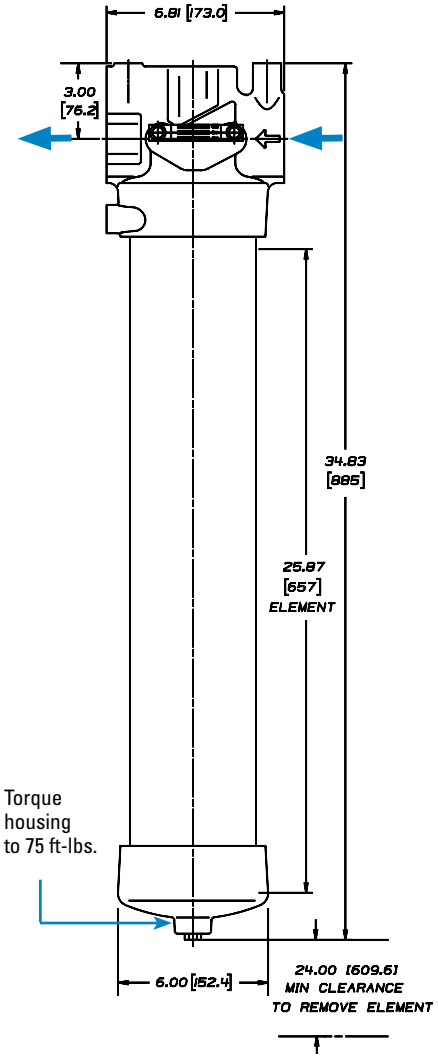
HPK05
Max Flow: 200 gpm (757 lpm)

Donaldson FILTRATION SOLUTIONS

HPK05 Specification Illustrations

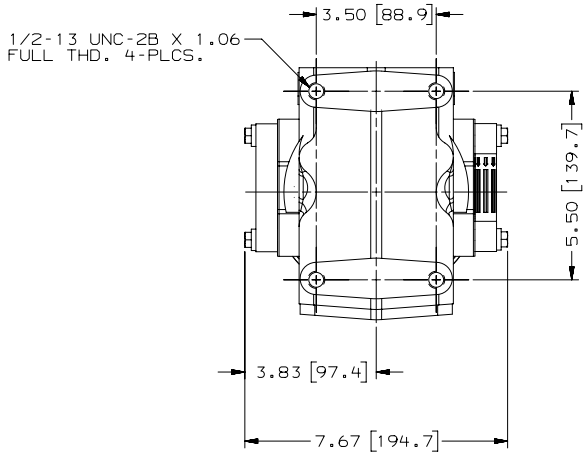
All dimensions are shown in inches [millimeters].

Assembly - Side View

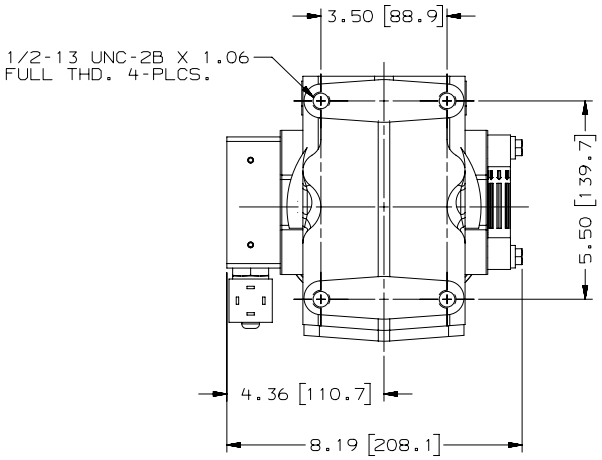


Head - Top View

HPK05
with Visual Service Indicator

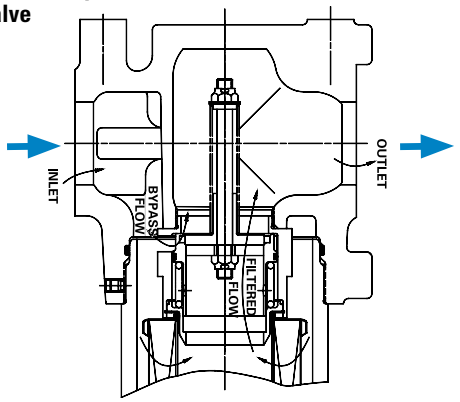


HPK05
with AC/DC Electrical Service Indicator

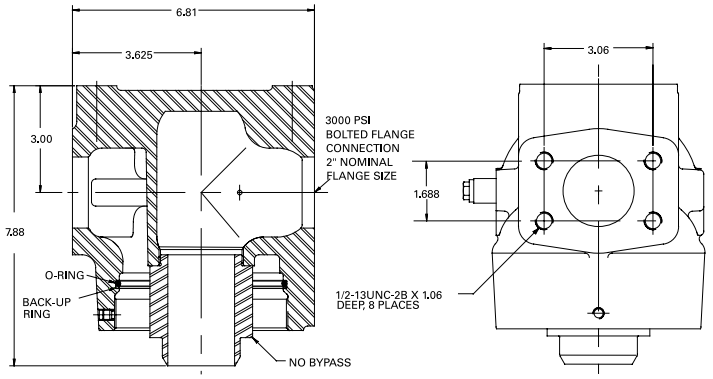


Bypass Valve Alternatives

60 psi /414 kPa Bypass Valve with Reverse Flow Check Valve



No Bypass



HPK05 Components

Assembly Choices

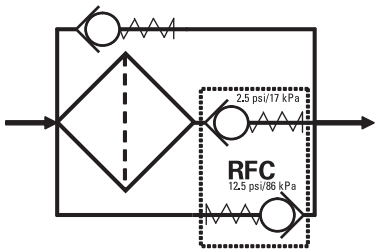
Includes Standard Filter

Port Size	Bypass Rating	Indicator Style/Location[1]	Assembly Number	Filter Part No.
2" SAE 4-Bolt Flange (Code 61)	60 psi / 414 kPa / 4.1 bar Reverse flow check valve	Visual, Left side	K052024	P164229
	No Bypass	Visual & Electrical[2]	K052039	P566643[3]

Assembly Notes

[1]Donaldson uses the inlet port as the reference point. "Left side," for instance, means that the indicator mounts on the side of the filter head that is on your left when you face the inlet port.
[2]Visual indicator is mounted on left side of the head; electrical indicator (P170365) is mounted on the right side.
[3]Rated as high collapse (3000 psi / 20700 kPa); has Viton® seals.

Reverse Flow Check Schematic



High-Performance DT Filter Choices

Media Type	$ß_{x(c)}$ = 1000 Rating based on ISO 16889	Length in	Length mm	Donaldson Part No.	Comments
DT Synteq	<4 µm	25.9	658	P566449	DT-9400-26-2UM
Synthetic	5 µm	25.9	658	P566450	DT-9400-26-5UM
	8 µm	25.9	658	P566451	DT-9400-26-8UM
	12 µm	25.9	658	P566452	DT-9400-26-14UM
	23 µm	25.9	658	P566453	DT-9400-26-25UM
	5 µm	25.9	658	P566642	DT-9901-26-5UM, High collapse
	12 µm	25.9	658	P566643	DT-9901-26-14UM, High collapse

Filter Notes

All Donaldson DT filters utilize glass fiber media with an epoxy-based resin system for the ultimate in chemical compatibility.
All Donaldson DT filters are potted with epoxy-based adhesives.
Standard collapse DT designs are double wire-backed using epoxy-coated steel mesh for maximum pleat support and dirt capacity.
High collapse designs are double wire-backed using stainless steel mesh.
High collapse designs are also potted into machined aluminum endcaps for greater filter integrity in critical applications
Viton® seals are standard on all Donaldson DT filters.

Standard Filter Choices

Media Type	$ß_{x(c)}$ = 1000 Rating based on ISO 16889	Length in	Length mm	Donaldson Part No.	Comments
Synteq	6 µm	25.5	648	P164585	Buna-N® Seal
Synthetic	11 µm	25.5	648	P164227	Buna-N Seal
	23 µm	25.5	648	P164229	Buna-N Seal

Filter Notes

Filters with seals made of Buna-N are appropriate for most applications involving petroleum oil. Filters with seals made of fluoroelastomer (such ad Viton® or Fluorel®) are required when using diester, phosphate ester fluids, water glycol, water/oil emulsions, and HWCF (high water content fluids) over 150°F/83°C.
Donaldson high collapse filters, with their steel end caps and reinforcing wire-backed media, are rated to withstand up to 3000 psi / 20,700 kPa before collapsing.
Refer to table in the Technical Reference Guide for fluid compatibility with our filter media.
Buna-N® and Viton® are registered trademarks of E. I. DuPont de Nemours and Company.

HPK05 Components

Service Indicator Kits

All kits include indicator with mounting block

Part No.	Use with Bypass Valve Pressure of:	Description
Visual Service Indicators		
P569632	60 psi / 4.1 bar	35 psi/2.4 bar indicator kit auto reset pop-out button
P569633	90 psi / 6.2 bar	70 psi/4.8 bar indicator kit auto reset pop-out button
P567988	60 psi / 4.1 bar	35 psi/2.4 bar indicator kit auto reset pop-out button with thermal lockout and surge control
P567989	90 psi / 6.2 bar	70 psi/4.8 bar indicator kit* auto reset pop-out button with thermal lockout and surge control
AC/DC Visual/Electrical Service Indicators		
P569634	60 psi / 4.1 bar	35 psi/2.4 bar indicator kit Hirschmann receptacle 115 VAC/28 VDC, 2 amps
P569635	90 psi / 6.2 bar	70 psi/4.8 bar indicator kit Hirschmann receptacle 115 VAC/28 VDC, 2 amps
P567986	60 psi / 4.1 bar	35 psi/2.4 bar indicator kit with thermal lockout and surge control, Hirschmann receptacle, 115 VAC/28 VDC, 2 amps, 4 pin DIN 43650
P567987	90 psi / 6.2 bar	70 psi/4.8 bar indicator kit with thermal lockout and surge control, Hirschmann receptacle, 115 VAC/28 VDC, 2 amps, 4 pin DIN 43650

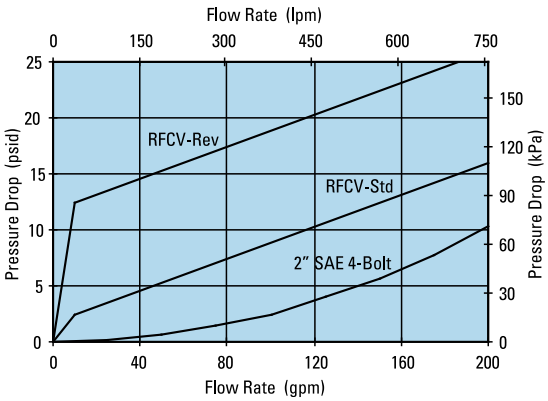
Indicator Choices

Replacement Indicator Only

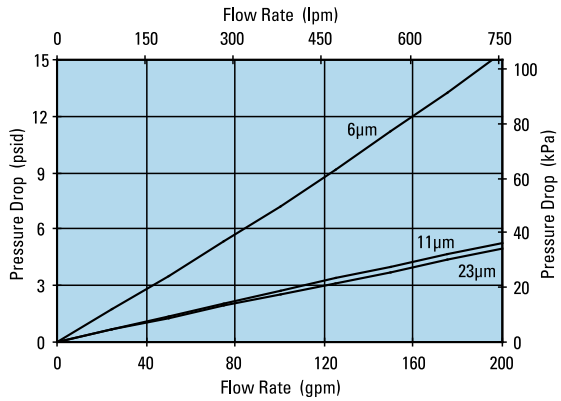
Part No.	Description
P567458	Visual/Electrical indicator with thermal lockout and surge, 35 psid/2.4 bar
P567459	Visual/Electrical indicator, with thermal lockout and surge, 70 psid/4.8 bar
P567456	Pop-Up Visual Indicator, with thermal lockout and surge, 35 psid/2.4 bar
P567457	Pop-Up Visual Indicator, with thermal lockout and surge, 70 psid/4.8 bar
P569636	Pop-Up Visual Indicator, 35 psid/2.4 bar
P569637	Pop-Up Visual Indicator, 70 psid/4.8 bar
P569638	Visual/Electrical Indicator, 35 psid/2.4 bar
P569639	Visual/Electrical Indicator, 70 psid/4.8 bar
P164315	Visual Indicator, bar style, 35 psid/2.4 bar
P166603	Visual Indicator, bar style, 70 psid/4.8 bar
P166134	Blanking plate
Indicator Mounting Block	
P573495	Mounting Block Assembly

