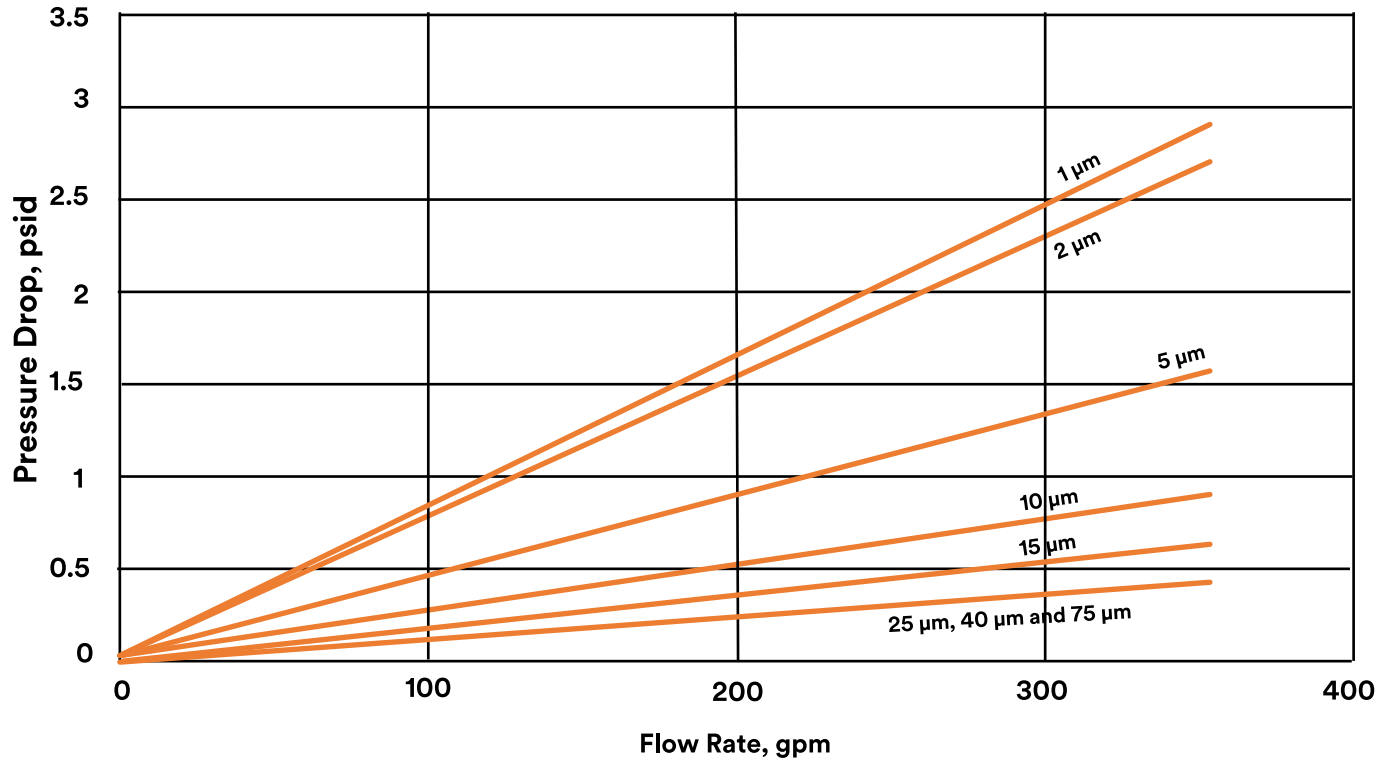
HFM - 10"- Cartridge



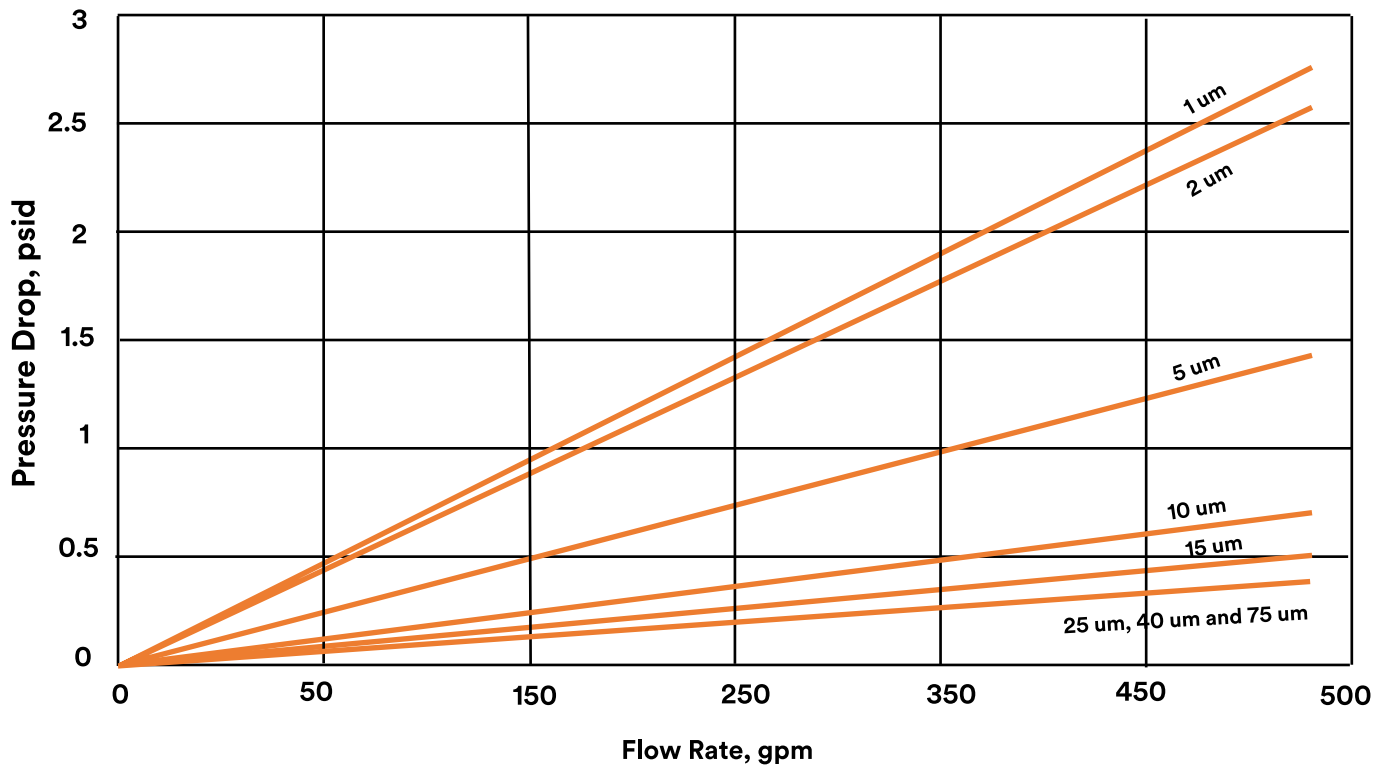
HF - 10"- Cartridge



HF 40" Clean Pressure Drop



HF 60" Clean Pressure Drop



| 3M™ High Flow System Filter Housings | |
|---|---|
| Features | Benefits |
| <p>High Flow Capability per Cartridge (vs. conventional 2.5” diameter cartridges)</p> | <p>Allows for use of smaller diameter housing reducing capital expense and system footprint requirements. Fewer cartridges required, resulting in:</p> <ul style="list-style-type: none"> • Reduced cartridge handling & disposal • Reduced filter change-out time • Less individual cartridge seal points reducing chance of fluid bypass |
| <p>Robust Cartridge Centerpost Support Design</p> | <ul style="list-style-type: none"> • Eliminates need for bulky support plates and tools. • Facilitates cartridge installation & removal. |
| <p>Unique Diamond Pleated Cartridge Sealing Mechanism (“Twist to Lock” into Plug Base Closure)</p> | <ul style="list-style-type: none"> • Allows for verification of proper cartridge seating, reducing chance of fluid bypass |

Industry-specific high flow housing designs

Oil & gas service:

Specially designed 3M High Flow series housings are available upon request in designs to accommodate requirements typically found in oil & gas applications, including:

- Corrosion allowances
- Higher pressure ratings
- Swing bolt closure design
- Non-destructive examination
- NACE (National Association of Corrosion Engineers) Compliance
- Post weld heat treatment

Food & beverage service:

Specially designed 3M High Flow Sanitary Design Housings are designed to deliver all of the system's benefits in a compact footprint:

- 316L Stainless steel construction generally regarded as safe
- Internal/external polished surfaces
- Sanitary flange connections (for inlet, outlet, bleed & drain ports)

10-inch housing:

ASME code and Non-Code housing designs are available to accommodate the 10-inch High Flow cartridge. This allows the user to take advantage of the benefits of the High Flow cartridge design (high efficiency filter media, “twist to lock” positive seating mechanism). These versions, capable of maximum flow rates of 85 gpm per cartridge, are great choices for lower process flow applications (such as point-of-use).

3M™ High Flow Series Filter Housing specifications

| Housing Family | 10" ASME Code | 10" Non-Code | 40" ASME Code | 60" ASME Code | 10" Sanitary | 40" Sanitary Design | 60" Sanitary |
|------------------------------------|---------------------|--------------|---|---------------|-----------------|---------------------|---------------------|
| Standard Designs (# of Cartridges) | 1 | 1 | 1, 3, 5, 7, 12, 19 | | 1 | 1 | 1 |
| Design Specification | ASME Code | Non-Code | ASME Code | | Non-Code | | |
| Design Pressure | 150 psi @ 250 F | | | | 150 psi @ 195 F | 150 psi @ 250 F | |
| Material of Construction | 304 SS | 316L SS | Carbon Steel * 304 SS * 316L SS | | 316L SS | | |
| O-Ring/Gasket | Buna N | | | | EPDM | | |
| Orientation | Vertical | Vertical | Horizontal** | Horizontal | Vertical | Horizontal | Horizontal |
| Cover | Swing Bolt – Hinged | Clamp | Swing Bolt – Hinged or Davit Arm | | Clamp | Swing Bolt – Hinged | Swing Bolt – Hinged |
| Exterior Finish | Bead Blast | Polished | Carbon Steel – Enamel Stainless Steel – Bead Blast | | Polished | | |

* Not available in 1-Around.

** 1-Around 40" available with Vercicle stand, some multi-around verticals are available - consult factory.

3M™ High Flow Series Industrial Filter Housing specifications (for 40" L High Flow cartridges)

| Housing Model | # of Cartridges | Housing OD (in/cm) | Materials of Construction | STD MODEL | | MAX MODEL | | Housing Dimensions (Inches/Centimeters See figure 8) |
|---------------|-----------------|--------------------|---|---|------------------------|---|------------------------|---|
| | | | | Inlet & Outlet Connection Sizes (in./cm) (ANSI Flanges) | Maximum Flow (gpm/lpm) | Inlet & Outlet Connection Sizes (in./cm) (ANSI Flanges) | Maximum Flow (gpm/lpm) | |
| 1HF40 | 1 | 8.625/22 | 316L Stainless Steel | - | - | 4 | 350/1325 | (A) 64 ^{1/2} /163.8 (B) 16/40.6 (C) 40 ^{7/8} /103.8 |
| 3HF40 | 3 | 16/41 | Carbon steel 304 Stainless Steel 316L Stainless Steel | 4 | 438/1658 | 6 | 875/3312 | (A) 74 ^{1/4} /188.5 (B) 24 ^{1/2} /62.2 (C) 51 ^{3/4} /131.4 |
| 5HF40 | 5 | 20/51 | | 6 | 775/2934 | 8 | 1550/5867 | (A) 82 ^{3/4} /208 (B) 28 ^{1/2} /72.4 (C) 55 ^{1/8} /140 |
| 7HF40 | 7 | 24/61 | | 8 | 1225/4637 | 10 | 2450/9274 | (A) 87 ^{7/8} /223.2 (B) 32/81.3 (C) 64 ^{7/8} /164.8 |
| 12HF40 | 12 | 30/76 | | 10 | 2100/7949 | 14 | 4200/15898 | (A) 96 ^{7/8} /246 (B) 36/91.4 (C) 72/182.8 |
| 19HF40 | 19 | 36/91 | | 12 | 3325/12586 | 18 | 6650/25173 | (A) 105 ^{5/8} /268.3 (B) 36/91.4 (C) 76 ^{1/8} /193.3 |