Performance Data

HPK05 Housing Only

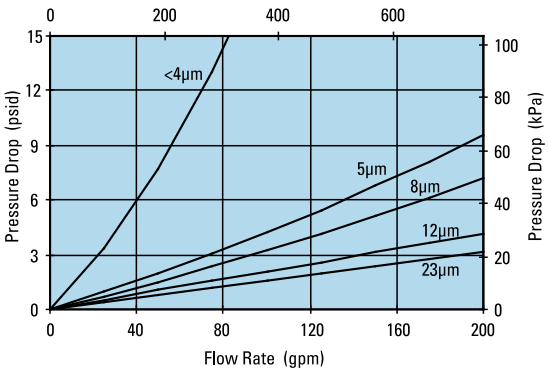


HPK05 26" Standard Filter Only



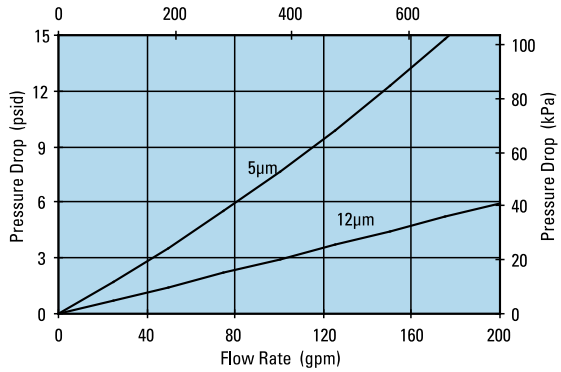
HPK05 26" DT Filter Only

DT-9400-26, 26"/660mm



HPK05 26" DT Filter Only

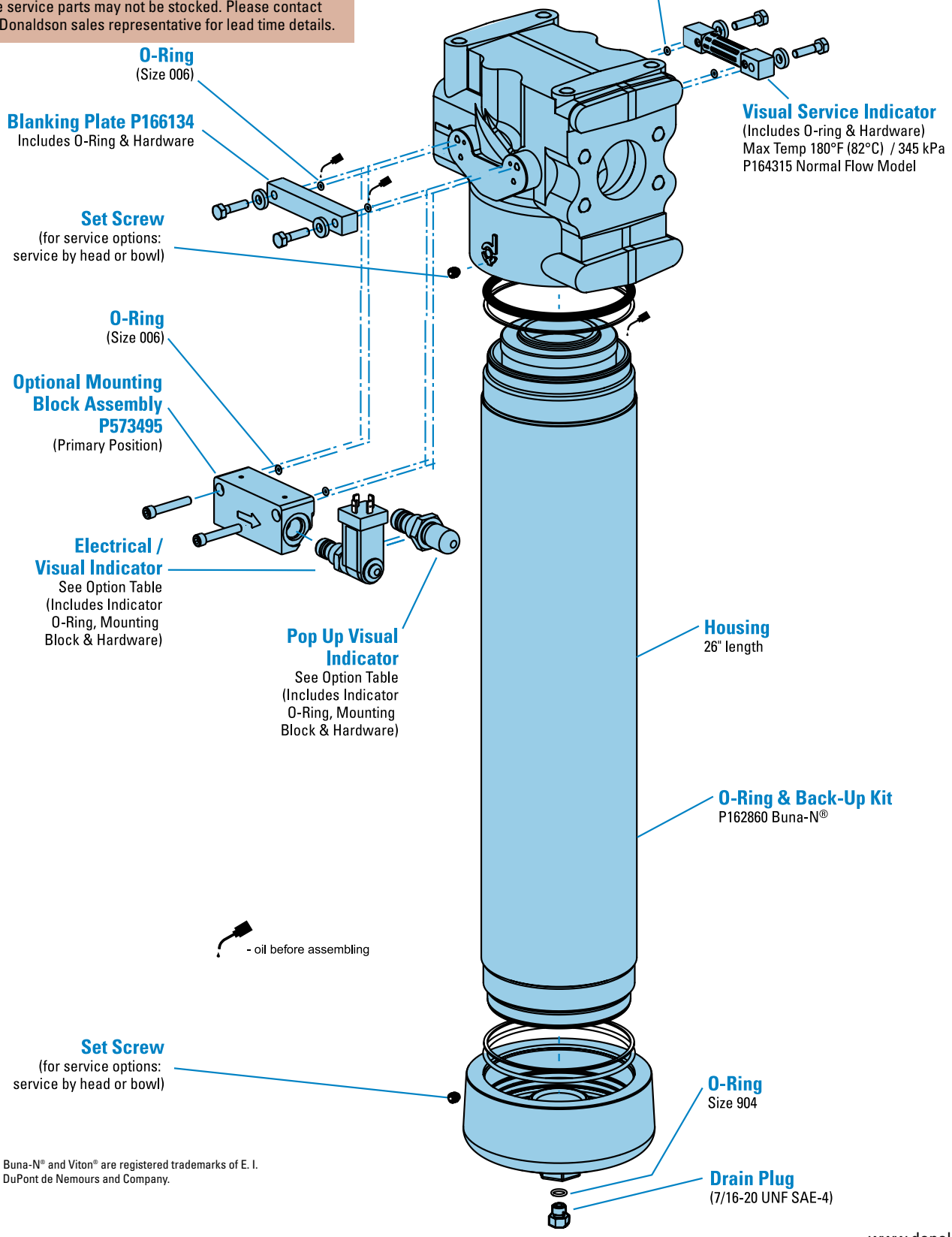
DT-9901-26, 26"/660mm



HPK05 Service Parts

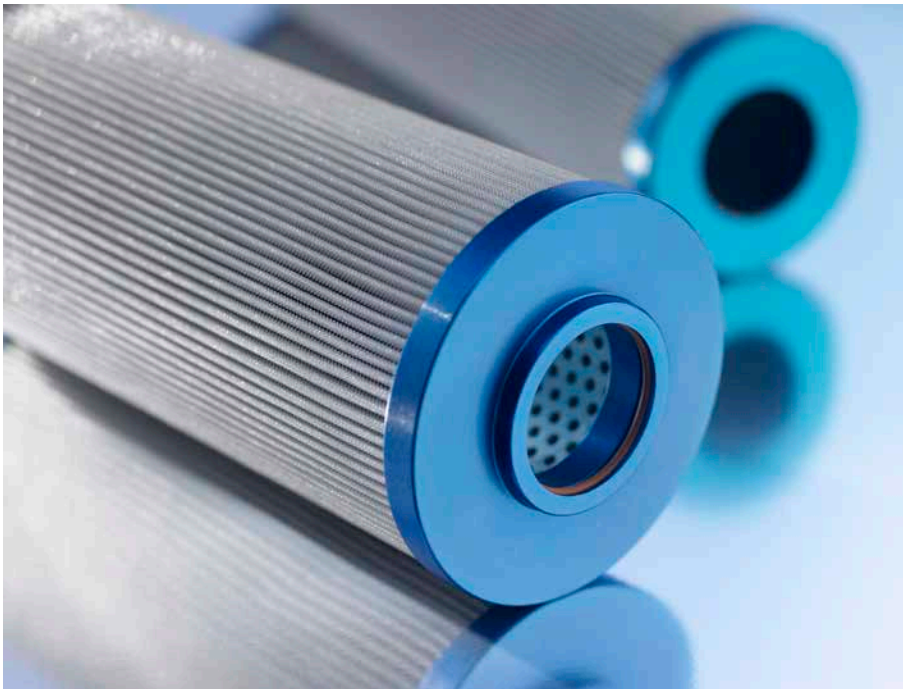
SERVICE PARTS NOTE:

Some service parts may not be stocked. Please contact your Donaldson sales representative for lead time details.



High-Performance DT Hydraulic Cartridges

Using Donaldson Synteq™ media technology, DT filters extend filter life, allow higher initial cleanliness and provide superior system protection.



Donaldson Blue™ Hydraulic Cartridges

The Donaldson Company has been releasing and supporting Donaldson Blue premium product in our Air, Clean Soutions and Liquid filtration product categories. Now, we're extending the same high quality coverage to our hydraulic offering with the first ever, **Donaldson Blue Hydraulic** filters.

Donaldson Blue Hydraulic filters deliver:

- Superior efficiency
- Longer filter life
- Reduced flow restriction

Donaldson Blue hydraulic filters deliver better system protection and performance.

Coupler P167324 available to connect filters.

Section Index

Cross Reference

Donaldson Blue	Schroeder®	Hydac®	Pall®	Parker®	Hy-Pro®
DBH6018	KZ5	2060529	HC9700FKN9H or CN9H	HF4L10VQ	HPKL9-6MB
DBH6019	KZ10	2060530	HC9700FKS9H or CS9H	HF4L15VQ	HPKL9-12MB
DBH6020	KKZ5	2060431	HC9700FKN18H or CN18H	932678Q	HPKL18-6MB
DBH6138	KKZ10	2060432	HC9700FKS18H or CS18H	932679Q	HPKL18-12MB
DBH6139	27KZ5	2065004	HC9700FKN27H or CN27H	933487Q	HPKL27-6MB
DBH6140	27KZ10	2065005	HC9700FKS27H or CS27H	933488Q	HPKL27-12MB

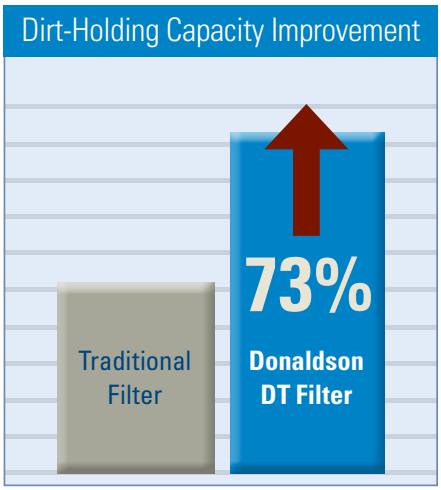
Donaldson FILTRATION SOLUTIONS

High-performance DT filters provide superior hydraulic system protection.

Premium Uptime Protection

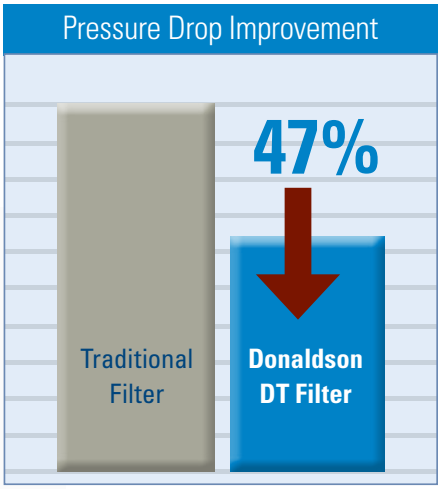
Every hydraulic system has suspended particles in its fluid. Contaminants grind and wear at the surface of moving parts, introducing even more particles into the system. These contaminants cause more than 70% of all hydraulic system downtime.

Donaldson high-performance DT cartridge filters provide better protection from the particles and contaminants that reduce the effectiveness of lubricant and hydraulic fluid. Using Donaldson Synteq™ media technology, these filters extend filter life, allow higher initial cleanliness and provide superior system protection.



Donaldson DT filters are ideally suited for a variety of demanding applications, including:

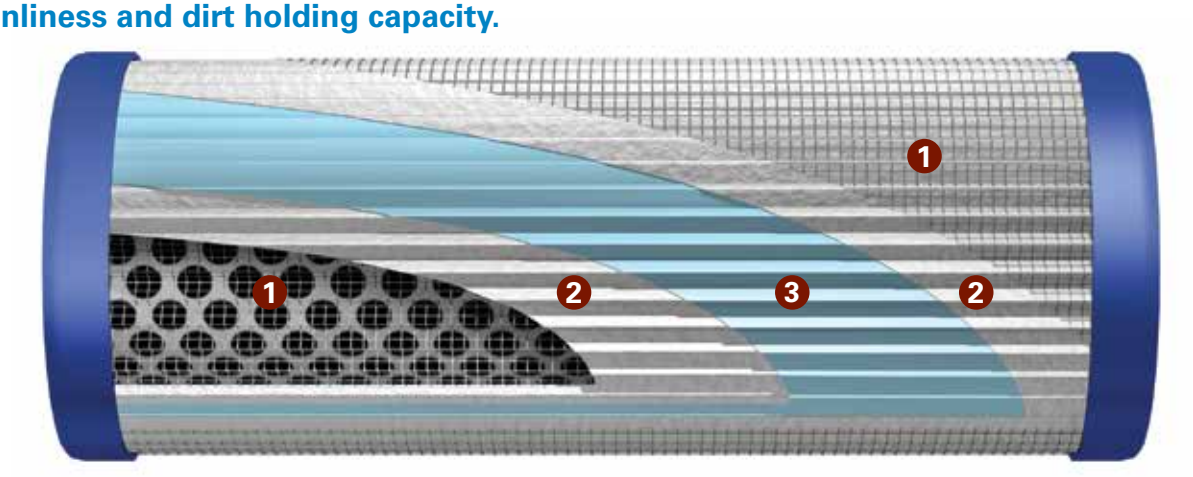
- heavy-duty mobile equipment
- in-plant hydraulics
- transmissions
- bearing lube oil systems



Donaldson DT filters are stocked and ready to ship!

See How Donaldson DT Filters Work

DT cartridge filters feature an advanced pleat pack design that provides higher initial cleanliness and dirt holding capacity.



1 Epoxy-Coated Steel Support Mesh

(Upstream and Downstream Sides)

- Provides excellent pleat support and spacing, which allows for maximum effective media area
- Protects against media damage during handling and installation

2 Media Support Layers

(Upstream and Downstream Sides)

- Optimizes media support
- Protects media during pressure surges

3 Synteq™ Media Technology

Donaldson-developed Synteq synthetic filter media has smooth, rounded fibers for low resistance to fluid flow. Synteq media is ideal for filtering synthetic fluids, water glycols, water/oil emulsions, HWCF (high water content fluids) and petroleum-based fluids.

- High-efficiency media grades with performance to ß<4(c)=1000 (per ISO 16889)
- Exceptionally low flow resistance
- Consistent performance throughout filter life
- Excellent fluid compatibility

Donaldson DT replacement filters are engineered to fit many competitive applications, including:

DIN* Standard	400, 630, 1000 Series
Fairey Arlon	170, 270, 370
Hydac	0030D, 0500R, 0060D/R, 0075D, 0110D/R, 0140D, 0160D/R, 0240D/R, 0280D, 0330D/R, 0660D/R, 0850R, 0950R, 1300R, 2600R
Pall	2544, 8200, 8300, 8310, 8314, 8800, 8900, 8904, 9020, 9021, 9024, 9100, 9101, 9104, 9400, 9404, 9600, 9601, 9604, 9650, 9651, 9800, 9801, 9804, 9901
Parker	15/40/80 CN, 25P, 31P, 61P, RF2/IL2
Porous Media	LG Series
PTI/Mahle	015/Pi X105, 025/Pi X108, 030/Pi X111, 050/Pi X115, 080/Pi X130, 120/Pi X145, PTI RP83
Schroeder	A, K, KK, KKK, N, NN, V

For a complete list of replacement part numbers, visit *crossreference.donaldson.com*.