3M™ High Flow Series Industrial Filter Housing specifications (for 60" L High Flow cartridges)

| Housing Model | # of Cartridges | Housing OD (in./cm) | Materials of Construction | STD Model | | MAX Model | | Housing Dimensions (See figure 8) |
|---------------|-----------------|---------------------|---|---|------------------------|---|------------------------|---|
| | | | | Inlet & Outlet Connection Sizes (in./cm) (ANSI Flanges) | Maximum Flow (gpm/lpm) | Inlet & Outlet Connection Sizes (in./cm) (ANSI Flanges) | Maximum Flow (gpm/lpm) | |
| 1HF60 | 1 | 8.625/22 | 316L Stainless Steel | – | – | 4 | 500/1893 | (A) 84 ^{1/2} /214.6 (B) 16/40.6 (C) 41 ^{7/8} /106.3 |
| 3HF60 | 3 | 16/41 | Carbon Steel 304 Stainless Steel 316L Stainless steel | 4 | 750/2839 | 8 | 1500/5678 | (A) 98 ^{1/4} /249.5 (B) 24 ^{1/2} /62.2 (C) 51 ^{7/8} /141.9 |
| 5HF60 | 5 | 20/51 | | 6 | 1225/4637 | 10 | 2450/9274 | (A) 104 ^{3/4} /266 (B) 28 ^{1/2} /72.4 (C) 55 ^{5/8} /141.3 |
| 7HF60 | 7 | 24/61 | | 8 | 1750/6624 | 12 | 3500/13249 | (A) 109 ^{5/8} /278.4 (B) 32/81.3 (C) 64 ^{7/8} /164.7 |
| 12HF60 | 12 | 30/76 | | 10 | 3000/11356 | 16 | 6000/22712 | (A) 118 ^{7/8} /301.9 (B) 36/91.4 (C) 72 ^{1/2} /184.1 |
| 19HF60 | 19 | 36/91 | | 12 | 4750/17981 | 20 | 9500/35961 | (A) 127 ^{5/8} /324.1 (B) 36/91.4 (C) 76 ^{5/8} /194.6 |

3M™ High Flow Series Industrial Filter Housing specifications

| Housing Part Number | Housing OD | Material of Construction | Inlet / Outlet | Maximum Flow | Height | Footprint | Drain | Vent | Gauge |
|---------------------|------------|--------------------------|----------------|--------------|--------|--------------------------|----------|----------|----------|
| 1HF10VBGD | 8 5/8" | 304 SS | 2" RFSO Flange | 85 GPM | 41"* | 13" In-Line Face-to-Face | 1/2" npt | 1/4" npt | 1/2" npt |
| 1HFN10VCGD | 8" | 316L SS | 2" npt | 85 GPM | 23" | 12" Face-to-Face | 3/4" npt | 1/4" npt | None |
| 1HFX40VC | 8 5/8" | 316L SS | 4" RFSO Flange | 350 GPM | 80"* | Stand 23" diameter | 1" npt | 1/4" npt | 1/4" npt |

*Adjustable

3M™ High Flow Series Sanitary Design Filter Housing specifications

| Housing Part Number | Housing OD | Material of Construction | Inlet / Outlet | Maximum Flow | Height | Footprint | Drain | Vent | Gauge |
|---------------------|------------|--------------------------|----------------|--------------|--------|---------------|---------------|---------------|-----------------|
| 1HF10VCS | 8" | 316L SS | 2" Sanitary | 85 GPM | 35" | 8" Diameter | 1/2" Sanitary | 1/2" Sanitary | 1 1/2" Sanitary |
| 1HFX40HCS | 10 3/4" | 316L SS | 3" Sanitary | 250 GPM | 50" | 55" L X 18" W | 1" Sanitary | 1/2" Sanitary | 1 1/2" Sanitary |
| 1HFX60HCS | 10 3/4" | 316L SS | 3" Sanitary | 250 GPM | 50" | 75" L X 18" W | 1" Sanitary | 1/2" Sanitary | 1 1/2" Sanitary |