* DIN - Deutsches Institut fur Normung E.V., the German Institute for Standardization

Donaldson FILTRATION SOLUTIONS

Popular DT Filters for Heavy-Duty Equipment and Industrial Hydraulic Applications

Donaldson	Description	Pall	Hydac	Parker	Schroeder
P566658	DT-0110-D-5UM	HC2206FKP6H or Z	0110D003BN4HC	PR3085	SBF-0110D-Z3B or V
P566659	DT-0110-D-8UM	HC2206FKN6H or Z	0110D005BN4HC	PR3086	SBF-0110D-Z5B or V
P566660	DT-0110-D-14UM	HC2206FKS6H or Z	0110D010BN4HC	PR3087	SBF-0110D-Z10B or V
P566965	DT-0110-R-5UM	HC2196FKP6H or Z	0110R003BN4HC	PR3256	SBF0110RZ3B or V
P566966	DT-0110-R-8UM	HC2196FKN6H or Z	0110R005BN4HC	PR3257	SBF0110RZ5B or V
P566967	DT-0110-R-14UM	HC2196FKS6H or Z	0110R010BN4HC	PR3258	SBF0110RZ10B or V
P566968	DT-0110-R-25UM	HC2196FKT6H or Z	0110R020BN4HC	PR3259	SBF0110RZ25B or V
P566666	DT-0160-D-5UM	HC2216FKP4H or Z	0160D003BN4HC	PR3114	SBF-0160D-Z3B or V
P566667	DT-0160-D-8UM	HC2216FKN4H or Z	0160D005BN4HC	PR3115	SBF-0160D-Z5B or V
P566668	DT-0160-D-14UM	HC2216FKS4H or Z	0160D010BN4HC	PR3116	SBF-0160D-Z10B or V
P566969	DT-0160-R-5UM	HC2226FKP4H or Z	0160R003BN4HC	PR3273	SBF0160RZ3B or V
P566970	DT-0160-R-8UM	HC2226FKN4H or Z	0160R005BN4HC	PR3274	SBF0160RZ5B or V
P566971	DT-0160-R-14UM	HC2226FKS4H or Z	0160R010BN4HC	PR3275	SBF0160RZ10B or V
P566972	DT-0160-R-25UM	HC2226FKT4H or Z	0160R020BN4HC	PR3276	SBF0160RZ25B or V
P566670	DT-0240-D-5UM	HC2216FKP6H or Z	0240D003BN4HC	PR3143	SBF-0240D-Z3B or V
P566671	DT-0240-D-8UM	HC2216FKN6H or Z	0240D005BN4HC	PR3144	SBF-0240D-Z5B or V
P566672	DT-0240-D-14UM	HC2216FKS6H or Z	0240D010BN4HC	PR3145	SBF-0240D-Z10B or V
P566977	DT-0240-R-5UM	HC2226FKP6H or Z	0240R003BN4HC	PR3290	SBF0240RZ3B or V
P566978	DT-0240-R-8UM	HC2226FKN6H or Z	0240R005BN4HC	PR3291	SBF0240RZ5B or V
P566979	DT-0240-R-14UM	HC2226FKS6H or Z	0240R010BN4HC	PR3292	SBF0240RZ10B or V
P566980	DT-0240-R-25UM	HC2226FKT6H or Z	0240R020BN4HC	PR3293	SBF0240RZ25B or V
P566674	DT-0280-D-5UM	NA	0280D003BN4HC	NA	SBF-0280D-Z3B OR V
P566675	DT-0280-D-8UM	NA	0280D005BN4HC	NA	SBF-0280D-Z5B OR V
P566676	DT-0280-D-14UM	NA	0280D010BN4HC	NA	SBF-0280D-Z10B OR V
P566677	DT-0280-D-25UM	NA	0280D020BN4HC	NA	SBF-0280D-Z25B OR V
P566678	DT-0330-D-5UM	HC2233FKP6H or Z	0330D003BN4HC	PR3172	SBF-0330D-Z3B or V
P566679	DT-0330-D-8UM	HC2233FKN6H or Z	0330D005BN4HC	PR3173	SBF-0330D-Z5B or V
P566680	DT-0330-D-14UM	HC2233FKS6H or Z	0330D010BN4HC	PR3174	SBF-0330D-Z10B or V
P566681	DT-0330-D-25UM	HC2233FKT6H or Z	0330D020BN4HC	PR3175	SBF-0330D-Z25B or V
P566981	DT-0330-R-5UM	HC2246FKP6H or Z	0330R003BN4HC	PR3307	SBF0330RZ3B or V
P566982	DT-0330-R-8UM	HC2246FKN6H or z	0330R005BN4HC	PR3308	SBF0330RZ5B or V

Donaldson	Description	Pall	Hydac	Parker	Schroeder
P566983	DT-0330-R-14UM	HC2246FKS6H or Z	0330R010BN4HC	PR3309	SBF0330RZ10B or V
P566984	DT-0330-R-25UM	HC2246FKT6H or Z	0330R0220BN4HC	PR3310	SBF0330RZ25B or V
P566195	DT-9020-4-5UM	HC9020FKP4H or Z	H9020-4-003BN4HC	932610Q	SBF-9020-4Z3B or V
P566196	DT-9020-4-8UM	HC9020FKN4H or Z	H9020-4-005BN4HC	933239Q	SBF-9020-4Z5B or V
P566197	DT-9020-4-14UM	HC9020FKS4H or Z	H9020-4-010BN4HC	925580Q	SBF-9020-4Z10B or V
P566200	DT-9020-8-5UM	HC9020FKP8H or Z	H9020-8-003BN4HC	925602Q	SBF-9020-8Z3B or V
P566201	DT-9020-8-8UM	HC9020FKN8H or Z	H9020-8-005BN4HC	933246Q	SBF-9020-8Z5B or V
P566202	DT-9020-8-14UM	HC9020FKS8H or Z	H9020-8-010BN4HC	925600Q	SBF-9020-8Z10B or V
P566210	DT-9600-8-5UM	HC9600FKP8H or Z	H9600-8-003BN4HC	926697Q	SBF-9600-8Z3B or V
P566212	DT-9600-8-14UM	HC9600FKS8H or Z	H9600-8-010BN4HC	926837Q	SBF-9600-8Z10B or V
P566215	DT-9600-13-5UM	HC9600FKP13H or Z	H9600-13-003BN4HC	926698Q	SBF-9600-13Z3B or V
P566216	DT-9600-13-8UM	HC9600FKN13H or Z	H9600-13-006BN4HC	926845Q	SBF-9600-13Z5B or V
P566217	DT-9600-13-14UM	HC9600FKS13H or Z	H9600-13-010BN4HC	926839Q	SBF-9600-13Z10B or V
P566220	DT-9600-16-5UM	HC9600FKP16H or Z	H9600-16-003BN4HC	926699Q	SBF-9600-16Z3B or V
P566221	DT-9600-16-8UM	HC9600FKN16H or Z	H9600-16-005BN4HC	926890Q	SBF-9600-16Z5B or V
P566222	DT-9600-16-14UM	HC9600FKS16H or Z	H9600-16-010BN4HC	926888Q	SBF-9600-16Z10B or V
P566373	DT-9604-8-5UM	HC9604FKP8H or Z	NA	NA	SBF-9604-8Z3B OR V
P566374	DT-9604-8-8UM	HC9604FKN8H or Z	NA	NA	SBF-9604-8Z5B OR V
P566375	DT-9604-8-14UM	HC9604FKS8H or Z	NA	NA	SBF-9604-16Z10B OR V
P566378	DT-9604-13-5UM	HC9604FKP13H or Z	NA	NA	SBF-960413Z3B OR V
P566379	DT-9604-13-8UM	HC9604FKN13H or Z	NA	NA	SBF-9604-13Z5B OR V
P566380	DT-9604-13-14UM	HC9604FKS13H or Z	NA	NA	SBF-9604-13Z10B OR V
P566383	DT-9604-16-5UM	HC9604FKP16H or Z	NA	NA	SBF-9604-16Z3B OR V
P566384	DT-9604-16-8UM	HC9604FKN16H or Z	NA	NA	SBF-9604-16Z5B OR V
P566385	DT-9604-16-14UM	HC9604FKS16H or Z	NA	NA	SBF-9604-16Z10B OR V
P566270	DT-HF4-9-5UM	HC9700FKP9H or Z	HK003BN4HC	HF4L3VQ	KZ3
P566271	DT-HF4-9-8UM	HC9700FKN9H or Z	HK005BN4HC	HF4L10VQ	KZ5
P566272	DT-HF4-9-14UM	HC9700FKS9H or Z	HK010BN4HC	HF4L15VQ	KZ10
P566274	DT-HF4-18-5UM	HC9700FKP18H or Z	H2K003BN4HC	932677Q	KKZ3
P566275	DT-HF4-18-8UM	HC9700FKN18H or Z	H2K005BN4HC	932678Q	KKZ5
P566276	DT-HF4-18-14UM	HC9700FKS18H or Z	H2K010BN4HC	932679Q	KKZ10

Pall® Ultipleat® SRT Replacement Filters
Cartridge Replacements for SRT 219, 319 and 619 Housings

Donaldson FILTRATION SOLUTIONS

Donaldson replacement filters for Pall Ultipleat SRT 219, 319 and 619 style housings provide protection from particles and contaminants that reduce the effectiveness of lubricant and hydraulic fluid. Using Donaldson DT Synteq™ media technology, these filters have long life and provide excellent system protection.

These filters feature an advanced pleat pack design that provides high initial cleanliness and efficient dirt holding capacity.

Double wire backed with an epoxy-coated steel mesh for excellent pleat support and spacing, which allows for maximum media area and excellent protection during operating pressure surges

Utilizes glass fiber DT Synteq media with an epoxy-based resin system and is potted with epoxy-based adhesives Viton® O-ring seals for excellent compatibility with a wide range of fluid types

Electrostatic Discharge (ESD) Reduction

Donaldson SRT replacement filters are designed to resist charge generation and reduce the occurrence of electrostatic discharges induced by the flow of fluids through the filter media – a known industry problem which can result in damage to the filter and degraded performance.

Utilizing DT Synteq™ Media Technology

Donaldson invented DT Synteq synthetic filter media has smooth, rounded fibers for low resistance to fluid flow. Synteq media is ideal for filtering synthetic fluids, water glycols, water/oil emulsions, petroleum-based and high water content fluids (HWCF).

Donaldson Replacement Filters for Pall® Ultipleat® SRT Housings

Length	Beta $_{x(c)}$ = 1000 Rating	Donaldson Part No.	Competitive Cross Reference			
			Pall	Hy-Pro	Hydac	Schroeder
219 Series						
4" (102mm)	< 4 µm	P573085	UE219AZ04H or Z	HP219L41EB or V	1.28.04 D 03 RT	SBFUE219-4Z3V
	5 µm	P573086	UE219AP04H or Z	HP219L43EB or V	1.28.04 D 05 RT	SBFUE219-4Z5V
	8 µm	P573087	UE219AN04H or Z	HP219L46EB or V	1.28.04 D 07 RT	—
	12 µm	P573088	UE219AS04H or Z	HP219L412EB or V	1.28.04 D 12 RT	SBFUE219-4Z10V
	23 µm	P573089	UE219AT04H or Z	HP219L422EB or V	1.28.04 D 20 RT	SBFUE219-4Z25V
8" (203mm)	< 4 µm	P573090	UE219AZ08H or Z	HP219L81EB or V	1.28.08 D 03 RT	SBFUE219-8Z3V
	5 µm	P573091	UE219AP08H or Z	HP219L83EB or V	1.28.08 D 05 RT	SBFUE219-8Z5V
	8 µm	P573092	UE219AN08H or Z	HP219L86EB or V	1.28.08 D 07 RT	—
	12 µm	P573093	UE219AS08H or Z	HP219L812EB or V	1.28.08 D 12 RT	SBFUE219-8Z10V
	23 µm	P573094	UE219AT08H or Z	HP219L822EB or V	1.28.08 D 20 RT	SBFUE219-8Z25V
13" (330mm)	< 4 µm	P573095	UE219AZ13H or Z	HP219L131EB or V	1.28.13 D 03 RT	SBFUE219-13Z3V
	5 µm	P573096	UE219AP13H or Z	HP219L133EB or V	1.28.13 D 05 RT	SBFUE219-13Z5V
	8 µm	P573097	UE219AN13H or Z	HP219L136EB or V	1.28.13 D 07 RT	—
	12 µm	P573098	UE219AS13H or Z	HP219L1312EB or V	1.28.13 D 12 RT	SBFUE219-13Z10V
	23 µm	P573099	UE219AT13H or Z	HP219L1322EB or V	1.28.13 D 20 RT	SBFUE219-13Z25V
20" (508mm)	< 4 µm	P573100	UE219AZ20H or Z	HP219L201EB or V	1.28.20 D 03 RT	SBFUE219-20Z3V
	5 µm	P573101	UE219AP20H or Z	HP219L203EB or V	1.28.20 D 05 RT	SBFUE219-20Z5V
	8 µm	P573102	UE219AN20H or Z	HP219L206EB or V	1.28.20 D 07 RT	—
	12 µm	P573103	UE219AS20H or Z	HP219L2012EB or V	1.28.20 D 12 RT	SBFUE219-20Z10V
	23 µm	P573104	UE219AT20H or Z	HP219L2022EB or V	1.28.20 D 20 RT	SBFUE219-20Z25V
319 Series						
8" (203mm)	< 4 µm	P573105	UE319AZ08H or Z	HP319L81EB or V	1297074 or 1.21.08D03RT	SBFUE319-8Z3V
	5 µm	P573106	UE319AP08H or Z	HP319L83EB or V	1296464 or 1.21.08D05RT	SBFUE319-8Z5V
	8 µm	P573107	UE319AN08H or Z	HP319L86EB or V	1296465 or 1.21.08D07RT	—
	12 µm	P573108	UE319AS08H or Z	HP319L812EB or V	1297075 or 1.21.08D12RT	SBFUE319-8Z10V
	23 µm	P573109	UE319AT08H or Z	HP319L822EB or V	1.21.08 D 20 RT	SBFUE319-8Z25V
13" (330mm)	< 4 µm	P573110	UE319AZ13H or Z	HP319L131EB or V	1297076 or 1.21.13D03RT	SBFUE319-13Z3V
	5 µm	P573111	UE319AP13H or Z	HP319L133EB or V	1296466 or 1.21.13D05RT	SBFUE319-13Z5V
	8 µm	P573112	UE319AN13H or Z	HP319L136EB or V	1296467 or 1.21.13D07RT	—
	12 µm	P573113	UE319AS13H or Z	HP319L1312EB or V	1297077 or 1.21.13D12RT	SBFUE319-13Z10V
	23 µm	P573114	UE319AT13H or Z	HP319L1322EB or V	1.21.13 D 20 RT	SBFUE319-13Z25V
20" (508mm)	< 4 µm	P573115	UE319AZ20H or Z	HP319L201EB or V	1297078 or 1.21.20D03RT	SBFUE319-20Z3V
	5 µm	P573116	UE319AP20H or Z	HP319L203EB or V	1296468 or 1.21.20D05RT	SBFUE319-20Z5V
	8 µm	P573117	UE319AN20H or Z	HP319L206EB or V	1296469 or 1.21.20D07RT	—
	12 µm	P573118	UE319AS20H or Z	HP319L2012EB or V	1297079 or 1.21.20D12RT	SBFUE319-20Z10V
	23 µm	P573119	UE319AT20H or Z	HP319L2022EB or V	1.21.20 D 20 RT	SBFUE319-20Z25V
40" (107mm)	< 4 µm	P573120	UE319AZ40H or Z	HP319L401EB or V	1297080 or 1.21.40D03RT	SBFUE319-40Z3V
	5 µm	P573121	UE319AP40H or Z	HP319L403EB or V	1296665 or 1.21.40D05RT	SBFUE319-40Z5V
	8 µm	P573122	UE319AN40H or Z	HP319L406EB or V	1296666 or 1.21.40D07RT	—
	12 µm	P573123	UE319AS40H or Z	HP319L4012EB or V	1297083 or 1.21.40D12RT	SBFUE319-40Z10V
	23 µm	P573124	UE319AT40H or Z	HP319L4022EB or V	1.21.40 D 20 RT	SBFUE319-40Z25V
619 Series						
20" (508mm)	< 4 µm	P573125	UE619AZ20H or Z	HP619L201EB or V	1297084 or 1.22.20D03RT	SBFUE619-20Z3V
	5 µm	P573126	UE619AP20H or Z	HP619L203EB or V	1296470 or 1.22.20D05RT	SBFUE619-20Z5V
	8 µm	P573127	UE619AN20H or Z	HP619L206EB or V	1296471 or 1.22.20D07RT	—
	12 µm	P573128	UE619AS20H or Z	HP619L2012EB or V	1297085 or 1.22.20D12RT	SBFUE619-20Z10V
	23 µm	P573129	UE619AT20H or Z	HP619L2022EB or V	1.22.20 D 20 RT	SBFUE619-20Z25V
40" (107mm)	< 4 µm	P573130	UE619AZ40H or Z	HP619L401EB or V	1297086 or 1.22.40D03RT	SBFUE619-40Z3V
	5 µm	P573131	UE619AP40H or Z	HP619L403EB or V	1296472 or 1.22.40D05RT	SBFUE619-40Z5V
	8 µm	P573132	UE619AN40H or Z	HP619L406EB or V	1296473 or 1.22.40D07RT	—
	12 µm	P573133	UE619AS40H or Z	HP619L4012EB or V	1297087 or 1.22.40D12RT	SBFUE619-40Z10V
	23 µm	P573134	UE619AT40H or Z	HP619L4022EB or V	1.22.40 D 20 RT	SBFUE619-40Z25V

Accessories

Donaldson offers an extensive line of accessories for hydraulic circuits, lines and reservoirs that will help you maintain proper ISO cleanliness levels.

Section Index

T.R.A.P.™ Breather Technology
(Thermally Reactive Advanced Protection)

T.R.A.P. breathers provide fast-acting protection against airborne moisture and particulate contamination. It stops solid particulate down to 3 µm at 97% efficiency as well as prevents moisture from entering the reservoir. Water-holding capacity is regenerated with every oil return phase for long service life. Its self-regenerating capability enables extended life.

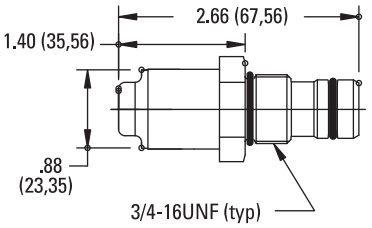
Visual Service Indicator Kits

Visual Service Indicator Kit Choices

Part No.	Use with Bypass Valve Pressure of:	Description	Where Used
P569632	50 psi / 3.5 bar	35 psi/2.4 bar indicator kit* auto reset pop-out button	HPK02, HPK03, HPK04, HPK05
P569633	90 psi / 6.2 bar	70 psi/4.8 bar indicator kit* auto reset pop-out button	HPK02, HPK03, HPK04, HPK05
P567988	50 psi / 3.5 bar	35 psi/2.4 bar indicator kit* auto reset pop-out button with thermal lockout and surge control	HPK02, HPK03, HPK04, HPK05
P567989	90 psi / 6.2 bar	70 psi/4.8 bar indicator kit* auto reset pop-out button with thermal lockout and surge control	HPK02, HPK03, HPK04, HPK05

* Note: Above kits include indicator and P573495 mounting block.

Visual (Mechanical) Indicators (with auto reset pop-out button)

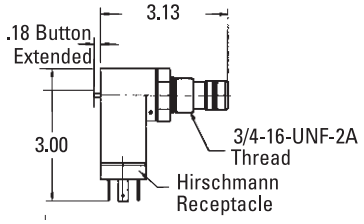


Visual/Electrical Service Indicator Kit Choices

Part No.	Use with Bypass Valve Pressure of:	Description	Where Used
P569634	50 psi / 3.5 bar	35 psi/2.4 bar indicator kit* Hirschmann receptacle 115 VAC/28 VDC, 2 amps	HPK02, HPK03, HPK04, HPK05
P569635	90 psi / 6.2 bar	70 psi/4.8 bar indicator kit* Hirschmann receptacle 115 VAC/28 VDC, 2 amps	HPK02, HPK03, HPK04, HPK05
P567986	50 psi / 3.5 bar	35 psi/2.4 bar indicator kit* with thermal lockout and surge control, Hirschmann receptacle, 115 VAC/28 VDC, 2 amps, 4 pin DIN 43650	HPK02, HPK03, HPK04, HPK05
P567987	90 psi / 6.2 bar	70 psi/4.8 bar indicator kit* with thermal lockout and surge control, Hirschmann receptacle, 115 VAC/28 VDC, 2 amps, 4 pin DIN 43650	HPK02, HPK03, HPK04, HPK05

* Note: Above kits include indicator and P573495 mounting block.

AC/DC Electrical Indicators (with aluminum electrical housing)



Electrical Service Indicators

Electrical Service Indicator Choices

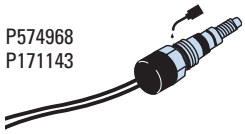
All electric models have a maximum operating temperature of 250°F/ 114°C.

Part No.	Use with Bypass Valve Pressure of:	Description	Where Used	Illustration
P162400	25 psi/ 172 kPa	DC/single post. Normally open.	HBK04, HBK05, HMK04/24, HMK05/25	Style A
P163601	15 psi/ 103 kPa	DC/single post. Normally open.	HBK04, HBK05, HMK04/24, HMK05/25	Style A
P163642	5 psi/ 34 kPa	DC/single post. Normally open.	HBK04, HBK05, HMK04/24, HMK05/25	Style A
P163839	25 psi/ 172 kPa	DC/single post. Normally closed.	HBK04, HBK05, HMK04/24, HMK05/25	Style A
P165194	50 psi/ 345 kPa	DC/single post. Normally open.	HMK03, HMK04/24, HMK05/25, FPK04	Style A
P574967	50 psi/ 276 kPa	DC 2-wire. Normally closed. Gold contacts. Microprocessor compatible.	HBK05, HMK03, HMK04/24, HMK05/25, FLK90/110/125	Style E
P574968	50 psi/ 345 kPa	DC 2-wire. Packard Weatherpack connector. Normally open.	HMK03, HMK04/24, HMK05/25, FLK90/110/125	Style B
P171143	25 psi/ 172 kPa	DC 2-wire. Cannon connector. Normally open.	HBK04, HBK05, HMK03, HMK04/24, HMK05/25	Style B
P171966	22 psi/ 150 kPa	AC/DC. 0.5A resistive, 0.2A inductive. Normally open.	FIK	at right
P575549	50 psi/ 345 kPa	DC 3-wire. Gold alloy contacts. Micro-processor compatible. White: normally open; Red: normally closed; Black: common.	HMK04/24, HMK05/25	Style F
P173944	25 psi/ 172 kPa	AC/DC 3-wire. Silver alloy contacts. White: normally open; Red: normally closed; Black: common.	HBK04, HBK05, HMK03, HMK04/24, HMK05/25	Style C
P174396	50 psi/ 345 kPa	AC/DC 3-wire. Silver alloy contacts. White: normally open; Red: normally closed; Black: common.	HMK03, HMK04/24, HMK05/25	Style C
P761056	87 psi/ 592 kPa	AC/DC Normally open or closed. 30 VAC or 30 VDC max. 0.5A resistive, 02A inductive.	FPK02	see FPK02 section
P563978	15 psi/103.4 kPa or 25 psi / 172.5 kPa	Return indicator, field adj.* or No Bypass	SP15/25, SP50/60, SP80/90, SP100/120, TT15/30/60	at right
P563979	5 psi / 34.5 kPa / .34 bar	Suction indicator, Hg field adj.* or No Bypass	SP15/25, SP50/60, SP80/90, SP100/120, TT15/30/60	at right

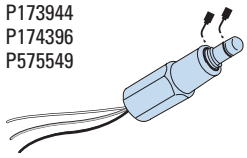
* NOT PRESET: Setting adjustable for desired application

Style A
P162400
P163601
P163642
P163839
P165194

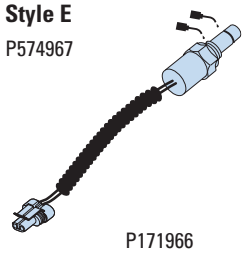
Style B
P574968
P171143



Styles C & F
P173944
P174396
P575549



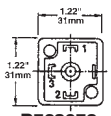
Style E
P574967



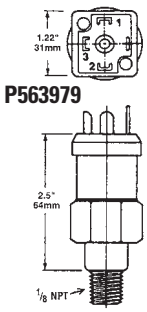
P171966

P563978
P563979

#1 Common; #2 Normally Closed;
#3 Normally Open



P563978

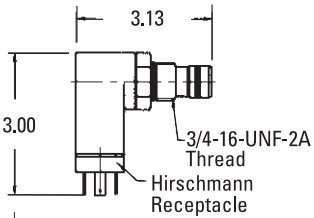


P563979

Adjustment screw located in center of elec. prongs

Instructions
1. Remove DIN adaptor
2. Remove small brass screw
3. Using 1/8" allen wrench adjust clockwise to increase set point/counter-clockwise to decrease set point
4. NO / NC

Electric △P indicator



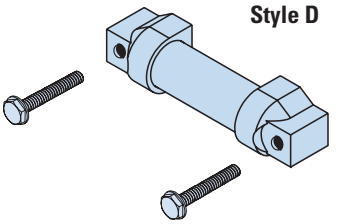
Electric △P indicator with pop-up visual button and manual reset

Visual Service Indicators

Visual Service Indicator Choices

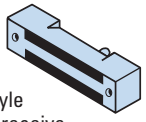
All non-electric models have a maximum operating temperature of 180°F/ 82°C.

Part No.	Use with Bypass Valve Pressure of:	Where Used	Illustration
P162642	15 psi/103 kPa	HBK04, HBK05, HMK04/24, HMK05/25	Style D
P162694	5 psi/34 kPa	HBK04, HBK05	Style D (old style)
P162696	25 psi/172 kPa	HBK04, HBK05, HMK04/24, HMK05/25	Style D
P164315	50 psi/345 kPa	HPK02, HPK03, HPK04, HPK05	see HPK02 section
P165965	25 psi/345 kPa	HMK03, HMK04/24, HMK05/25	Style D
P574177	50 psi / 345 kPa	HMK03, HMK04/24	Style D
P166603	50 psi/345 kPa (reverse flow)	HPK04	see HPK04 section
P167580	50 psi/345 kPa	HMK04/24, HMK05/25	Style D
P171958	17 psi/116 kPa	FIK	at left
P171945	72 psi/493 kPa	FPK02	see FPK02 section
P575334	25 psi/172 kPa	HBK05, HMK03, HMK05/25, HNK04/05, HMK04/24, FLK90, FLK110, FLK125	Style H
P575335	50 psi/345 kPa	HBK05, HMK03, HMK05/25, HNK04/05, HMK04/24, FLK90, FLK110, FLK125	Style H



Style D

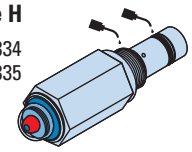
P162642
P162694
P162696
P165965
P574177
P167580



NOTE on Style D Indicators:
Our old square-style visual indicator has been improved in a design revision. If you have this style and order a replacement, you will receive the new rounded Style D shown above.
Exception: P162694 is still made per the old style.
Bar style visual indicators not for use with phosphate ester applications.

Style H

P575334
P575335



P171958

Indicators

Indicator Choices

Indicator Pressure Setting	Connector Style	Donaldson Part No.	Where Used
Pressure Gauge, 0 - 60 psi Models			
25 psi / 172 kPa	NA	X011059	WL15, WL16
50 psi / 345 kPa	NA	X011075	WL15, WL16
Pressure Gauge, 0 - 200 psi Models			
50 psi / 345 kPa	NA	X011060	WL15, WL16

Indicator Choices

Indicator Pressure Setting	Connector Style	Donaldson Part No.	Where Used
Electrical Models			
18 psi / 124 kPa	Hirschman	X011061	WL15, WL16
35 psi / 241 kPa	Hirschman	X011064	WL15, WL16
18 psi / 124 kPa	Brad Harrison	X011065	WL15, WL16
35 psi / 241 kPa	Brad Harrison	X011066	WL15, WL16

Visual Pressure Gauges

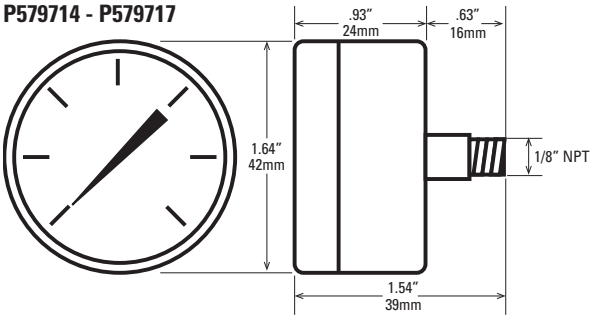
Visual Pressure Gauge Choices

Part No.	Pressure Range	Function
P579714	0 to 100 PSI Numeric Scale	Return
P579715	0 to 100 PSI Color Coded (15 PSI)	Return
P579716	0 to 100 PSI Color Coded (25 PSI)	Return
P579717	0 to -20 Hg	Suction
P563300	0 to 30 PSI Color Coded (15 PSI)	Return

P171956
for FIK series
-1 to +5 bar
14.5 to 72.5 psi
-100 to +500 kPa

P171953
G 1/8

P579714 - P579717



Replacement Indicators (Visual, Electrical and Visual / Electrical)