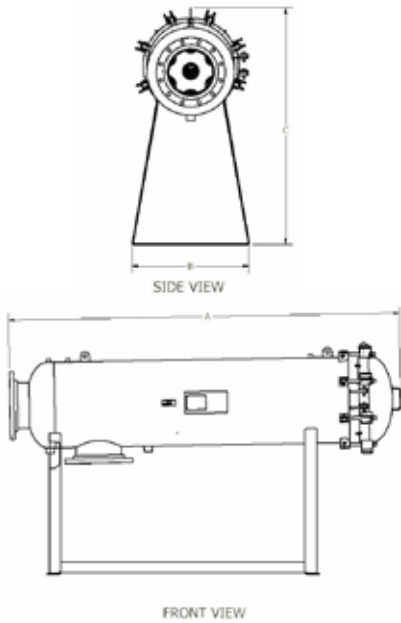


Figure 8: 3M™ High Flow 40" L & 60" L Housings – Horizontal configurations

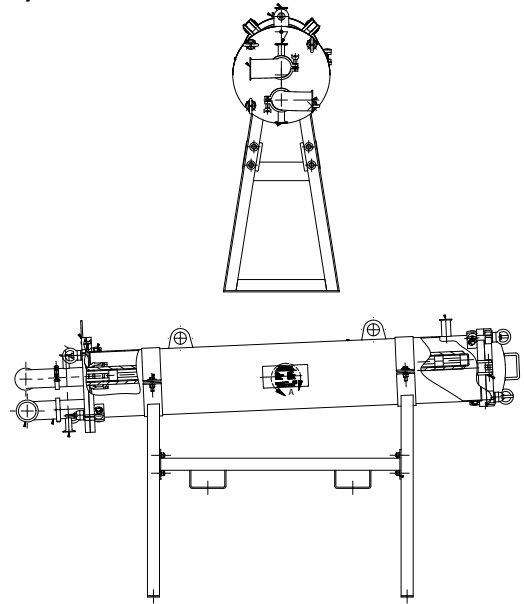
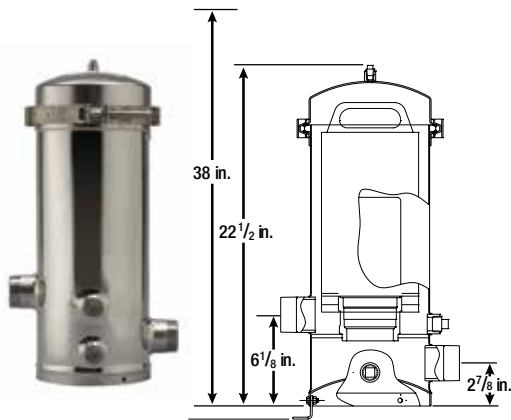


Figure 9: 3M™ High Flow 40" L & 60" L Sanitary Design Housings – Horizontal configurations



10" HFN Housing Non-Code

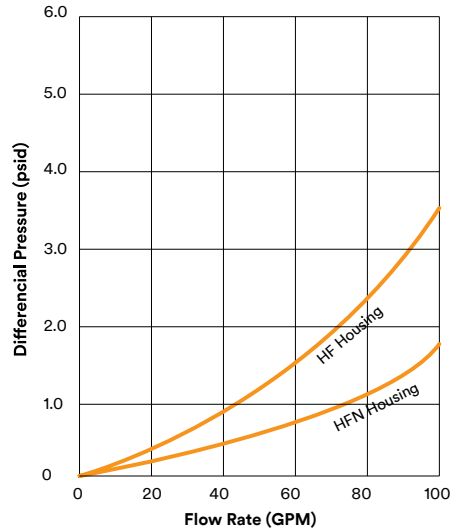
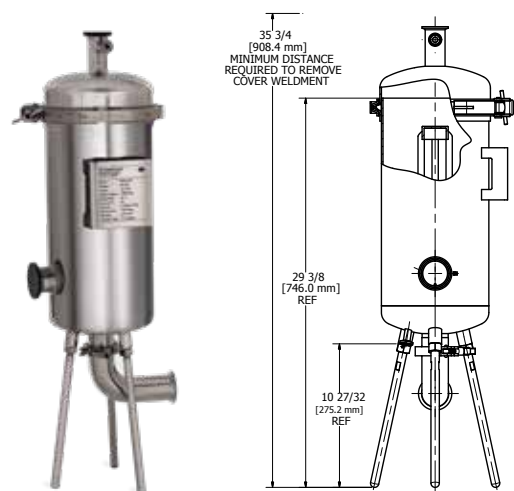