Replacement Indicator Choices

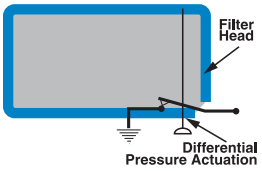
Part No.	Use with Bypass Valve Pressure of	Connector Style	Seal Material	Thermal Lockout	Surge Control	Where Used
Electrical Indicators						
P572355	15 psid/1.04 bar	Hirschman	Buna-N	No	No	WO23, WO61
P572359	35 psid/2.41 bar	Hirschman	Buna-N	No	No	WO23, WO61, WO41, W440, W350, W451, W620
P572361	35 psid/2.4 bar	Brad Harrison	Buna-N	No	No	WO23, WO61, WO41, W440, W350, W451, W620
P572369	70 psid/4.8 bar	Hirschman	Buna-N	No	No	WO41, W440, W350, W451, W620
Visual / Electrical Indicators						
P572323	15 psid/1.04 bar	Hirschman	Buna-N	No	No	WO23, WO61
P572342	15 psid/1.04 bar	3-wire flying leads	Buna-N	No	No	WO23, WO61
P572327	35 psid/2.41 bar	Hirschman	Buna-N	No	No	WO23, WO61, WO41, W440, W350, W451, W620
P569638	35 psid/2.4 bar	Hirschman	Viton	Yes	No	HPK02, HPK03, HPK04, HPK05
P572329	35 psid/2.4 bar	Brad Harrison	Buna-N	No	No	WO23, WO61, WO41, W440, W350, W451, W620
P572349	35 psid/2.4 bar	3-wire flying leads	Buna-N	No	No	WO23, WO61, WO41, W440, W350, W451, W620
P572384	35 psid/2.4 bar	Hirschman	Buna-N	Yes	Yes	WO23, WO61, WO41, W440, W350, W451, W620
P572385	35 psid/2.4 bar	Brad Harrison	Buna-N	Yes	Yes	WO41, W440, W350, W451, W620
P567458	35 psid/2.4 bar	Hirschman	Viton	Yes	Yes	WO23, WO61, WO41, W440, W350, W451, W620, HPK02, HPK03, HPK04, HPK05
P569639	70 psid/4.8 bar	Hirschman	Viton	Yes	No	W440, W350, W451, W620, HPK02, HPK03, HPK04, HPK05
P567459	70 psid/4.8 bar	Brad Harrison	Buna-N	Yes	Yes	W440, W350, W451, W620, HPK02, HPK03, HPK04, HPK05
P572320	70 psid/4.8 bar	Hirschman	Buna-N	Yes	Yes	W440, W350, W451, W620
P572373	70 psid/4.8 bar	Hirschman	Buna-N	Yes	No	W440, W350, W451, W620
P572387	100 psid/6.89 bar	Hirschman	Buna-N	Yes	Yes	W440, W350, W451
Visual Indicators						
P572345	15 psid/1.04 bar	N/A	Buna-N	No	No	WO23, WO61
P572347	35 psid/2.41 bar	N/A	Buna-N	No	No	WO23, WO61, WO41, W440, W350, W451, W620
P572348	35 psid/2.41 bar	N/A	Buna-N	Yes	Yes	WO23, WO61, WO41, W440, W350, W451, W620
P567456	35 psid/2.4 bar	N/A	Buna-N	Yes	Yes	WO23, WO61, WO41, W440, W350, W451, W620, HPK02, HPK03, HPK04, HPK05
P572319	70 psid/4.8 bar	N/A	Buna-N	Yes	Yes	W440, W350, W451, W620
P567457	70 psid/4.8 bar	N/A	Viton	Yes	Yes	W440, W350, W451, W620, HPK02, HPK03, HPK04, HPK05
P572353	100 psid/6.9 bar	N/A	Buna-N	Yes	No	W440, W350, W451
P572354	100 psid/6.89 bar	N/A	Viton	Yes	Yes	W440, W350, W451
P569636	35 psid/2.4 bar	N/A	Viton	No	No	HPK02, HPK03, HPK04, HPK05
P569637	70 psid/4.8 bar	N/A	Viton	No	No	HPK02, HPK03, HPK04, HPK05

Wiring Diagrams
Indicator Switches

Electrical Schematics

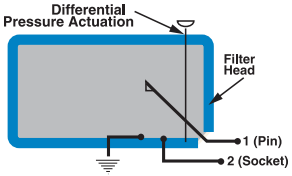
Style A: Single Post DC Indicator (Maximum: 200 mA DC @ 30 VDC)

P163839



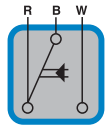
Style B: DC 2-Wire Indicator (Maximum: 200 mA DC @ 30 VDC)

P171143

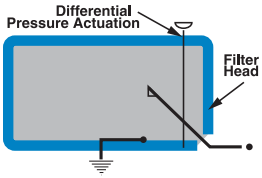


Style C, F: AC/DC 3-Wire Indicator (Maximums: 2 amps @ 24 VDC or 2 amps @ 110 VAC)

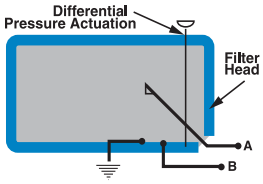
P173944



P162400
P163601
P163642
P165194

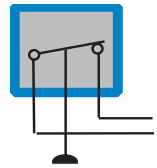


P574968



Style E: DC 2-Wire Indicator (Maximum: 100 mA DC @ 30 VDC)

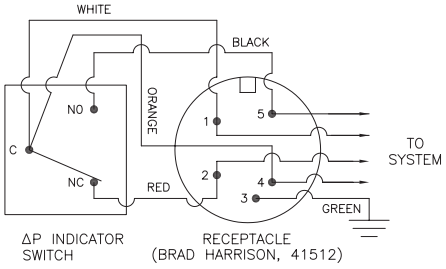
P574967

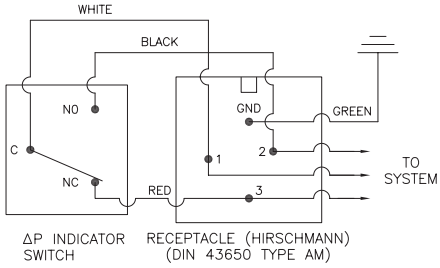


All dimensions are shown in millimeters [inches].

Indicator Switch Schematic Wiring Diagram

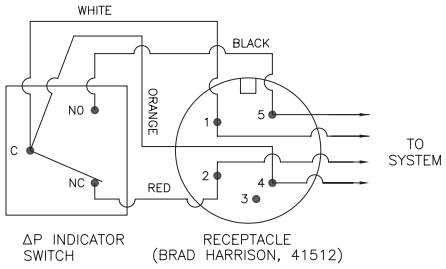
Aluminum Electrical Housings

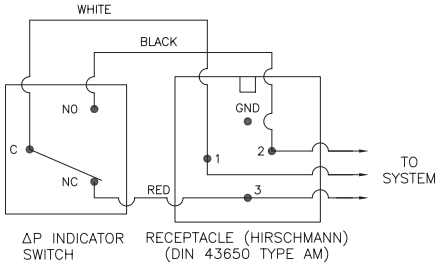




Note: The female plug (connector) is to be furnished by customer.

Plastic Electrical Housings





Note: The female plug (connector) is to be furnished by customer.

Differential Indicators:
Indicators are designed to actuate at approximately 80% of bypass valve cracking pressure. It is recommended that an indicator with a bypass setting of 100 psid is used with a non-bypass housing.

Surge Control:
This optional feature is used to dampen pressure surges or spikes to avoid premature actuation of the indicator. Surge control delays the indicator response.

Thermal Lockout:
The Thermal Lockout prevents premature signaling of a bypass condition created by viscous fluid during cold start-ups. Normal indicator actuation capability is resumed once the operating temperature of the fluid reaches approximately 80° F.

In-Line Accessories

- Pressure gauges for monitoring system pressure
- Hoses and test points for sampling oil and determining ISO cleanliness levels
- Flanges to connect components
- Valves for system control

In-Line Pressure Gauges

Specifications

- Stainless steel (304SS)
- Phosphor bronze bourdon tube
- Acrylic lenses
- Built-in snubber
- Glycerin Filled

Features

Donaldson Pressure Gauge Liquid-filled (PGL) series gauges are mechanical bourdon tube pressure gauges. Each gauge has a glycerin filled stainless steel bezel and case that is robust and will not discolor or rust. The bourdon tube and movement is constructed from brass and bronze alloys. PGL series gauges are easy to install for continuous readings with face diameters of 2½" (63 mm) and 4" (100 mm).

Operating Temperatures

- 30°F to 160°F (-1°C to 71°C)

Accuracy

- +/- 3% of full scale

Scale

- psi
- bar

Dial Sizes

- 2½" (63 mm) and 4" (100 mm)

Mounting

- Stem, Panel, Front Flange

Thread Type

- 2½" size
  - ¼" NPT, ¼" SAE, ¼" BSP
- 4"
  - ½" NPT

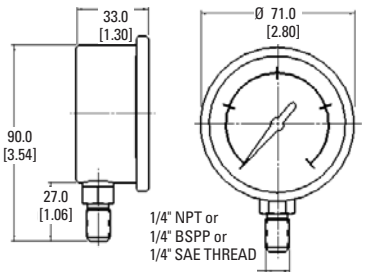
In-Line Pressure Gauges

Pressure Range Options

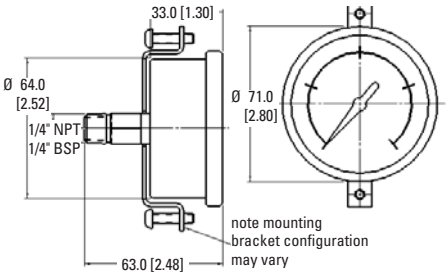
PGL-A	30 Hg-20 psi	0-30 in. Hg	0-30 psi	0-60 psi	0-100 psi	0-160 psi	0-300 psi	0-500 psi	0-600 psi	0-1000 psi	0-1500 psi	0-2000 psi	0-3000 psi	0-4000 psi	0-5000/345 psi	0-6000 psi	0-10000 psi
2½" Stem	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
2½" SAE Stem							•		•	•	•	•		•	•		
2½" Panel	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	
4" Stem							•		•	•	•	•	•		•	•	•
4" Panel							•		•	•	•	•	•		•		•

2½" Diameter Gauges

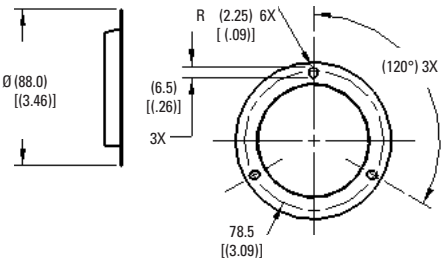
Stem Mount



Panel Mount



With Front Flange



Front Flange Options

Donaldson Part No.	Description	Dial Size
P562699	PGL-A-63-FF	2-1/2" (63 mm)
P562671	PGL-A-100-FF	4" (100 mm)

2½" Stem Mount

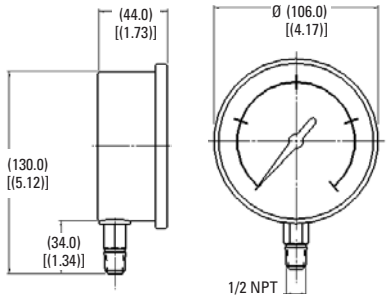
Donaldson Part No.	Description	Pressure Range (psi/bar)	Thread Type
P562718	PGL-A-63-N-B-30-CS	-30" Hg + 20/1	1/4" NPT
P562719	PGL-A-63-N-B-30-S	0 - 30/2	1/4" NPT
P562721	PGL-A-63-N-B-30-VS	0 - 30" Hg Vac	1/4" NPT
P562733	PGL-A-63-N-B-60-S	0 - 60/4	1/4" NPT
P562705	PGL-A-63-N-B-100-S	0 - 100/7	1/4" NPT
P562709	PGL-A-63-N-B-160-S	0 - 160/11	1/4" NPT
P562717	PGL-A-63-N-B-300-S	0 - 300/20	1/4" NPT
P562727	PGL-A-63-N-B-500-S	0 - 500/35	1/4" NPT
P562731	PGL-A-63-N-B-600-S	0 - 600/40	1/4" NPT
P562703	PGL-A-63-N-B-1000-S	0 - 1,000/70	1/4" NPT
P562707	PGL-A-63-N-B-1500-S	0 - 1,500/100	1/4" NPT
P562711	PGL-A-63-N-B-2000-S	0 - 2,000/125	1/4" NPT
P562713	PGL-A-63-N-B-3000-S	0 - 3,000/200	1/4" NPT
P562723	PGL-A-63-N-B-4000-S	0 - 4,000/275	1/4" NPT
P562725	PGL-A-63-N-B-5000/345-S	0 - 5,000/350	1/4" NPT
P562729	PGL-A-63-N-B-6000-S	0 - 6,000/400	1/4" NPT
P562701	PGL-A-63-N-B-10,000-S	0 - 10,000/700	1/4" NPT
P562696	PGL-A-63-B-B-1500-S	0 - 1,500/100	1/4" BSP
P562739	PGL-A-63-S-B-500-S	0 - 500/35	1/4" SAE
P562734	PGL-A-63-S-B-1000-S	0 - 1,000/70	1/4" SAE
P562735	PGL-A-63-S-B-1500-S	0 - 1,500/100	1/4" SAE
P562736	PGL-A-63-S-B-2000-S	0 - 2,000/125	1/4" SAE
P562737	PGL-A-63-S-B-3000-S	0 - 3,000/200	1/4" SAE
P562738	PGL-A-63-S-B-5000/345-S	0 - 5,000/350	1/4" SAE
P562740	PGL-A-63-S-B-6000-S	0 - 6,000/400	1/4" SAE

2½" Panel Mount

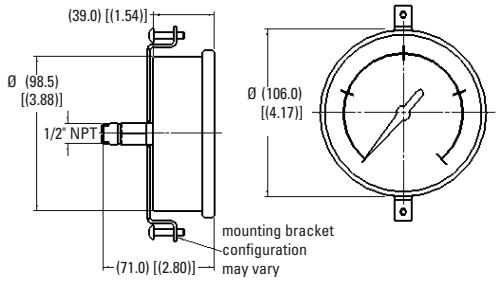
Donaldson Part No.	Description	Pressure Range Range (psi/bar)	Thread Type
P562720	PGL-A-63-N-B-30-VP	0 - 30" Hg Vac	1/4" NPT
P562732	PGL-A-63-N-B-60-P	0 - 60/4	1/4" NPT
P562704	PGL-A-63-N-B-100-P	0 - 100/7	1/4" NPT
P562708	PGL-A-63-N-B-160-P	0 - 160/11	1/4" NPT
P562716	PGL-A-63-N-B-300-P	0 - 300/20	1/4" NPT
P562726	PGL-A-63-N-B-500-P	0 - 500/35	1/4" NPT
P562730	PGL-A-63-N-B-600-P	0 - 600/40	1/4" NPT
P562702	PGL-A-63-N-B-1000-P	0 - 1,000/70	1/4" NPT
P562706	PGL-A-63-N-B-1500-P	0 - 1,500/100	1/4" NPT
P562710	PGL-A-63-N-B-2000-P	0 - 2,000/125	1/4" NPT
P562712	PGL-A-63-N-B-3000-P	0 - 3,000/200	1/4" NPT
P562722	PGL-A-63-N-B-4000-P	0 - 4,000/275	1/4" NPT
P562724	PGL-A-63-N-B-5000/345-P	0 - 5,000/350	1/4" NPT
P562728	PGL-A-63-N-B-6000-P	0 - 6,000/400	1/4" NPT
P562700	PGL-A-63-N-B-10,000-P	0 - 10,000/700	1/4" NPT
P562697	PGL-A-63-B-B-3000-P	0 - 3,000/200	1/4" BSP
P562698	PGL-A-63-B-B-4000-P	0 - 4,000/275	1/4" BSP

4" Diameter Gauges

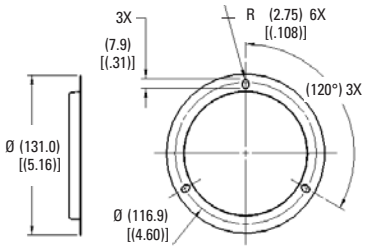
Stem Mount



Panel Mount



With Front Flange



4" Stem Mount

Donaldson Part No.	Description	Pressure Range Range (psi/bar)	Thread Type
P562683	PGL-A-100-N-B-300-S	0 - 300/20	1/2" NPT
P562688	PGL-A-100-N-B-600-S	0 - 600/40	1/2" NPT
P562675	PGL-A-100-N-B-1000-S	0 - 1,000/70	1/2" NPT
P562677	PGL-A-100-N-B-1500-S	0 - 1,500/100	1/2" NPT
P562679	PGL-A-100-N-B-2000-S	0 - 2,000/125	1/2" NPT
P562681	PGL-A-100-N-B-3000-S	0 - 3,000/200	1/2" NPT
P562685	PGL-A-100-N-B-5000	0 - 5,000/350	1/2" NPT
P562686	PGL-A-100-N-B-6000-S	0 - 6,000/400	1/2" NPT
P562673	PGL-A-100-N-B-10,000-S	0 - 10,000/700	1/2" NPT

4" Panel Mount

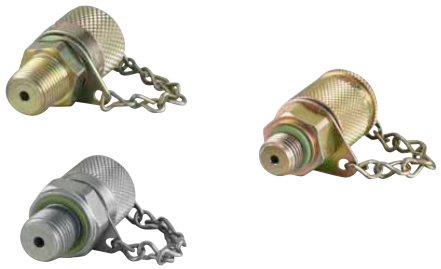
Donaldson Part No.	Description	Pressure Range Range (psi/bar)	Thread Type
P562682	PGL-A-100-N-B-300-P	0 - 300/20	1/2" NPT
P562687	PGL-A-100-N-B-600-P	0 - 600/40	1/2" NPT
P562674	PGL-A-100-N-B-1000-P	0 - 1,000/70	1/2" NPT
P562676	PGL-A-100-N-B-1500-P	0 - 1,500/100	1/2" NPT
P562678	PGL-A-100-N-B-2000-P	0 - 2,000/125	1/2" NPT
P562680	PGL-A-100-N-B-3000-P	0 - 3,000/200	1/2" NPT
P562684	PGL-A-100-N-B-5000	0 - 5,000/350	1/2" NPT
P562672	PGL-A-100-N-B-10,000-P	0 - 10,000/700	1/2" NPT

Test Points

Specifications

- Working Pressure: 9000 psi /630 bar
- Seals: Buna-N®
- Caps: Plastic or metal
- Leak-free connection at full pressure

Buna-N® is a registered trademark of E. I. DuPont de Nemours and Company.



Features

Test points can be used as a connection into the hydraulic system on the suction side, pressure side or return. They allow connection for pressure transducers and provide ports for fluid sampling (so you can monitor cleanliness and keep your system operating optimally). If you have filters installed in hard-to-access locations, test points and hose assemblies can be used to plumb up a bulkhead to read pressure differentials.

Styles

- Pressure

Applications

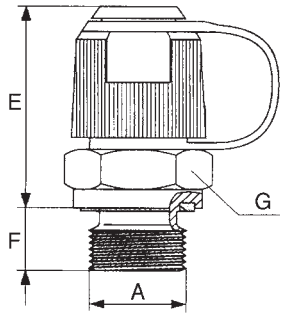
- Fluid or gas

Temperature Range

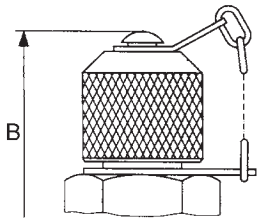
- Metal cap: -22°F to 248°F / -30°C to 120°C
- Plastic cap: -22°F to 212°F / -30°C to 100°C

TPM/TPP-1215 Assembly Views M12x1.5 Thread

Plastic Cap



Metal Cap

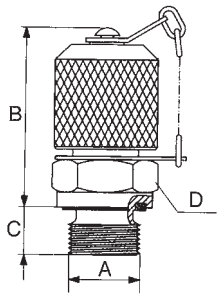


Test Point Choices

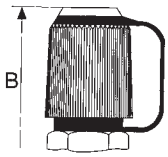
Donaldson Part No.	Description	Working Pressure psi/bar	A Thread Type	E (in./mm)	F (in./mm)	G (in./mm)	Cap
P563192	TPM-1215-04G	9000/630	1/4" BSPP, Form G	1.30/33	.33/8.5	0.55/14	Metal
P563197	TPP-1215-02N	5800/400	1/8" NPTF	1.14/29	.47/12	0.55/14	Plastic
P563193	TPM-1215-04N	9000/630	1/4" NPTF	1.14/29	.59/15	0.55/14	Metal
P563199	TPP-1215-03S	9000/630	3/8"-24 UNF (#3 SAE)	1.42/36	.39/10	0.87/22	Plastic
P563206	TPP-1215-04S	9000/630	7/16"-20 UNF (#4 SAE)	1.26/32	.35/9	0.67/17	Plastic
P563207	TPP-1215-06S	9000/630	9/16"-18 UNF (#6 SAE)	1.22/31	.39/10	0.75/19	Plastic

TPM/TPP-1620 Assembly Views M16x2 Thread

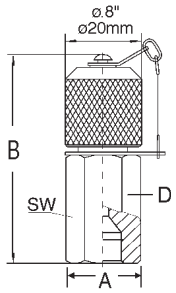
TPM Metal Cap



TPP Plastic Cap



JIC Style



Test Point Choices

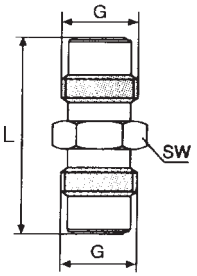
Donaldson Part No.	Description	Working Pressure psi/bar	A Thread Type	B (in./mm)	C (in./mm)	D (mm)	Cap
P563210	TPM-1620-02B	5800/400	ISO 228-G 1/8" BSPP	1.5/38	0.31/8	17	Metal
P563215	TPM-1620-04B	9000/630	ISO 228-G 1/4" BSPP	1.42/36	0.39/10	19	Metal
P563987	TPM-1620-06B	9000/630	ISO 228-G 3/8" BSPP	1.42/36	0.39/10	22	Metal
P563219	TPM-1620-04J	8100/600	#4 37° JIC Female	2.17/55	–	17	Metal
P563231	TPM-1620-06J	4500/315	#6 37° JIC Female	2.26/57.5	–	19	Metal
P563212	TPM-1620-02N	5800/400	1/8" NPTF	1.3/33	0.51/13	17	Metal
P563220	TPM-1620-04N	9000/630	1/4" NPTF	1.3/33	0.65/16.5	17	Metal
P563224	TPM-1620-04S	9000/630	7/16"-20 UNF (#4 SAE)	1.46/37	0.35/9	17	Metal
P563232	TPM-1620-06S	9000/630	9/16"-18 UNF (#6 SAE)	1.42/36	0.39/10	19	Metal

Test Point Adapters

A variety of adapters to suit your application.

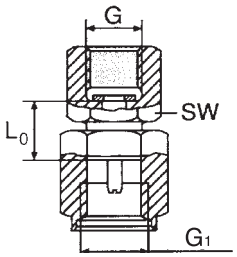
Hose Union Gauge

Donaldson Part No.	Description	G Thread	psi/bar	L (in./mm)	SW (in./mm)
P563263	AHU-1215	M12 x 1.5	9000/630	1.14/29	.55/14
P563264	AHU-1620	M16 x 2	9000/630	1.65/42	.67/17



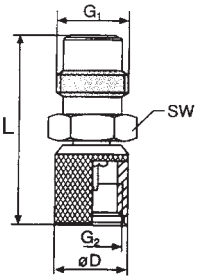
Direct Gauge Adapter

Donaldson Part No.	Description	G Int. Thread	G1 Thread	psi/bar	LO (in./mm)	SW (in./mm)
P563808	ADG-1215-04N	1/4" NPT	M12 x 1.5	9000/630	1.14/29	.55/14
P563809	ADG-1620-04N	1/4" NPT	M16 x 2	9000/630	.55/14	.75/19



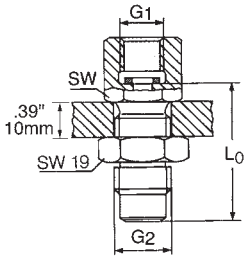
Series Converter

Donaldson Part No.	Description	G1 Thread	G2 Thread	ØD (in./mm)	L (in./mm)	SW (in./mm)
P563265	ASC-1215	M16 x 2	M12 x 1.5	.67/17	1.30/33	.67/17
P563266	ASC-1620	M12 x 1.5	M16 x 2	.79/20	1.04/26.5	.67/17



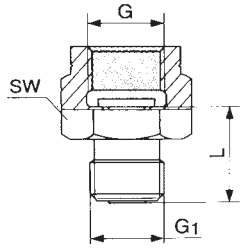
Bulkhead Gauge Adaptor

Donaldson Part No.	Description	G1 Thread	G2 Thread	L (in./mm)	SW (in./mm)
P563800	ABH-1215-04N	1/4" NPT	1215M 12 x 1.5	1.52/39.5	.75/27
P563807	ASC-1620-04N	1/4" NPT	1620/M16 x 2	1.52/38.5	.75/19



Pressure Gauge Connection

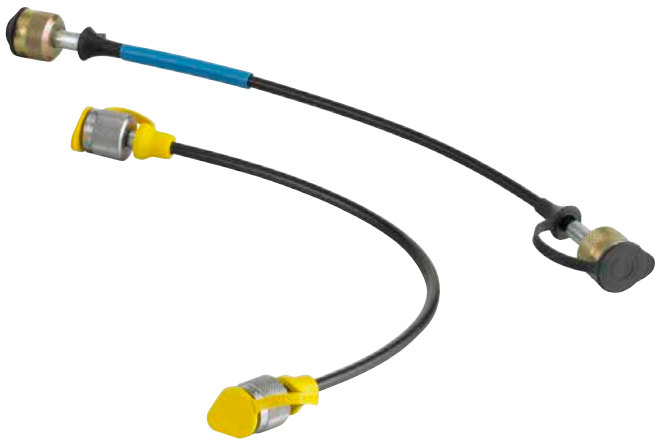
Donaldson Part No.	Description	G Thread	G1 Thread	psi/bar	L (in./mm)	SW (in./mm)
P563262	AHG-1215-04N	1/4" NPT	M12 x 1.5	9000/630	.71/18	.74/19



Test Point Hose Assemblies

Specifications

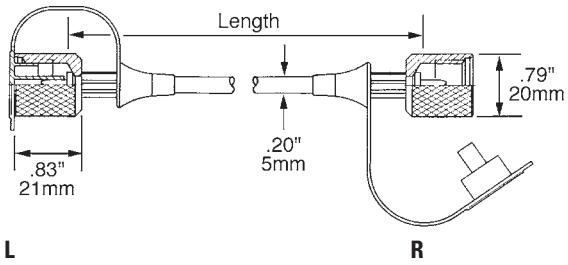
- Working Pressure to: 9000 psi / 630 bar
- Temperature Range: -4°F to 212°F / -20°C to 100°C
- Length: 12" to 180" / 305 to 4570



Features

Donaldson test point hoses are made of Polyamide II core with polyester braid reinforcement and Polyamid11 cover. They are suitable for use with petroleum-based fluids. Hoses are standard straight on both ends and include plastic dust caps.

For hydraulic filters installed in hard-to-access locations, hose assemblies and test points can be used to plumb up a bulkhead to read pressure differentials.



1215 Series M12x1.5 Thread

Donaldson Part No.	Description	Length (in/mm)
P563240	H-1215-B-0101-012	12/305
P563243	H-1215-B-0101-024	24/610
P563244	H-1215-B-0101-036	36/915
P563245	H-1215-B-0101-048	48/1220
P563246	H-1215-B-0101-072	72/1830
P563247	H-1215-B-0101-096	96/2440
P563248	H-1215-B-0101-120	120/3050
P563249	H-1215-B-0101-180	80/4570

1620 Series M16x2 Thread

Donaldson Part No.	Description	Length (in/mm)
P563250	H-1620-B-0101-012	12/305
P563251	H-1620-B-0101-018	18/460
P563252	H-1620-B-0101-024	24/610
P563254	H-1620-B-0101-036	36/915
P563255	H-1620-B-0101-048	48/1220
P563256	H-1620-B-0101-072	72/1830
P563257	H-1620-B-0101-096	96/2440
P563259	H-1620-B-0101-120	120/3050
P563260	H-1620-B-0101-144	144/3660
P563261	H-1620-B-0101-180	180/4570

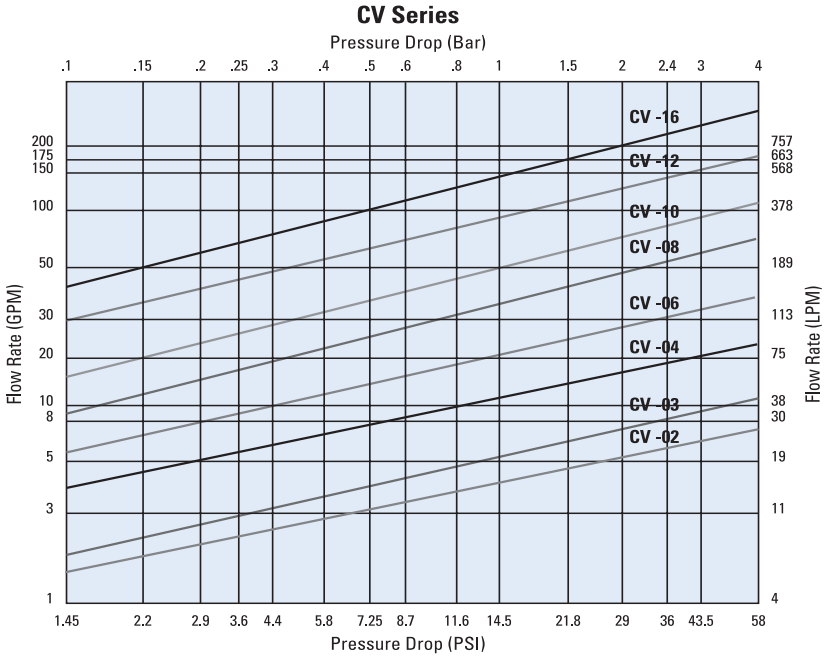
In-Line Check Valves

Specifications

- Working Pressure to: 4350 psi / 300 bar
- Flow Range: 200 gpm 757 lpm

Features

Steel constructed check valves are compatible with all non-corrosive liquids. Valves contain no elastomeric seals. Restricted orifice (.062) option available on some models.