Figure 10: 3M™ High Flow 10" L Housings – ASME Code and Non-Code Versions*. *Total clean system pressure drop is the sum of the housing pressure drop and the selected element pressure drop for a given flow rate (assumes fluid viscosity of 1 cps).



10" HF Housing ASME Code



10" HF Sanitary Design Housing

3M™ High Flow Filter System

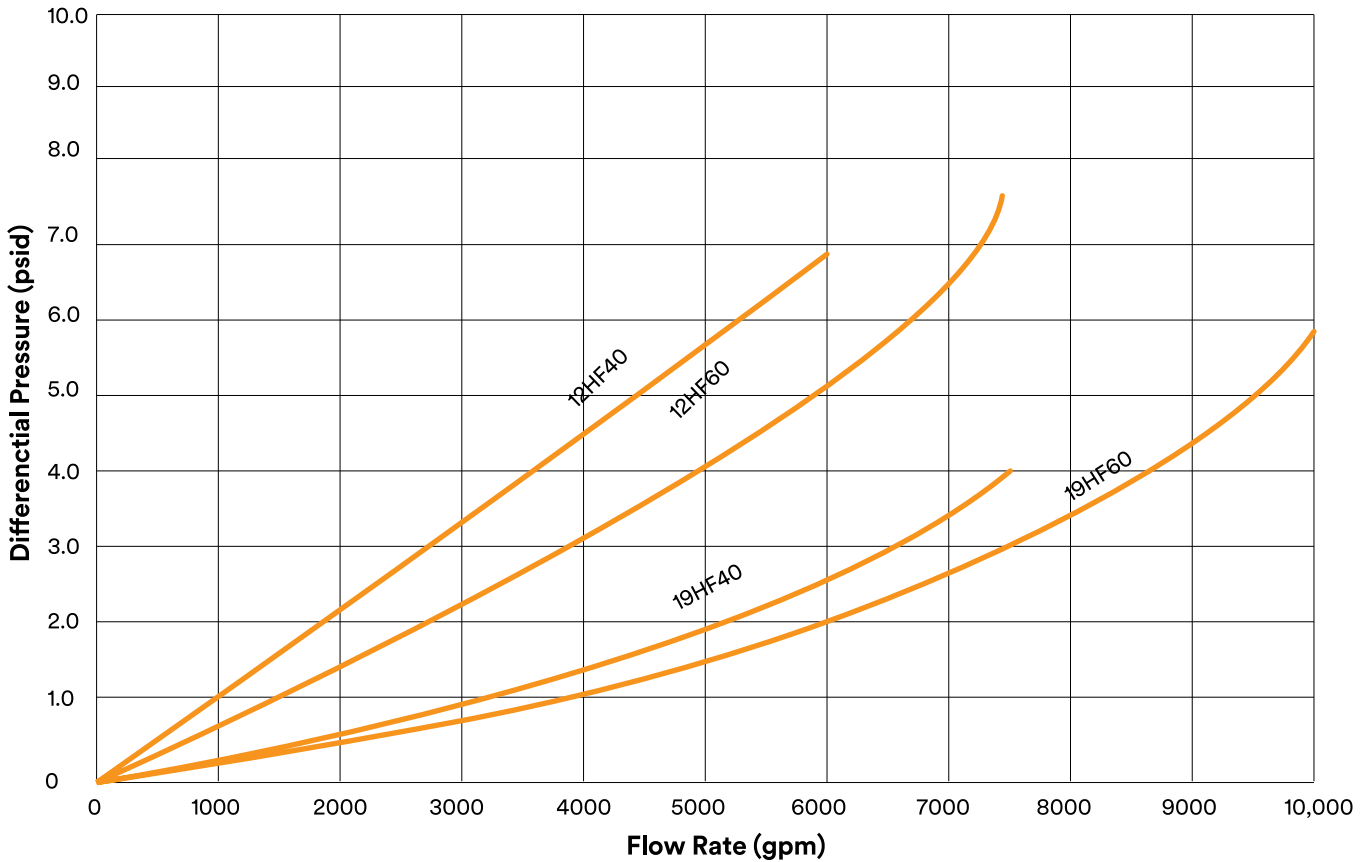
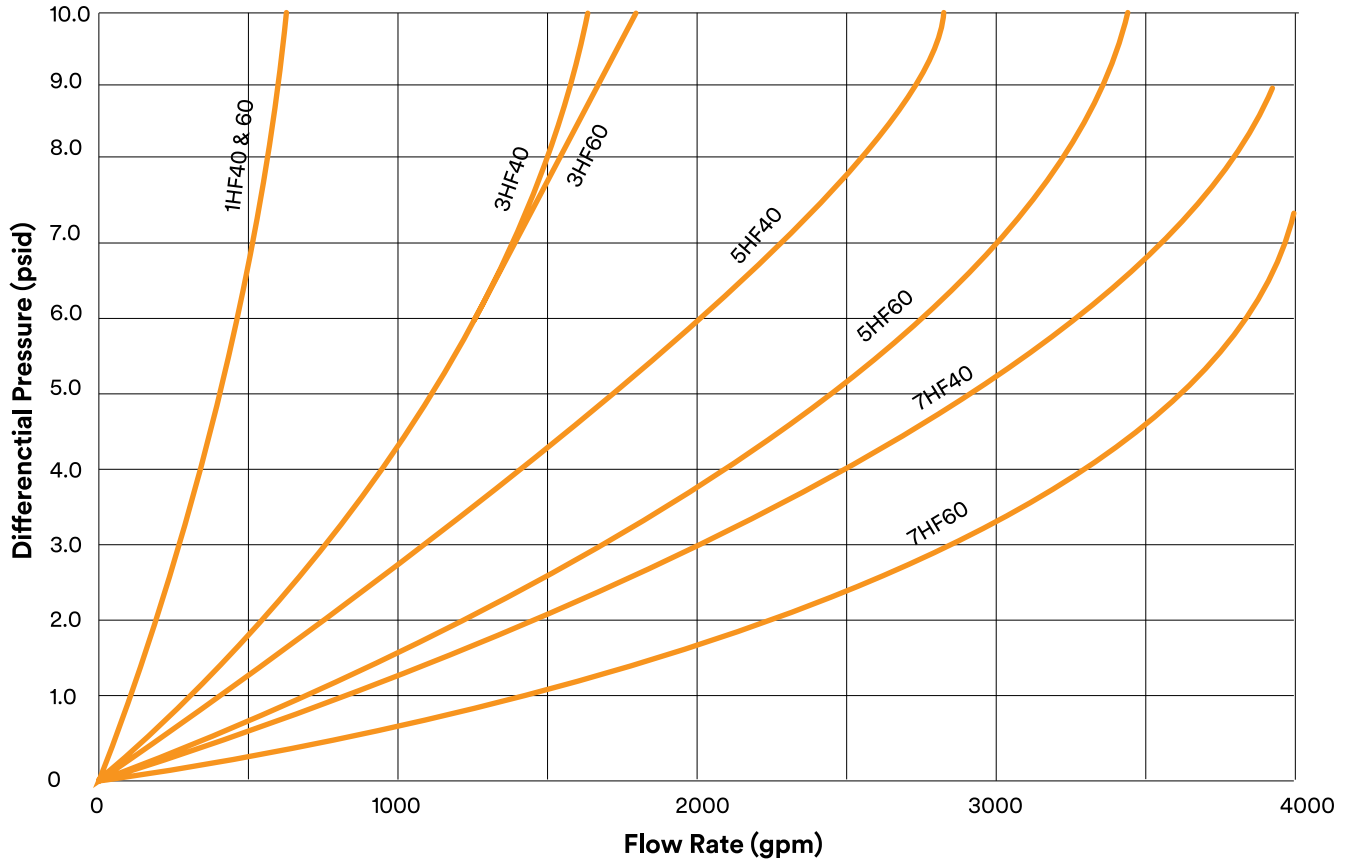