The above chart is based on Hydraulic Oil 100 SUS, S.G. = 0.86

Sizes

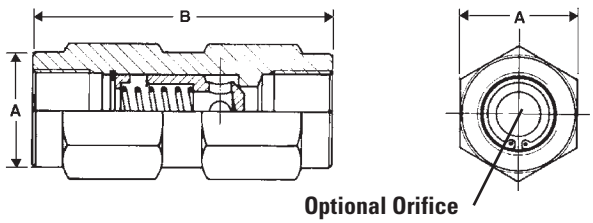
- ¼", 3/8", ½", ¾", 1", 1¼", 1½" and 2" NPT
- #4, #6, #8, #12, #16, #20, #24 and #32 SAE

Opening Pressure (Cracking

- 5 psi / 0.34 bar or 65 psi / 4.5 bar

In-Line Check Valve Options

Donaldson Part No.	Reference	Max Working Pressure (psi/bar)	Max. Rated Flow Flow (gpm/lpm)	Opening Pressure (psi/bar)	Port	A (in./mm)	B (in./mm)
P562297	CV-02P-5	4350/300	6/23	5/0.34	1/4" NPT	0.75/19	2.17/55
P562298	CV-02P-65	4350/300	6/23	65/4.5	1/4" NPT	0.75/19	2.17/55
P562299	CV-02S-5	4350/300	6/23	5/0.34	#4 SAE	0.75/19	2.17/55
P562301	CV-03P-5	4350/300	10/38	5/0.34	3/8" NPT	0.98/25	2.68/68
P562302	CV-03P-65	4350/300	10/38	65/4.5	3/8" NPT	0.98/25	2.68/68
P562303	CV-03S-5	4350/300	10/38	5/0.34	#6 SAE	0.75/19	2.29/58
P562305	CV-04P-5	4350/300	16/60	5/0.34	1/2" NPT	1.06/27	2.95/75
P562306	CV-04P-65	4350/300	16/60	65/4.5	1/2" NPT	1.06/27	2.95/75
P562307	CV-04S-5	4350/300	16/60	5/0.34	#8 SAE	0.98/25	2.72/69
P562308	CV-04S-65	4350/300	16/60	65/4.5	#8 SAE	0.98/25	2.72/69
P562309	CV-06P-5	4350/300	25/94	5/0.34	3/4" NPT	1.38/35	3.48/88
P562311	CV-06P-65	4350/300	25/94	65/4.5	3/4" NPT	1.38/35	3.48/88
P562312	CV-06S-5	4350/300	25/94	5/0.34	#12 SAE	1.38/35	3.48/88
P562313	CV-06S-65	4350/300	25/94	65/4.5	#12 SAE	1.38/35	3.48/88
P562314	CV-08P-5	4350/300	45/169	5/0.34	1" NPT	1.61/41	4.33/110
P562316	CV-08P-65	4350/300	45/169	65/4.5	1" NPT	1.61/41	4.33/110
P562317	CV-08S-5	4350/300	45/169	5/0.34	#16 SAE	1.61/41	4.33/110
P563307	CV-08S-65	4350/300	45/169	65/4.5	#16 SAE	1.61/41	4.33/110
P562319	CV-10P-5	4350/300	95/357	5/0.34	1-1/4" NPT	2.16/55	4.72/120
P562320	CV-10P-65	4350/300	95/357	65/4.5	1-1/4" NPT	2.16/55	4.72/120
P562321	CV-10S-5	4350/300	95/357	5/0.34	#20 SAE	2.16/55	4.72/120
P562322	CV-10S-65	4350/300	95/357	65/4.5	#20 SAE	2.16/55	4.72/120
P562323	CV-12P-5	4350/300	130/489	5/0.34	1-1/2" NPT	2.56/65	5.43/138
P562324	CV-12P-65	4350/300	130/489	65/4.5	1-1/2" NPT	2.56/65	5.43/138
P562325	CV-12S-5	4350/300	130/489	5/0.34	#24 SAE	2.56/65	5.43/138
P562326	CV-12S-65	4350/300	130/489	65/4.5	#24 SAE	2.56/65	5.43/138
P562327	CV-16P-5	2900/200	200/752	5/0.34	2" NPT	2.56/65	5.43/138
P562328	CV-16P-65	2900/200	200/752	65/4.5	2" NPT	2.56/65	5.43/138

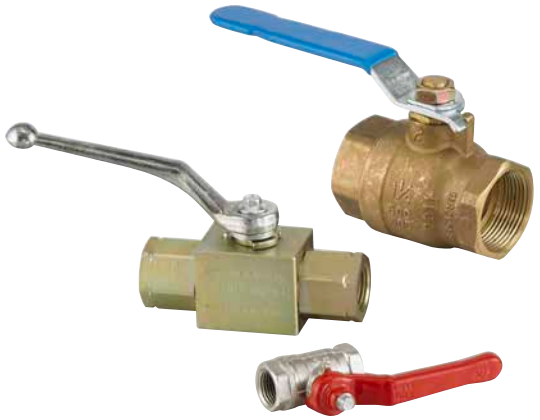


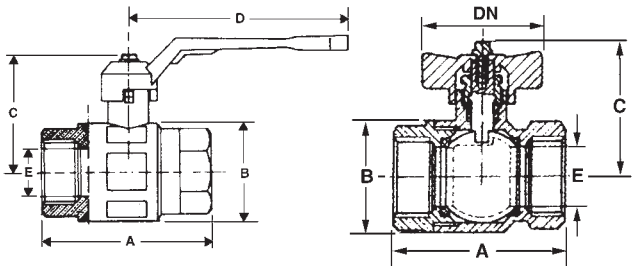
Ball Valves - Low Pressure

Specifications

- Hot pressed brass body and ball OT 58
- Materials (ball and body): BV Series chromium plated
- Steel handle
- Teflon® seals (ball and stem)

Teflon® is a registered trademark of E. I. DuPont de Nemours and Company.





Features

Low pressure ball valves are rated for water, oil or gas (WOG) applications. Two-way/two-position, quarter turn operation. Full-ported sizes from ¼" to 2" NPT. T-handle available on some models. Suitable for temperatures from -22°F to 350°F (-30°C to 162°C).

Ball Valve Options

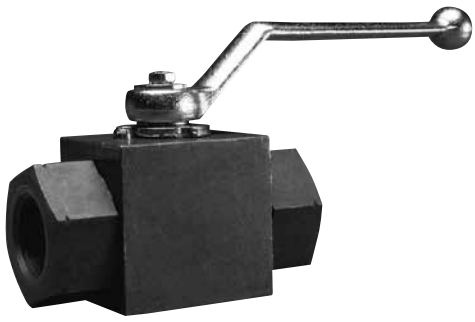
Donaldson Part No.	Description	Max. Working Pressure (psi/bar)	Port Thread	A (in./mm)	B (in./mm)	C (in./mm)	D (in./mm)	E (in./mm)
P562331	BV-04-N	710/49	1/4" NPT	1.89/48	0.98/25	1.69/43	3.15/80	0.40/10
P562333	BV-06-N	710/49	3/8" NPT	1.89/48	0.98/25	1.69/43	3.15/80	0.40/10
P562336	BV-08-N	710/49	1/2" NPT	2.00/51	1.22/31	1.77/45	3.15/80	0.60/15
P563311	BV-12-N	570/39	3/4" NPT	2.24/57	1.46/37	2.36/60	4.44/113	0.80/20
P562338	BV-16-N	570/39	1" NPT	2.75/70	1.81/46	2.48/63	4.44/113	1.00/25
P562339	BV-20-N	430/30	1-1/4" NPT	3.15/80	2.24/57	3.11/79	5.43/138	1.25/32
P562341	BV-24-N	430/30	1-1/2" NPT	3.66/93	2.75/70	3.27/83	5.43/138	1.57/40
P562343	BV-32-N	360/25	2" NPT	4.41/112	3.31/84	3.94/100	6.22/158	1.97/50
P562345	BV-40-N	260/18	2-1/2" NPT	5.31/135	3.82/97	3.98/101	7.75/197	2.12/54
P562346	BV-48-N	230/16	3" NPT	6.25/159	4.80/122	5.08/129	9.84/250	2.56/65

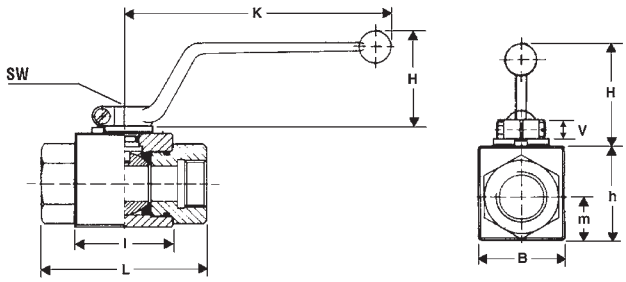
Ball Valves - Medium/High Pressure

Specifications

- Steel body
- Brass ball with chrome plating (MBV-04 thru MBV-16)
- Steel ball with chrome plating (HBV, MBV-20 thru MBV-32)
- Steel zinc stem (MBV)
- Delrin ball seal
- Stem seal: Buna-N® (MBV); Viton (HBV)
- Aluminum handles on HBV larger sizes

Buna-N® is a registered trademark of E. I. DuPont de Nemours and Company.





Features

Medium duty (MBV) and high pressure (HBV) ball valves are compatible with petroleum-based fluids. Two-way, two-position valves are suited for on/off control. Optional locking tabs provide added safety. Valves come standard with bent handles; straight handles are available for some models. Operating temperatures from -22°F to 212°F / -30°C to 100°C.

Medium Duty Ball Valves - MBV

Donaldson Part No.	Description	Port Thread	Pressure (psi/bar)	L (in./mm)	I (in./mm)	B (in./mm)	H (in./mm)	h (in./mm)	m (in./mm)	V (in./mm)	SW (in./mm)	K (in./mm)
P562387	MBV-04-N	1/4" NPT	7250/500	2.7/69	1.4/36	1.0/26	1.7/43	1.3/32	0.5/12.5	0.4/11	0.4/9	4.6/118
P562388	MBV-04-S	7/16"-20 SAE	7250/500	2.7/69	1.4/36	1.0/26	1.7/43	1.3/32	0.5/12.5	0.4/11	0.4/9	4.6/118
P563308	MBV-06-N	3/8" NPT	7250/500	3.1/79	1.7/43	1.3/32	1.7/43	1.5/38	0.7/17.5	0.4/11	0.4/9	4.6/118
P562389	MBV-06-S	9/16"-18 SAE	7250/500	3.1/79	1.7/43	1.3/32	1.7/43	1.5/38	0.7/17.5	0.4/11	0.4/9	4.6/118
P562390	MBV-08-N	1/2" NPT	7250/500	4.1/104	1.9/48	1.4/35	1.7/43	1.6/40	0.75/19	0.4/11	0.4/9	4.6/118
P563309	MBV-08-S	3/4"-16 SAE	7250/500	4.1/104	1.9/48	1.4/35	1.7/43	1.6/40	0.75/19	0.4/11	0.4/9	4.6/118
P562391	MBV-12-N	3/4" NPT	5800/400	4.3/109	2.4/62	1.9/49	2.3/58	2.2/57	1.0/24.5	0.6/14	0.6/14	7.2/182
P562392	MBV-12-S	1-1/16"-12 SAE	5800/400	4.3/109	2.4/62	1.9/49	2.3/58	2.2/57	1.0/24.5	0.6/14	0.6/14	7.2/182
P562394	MBV-16-N	1" NPT	4500/310	4.6/117	2.6/66	2.3/58	2.3/58	2.6/65	1.2/29.5	0.6/14	0.6/14	7.2/182
P562395	MBV-16-S	1-5/16"-12 SAE	4500/310	4.6/117	2.6/66	2.3/58	2.3/58	2.6/65	1.2/29.5	0.6/14	0.6/14	7.2/182
P562396	MBV-20-N	1-1/4" NPT	4500/310	4.3/110	3.2/80	3.0/76	2.3/58	3.3/84	1.5/38	0.6/15	0.7/17	8.5/218
P562397	MBV-20-S	1-5/8"-12 SAE	4500/310	4.3/110	3.2/80	3.0/76	2.3/58	3.3/84	1.5/38	0.6/15	0.7/17	8.5/218
P562398	MBV-24-N	1-1/2" NPT	3625/250	5.1/130	3.3/85	3.6/92	2.3/58	3.9/99	1.8/46	0.6/15	0.7/17	8.5/218
P563310	MBV-24-S	1-7/8"-12 SAE	3625/250	5.1/130	3.3/85	3.6/92	2.3/58	3.9/99	1.8/46	0.6/15	0.7/17	8.5/218
P562399	MBV-32-N	2" NPT	3625/250	5.5/140	3.9/100	4.2/106	2.3/58	4.4/111	2.1/53	0.6/15	0.7/17	8.5/218