Figure 11: 3M™ High Flow housing (40”L & 60”L) clean pressure drop vs. flow rates*

*Assumes fluid viscosity of 1 cps. Pressure drop for MAX housing models without filters installed.

3M™ High Flow Cartridges - Ordering Guide

| Model | Cartridge Length | Micron Rating (@ 99.9% PRE) | Micron Rating | O-Ring Material | Packaging |
|----------------|--|-----------------------------|---|---|-------------|
| HF - High Flow | 10 - 10 inch 40 - 40 inch 60 - 60 inch | PP - Polypropylene | 001 - 1µm 002 - 2µm 005 - 5µm 010 - 10µm 015 - 15µm 025 - 25µm 040 - 40µm 070 - 70µm | A - Silicone B - Fluorocarbon C - EPDM D - Nitrile | 01 - 1 Pack |

| Model | Cartridge Length | Micron Rating (@ 99.9% PRE) | Micron Rating | O-Ring Material |
|-----------------------------------|--|-----------------------------|---|-----------------|
| HFM - High Flow (High Loft Media) | 10 - 10 inch 40 - 40 inch 60 - 60 inch | PP - Polypropylene | A05 - 5 um (Absolute) A10 - 10 um (Absolute) A20 - 20 um (Absolute) *N05 - 5µm (Nominal) | D - Nitrile |

*(70µm Absolute)

3M™ High Flow Industrial ASME Code Housings - Ordering Guide (For 40" & 60" Length Cartridges)

| Number of Filter Elements | Model | Flow Rate Capability | Cartridge Size | Configuration | Housing Material ⁽¹⁾ |
|------------------------------|-------|-----------------------------------|----------------|---|--|
| 1 3 5 7 12 19 | HF | X = MAX S = STD ⁽²⁾ | 40 60 | H = Horizontal V = Vertical ⁽³⁾ | A = Carbon Steel ⁽²⁾ B = 304 SS ⁽²⁾ C = 316 SS |

Notes:

- 1) All housing models come standard with nitrile cover gasket. Contact factory for other gasket materials.
- 2) Not available for single element (1-round) configuration.
- 3) 1HFX40V is standard configuration, other vertical configurations available upon request.

3M™ High Flow Housings - Ordering Guide (for all 10" and Sanitary Design 40" and 60" Length Housings)

| Part Number | Description |
|-------------|--|
| 1HFN10VCGD | 1-Around 10" High Flow, Non-Code, Vertical, 316LSS, Nitrile Gasket, 2" npt Inlet/Outlet |
| 1HF10VBGD | 1-Around 10" High Flow, ASME Code, Vertical, 304 SS, Nitrile Gasket, 2" Flange Inlet/Outlet |
| 1HF10VCS | 1-Around 10" High Flow, Non-Code, Vertical, 316L SS, EPDM Gasket, 2" Sanitary Inlet/Outlet |
| 1HFX40HCS | 1-Around 40" High Flow, Non-Code, Horizontal, 316L SS, EPDM Gasket, 3" Sanitary Inlet/Outlet |
| 1HFX60HCS | 1-Around 60" High Flow, Non-Code, Horizontal, 316L SS, EPDM Gasket, 3" Sanitary Inlet/Outlet |



3M™ High Flow series filter cartridges are tested and certified by WQA against NSF/ANSI Standard 61 for material safety requirements only.

For more information about the 3M High Flow series system please contact your local Industrial territory sales manager, call 1-800-243-6894, option 4 or visit our website at 3M.com/highflow.

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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