High Pressure Ball Valves

High Pressure Ball Valve Options

Donaldson Part No.	Description	Port Thread	Pressure (psi/bar)	L (in./mm)	I (in./mm)	B (in./mm)	H (in./mm)	h (in./mm)	m (in./mm)	V (in./mm)	SW (in./mm)	K (in./mm)
P562356	HBV-04-N	1/4" NPT	7250/500	2.7/69	1.4/36	1.0/26	1.7/43	1.3/32	0.5/12.5	0.4/11	0.4/9	4.6/118
P562357	HBV-04-S	7/16"-20 SAE	7250/500	2.7/69	1.4/36	1.0/26	1.7/43	1.3/32	0.5/12.5	0.4/11	0.4/9	4.6/118
P562358	HBV-06-N	3/8" NPT	7250/500	3.1/79	1.7/43	1.3/32	1.7/43	1.5/38	0.7/17.5	0.4/11	0.4/9	4.6/118
P562359	HBV-06-S	9/16"-18 SAE	7250/500	3.1/79	1.7/43	1.3/32	1.7/43	1.5/38	0.7/17.5	0.4/11	0.4/9	4.6/118
P562360	HBV-08-N	1/2" NPT	7250/500	4.1/104	1.9/48	1.4/35	1.7/43	1.6/40	0.75/19	0.4/11	0.4/9	4.6/118
P562361	HBV-08-S	3/4"-16 SAE	7250/500	4.1/104	1.9/48	1.4/35	1.7/43	1.6/40	0.75/19	0.4/11	0.4/9	4.6/118
P562362	HBV-12-N	3/4" NPT	5800/400	4.3/109	2.4/62	1.9/49	2.3/58	2.2/57	1.0/24.5	0.6/14	0.6/14	7.2/182
P562363	HBV-12-S	1-1/16"-12 SAE	5800/400	4.3/109	2.4/62	1.9/49	2.3/58	2.2/57	1.0/24.5	0.6/14	0.6/14	7.2/182
P562364	HBV-16-N	1" NPT	4500/310	4.6/117	2.6/66	2.3/58	2.3/58	2.6/65	1.2/29.5	0.6/14	0.6/14	7.2/182
P562365	HBV-16-S	1-5/16"-12 SAE	4500/310	4.6/117	2.6/66	2.3/58	2.3/58	2.6/65	1.2/29.5	0.6/14	0.6/14	7.2/182
P562368	HBV-20-N	1-1/4" NPT	4500/310	4.3/110	3.2/80	3.0/76	2.3/58	3.3/84	1.5/38	0.6/15	0.7/17	8.5/218
P562369	HBV-20-S	1-5/8"-12 SAE	4500/310	4.3/110	3.2/80	3.0/76	2.3/58	3.3/84	1.5/38	0.6/15	0.7/17	8.5/218

Replacement Parts for High Pressure Ball Valves

Donaldson Part No.	Description	Style	Valve Size
Handles			
P562376	HBVH-040608	Bent Handle	04, 06, 08
P562377	HBVH-1216	Bent Handle	12, 16
P562378	HBVH-202432	Bent Handle	20, 24, 32

Donaldson Part No.	Description	Valve Size
Seal Kit		
P562379	HBV-SK-04	04
P562380	HBV-SK-06	06
P562629	HBV-SK-08	08
P562630	HBV-SK-12	12
P562381	HBV-SK-16	16
P562382	HBV-SK-20	20

Lock Device Kits

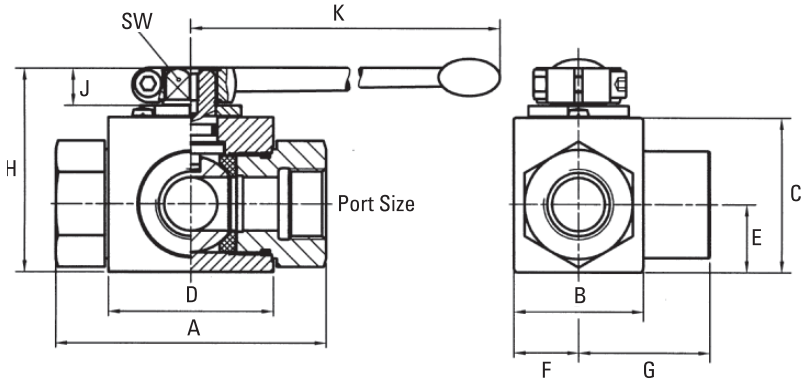
Donaldson Part No.	Description	Valve Size
P562332	LD-1	04, 06, 08
P562335	LD-2	12, 16
P562340	LD-3	20, 24, 32

For use on MBV, HBV and 3W-HBV

Three-Way Selector Ball Valve

Specifications

- Maximum pressure 7250 psi / 500 bar
- Steel construction
- Operating temperature
  -22°F to 212°F / -30°C to 100°C

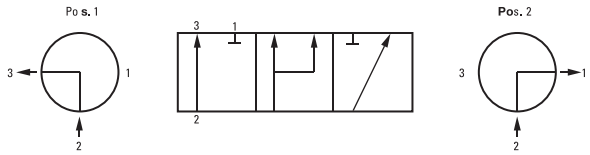


Donaldson Part No.	Reference	Port Size	Max Pressure	A (in./mm)	B (in./mm)	C (in./mm)	D (in./mm)	E (in./mm)	F (in./mm)	G (in./mm)	H (in./mm)	J (in./mm)	K (in./mm)	SW (in./mm)
P562342	3W-HBV-08-N	1/2" NPT	7250 psi	4.09	1.50	1.57	1.89	0.75	0.69	1.63	2.13	0.43	4.53	0.3
			50000 kPa	104	38	40	48	19	17.5	41.5	54	11	115	9
P562344	3W-HBV-12-N	3/4" NPT	4500 psi	4.02	2.05	2.24	2.44	0.96	0.96	1.87	2.95	0.55	7.87	0.55
			31028 kPa	102	52	57	62	24.5	24.5	47.5	75	14	200	14
P562404	3W-HBV-16-N	1" NPT	4500 psi	4.69	2.40	2.56	2.60	1.16	1.14	2.22	3.27	0.55	7.87	0.55
			31028 kPa	119	61	65	66	29.5	29	56.5	83	14	200	14
P562405	3W-HBV-16-S	SAE-16	4500 psi	4.72	2.80	3.33	3.19	1.54	1.54	2.36	4.17	0.65	12.60	0.67
			31028 kPa	120	71	84.5	81	39	39	60	106	16.5	320	17
P562406	3W-HBV-20-N	1-1/4" NPT	5000psi	4.72	2.80	3.33	3.19	1.54	1.54	2.36	4.17	0.65	12.60	0.67
			34500 kPa	120	71	84.5	81	39	39	60	106	16.5	320	17

Operation:

Open cross-over (no zero position)

Pressure inlet only from port 2



Split Flanges

Specifications

- Code 61 and Code 62
- Buna-N® O-Ring

Each kit includes:
- 2 split flange halves
- 4 hex head mounting bolts and lock washers
- 1 Buna-N® O-Ring

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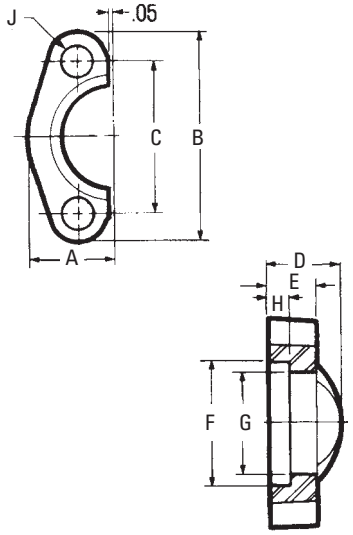


Code 61

Donaldson Part No.	Reference	Flange Size	A	B	Dimensions (in./mm) C	D	E	F	G	H	J (Dia.)	Mounting Hardware O-Ring	Hex Head Cap Screw	Maximum Working Pressure
P563042	L-12SF-3	0.75	0.98	2.56	1.875	0.88	0.56	1.531	1.265	0.245	0.406	-214	3/8"-16x11/4	5000
		19	25	65	48	22	14	39	32	6	10			34500kPa
P563044	L-16SF-3	1.00	1.11	2.75	2.062	0.94	0.62	1.781	1.515	0.295	0.406	-219	3/8"-16x11/4	5000
		25	28	70	52	24	16	45	38	7	10			34500kPa
P563047	L-20SF-3	1.25	1.39	3.12	2.312	0.88	0.56	2.031	1.720	0.295	0.469	-222	7/16"-14x11/2	4000 psi
		32	35	79	59	22	14	52	44	7	12			27580 kPa
P563050	L-24SF-3	1.50	1.58	3.69	2.750	1.00	0.62	2.406	2.000	0.295	0.531	-225	1/2"-13x11/2	3000 psi
		38	40	94	70	25	16	61	51	8	13			20685 kPa
P563053	L-32SF-3	2.00	1.86	4.00	3.062	1.03	0.62	2.844	2.470	0.355	0.531	-228	1/2"-13x11/2	3000 psi
		51	47	102	78	26	16	72	63	9	13			20685 kPa
P563056	L-40SF-3	2.50	2.09	4.50	3.500	1.50	0.75	3.344	2.950	0.355	0.531	-232	1/2"-13x13/4	2500 psi
		64	53	114	89	38	19	85	75	9	13			17240 kPa

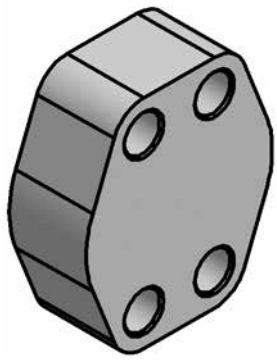
Code 62 Mounting Hardware

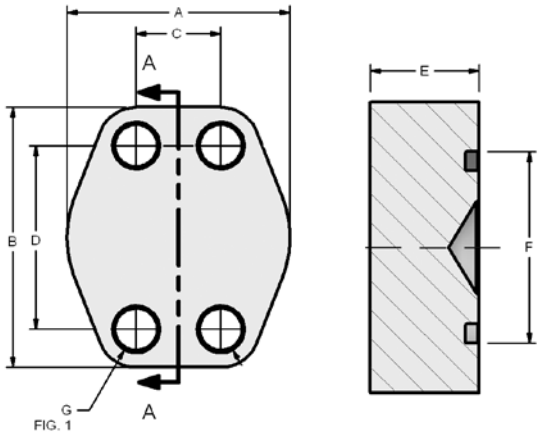
Donaldson Part No.	Reference	Flange Size	A	B	Dimensions (in./mm) C	D	E	F	G	H	J (Dia.)	Mounting Hardware O-Ring	Hex Head Cap Screw	Maximum Working Pressure
P563046	L-16SFX-6	1.00	1.33	3.19	2.250	1.31	0.94	1.906	1.530	0.355	0.469	-219	7/16"-14x13/4	6000 psi
		25	34	81	57	33	24	48	39	9	12			41370kPa
P563049	L-20SFX-6	1.25	1.48	3.75	2.625	1.50	1.06	2.156	1.750	0.385	0.531	-222	1/2"-13x13/4	6000 psi
		32	38	95	67	38	27	55	44	10	13			41370kPa
P563051	L-24SFX-6	1.50	1.83	4.44	3.125	1.69	1.19	2.531	2.030	0.475	0.656	-225	5/8"-11x21/4	6000 psi
		38	46	113	79	43	30	64	52	12	17			41370kPa
P563054	L-32SFX-6	2.00	2.20	5.25	3.812	2.06	1.44	3.156	2.660	0.475	0.781	-228	3/4"-10x23/4	6000 psi
		51	56	133	97	52	37	80	68	12	20			41370kPa

Blanking Flanges

Specifications

- Code 61 and 62
- O-Ring





Blanking Flanges, Code 61

Donaldson		Pad	Dimensions (in./mm)							Mounting Hardware	
Part No.	Reference	Size	A	B	C	D	E	F	G	O-Ring	SHCS
P563061	LIB-16-16-30	1"/25mm	2.313/59	2.750/70	1.031/26	2.063/52	0.88/22	1.560/40	0.406/10	-219	3/8"-16x1.75
P563063	LIB-20-20-30	1-1/4"/32mm	2.875/73	3.125/79	1.188/30	2.313/59	0.94/24	1.750/44	0.469/12	-222	7/16"-14x1.75
P563065	LIB-24-24-30	1-1/2"/38mm	3.250/83	3.688/94	1.406/36	2.750/70	1.19/30	2.115/54	0.531/13	-225	1/2"-13x2.25
P563067	LIB-32-32-30	2"/51mm	3.813/97	4.000/102	1.688/43	3.063/78	1.44/37	2.490/63	0.531/13	-228	1/2"-13x2.50

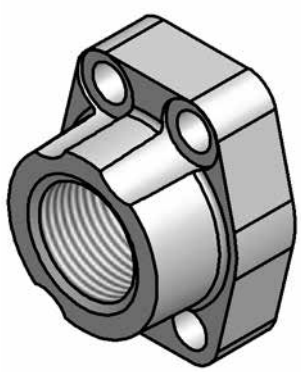
Blanking Flanges, Code 62

Donaldson		Pad	Dimensions (in./mm)							Mounting Hardware	
Part No.	Reference	Size	A	B	C	D	E	F	G	O-Ring	SHCS
P563064	LIB-20-20-60	1-1/4"/32mm	3.060/78	3.750/95	1.250/32	2.625/67	1.43/36	1.750/44	0.531/13	-222	1/2"-13x2.50

4-Bolt NPTF Threaded Flange

Specifications

- Code 61 and 62
- NPT Thread
- Buna-N® O-Ring
- Mounting hardware and O-Ring included on O-Ring models
- Maximum temperature with O-Ring 250°F / 121°C



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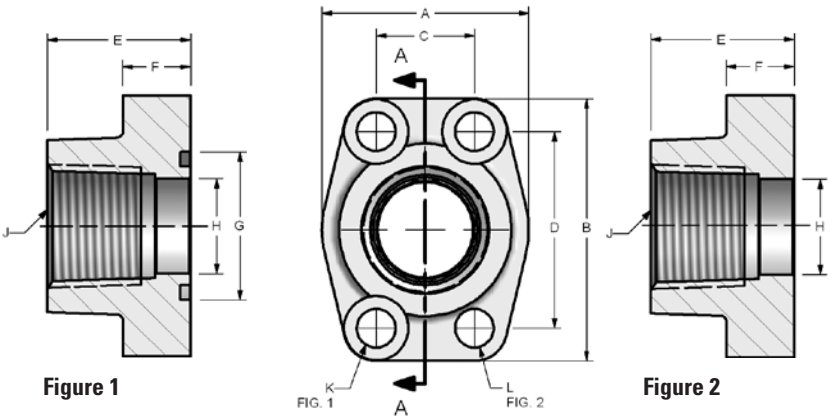


Figure 1

Front View

Figure 2

Code 61 NPTF Thread, O-Ring (Figure 1)

Donaldson Part No.	Desc.	Port Size	Pad Size	Dimensions (in./mm) A	B	C	D	E	F	G	H	J NPTF	K (dia.) Drill	Mounting Hardware O-Ring	SHCS
P563088	LI-12-12P-30	0.75	0.75	1.97	2.56	0.875	1.875	1.42	0.71	1.250	0.752	3/4"-14	0.406	-214	3/8"-16 x 1.25
		19	19	50	65	22	48	36	18	32	19		10		
P563093	LI-16-16P-30	1.00	1.00	2.17	2.75	1.031	2.062	1.50	0.71	1.560	1.002	1"-11.5	0.406	-219	3/8"-16 x 1.50
		25	25	55	70	26	52	38	18	40	25		10		
P563100	LI-20-20P-30	1.25	1.25	2.68	3.12	1.188	2.312	1.61	0.83	1.750	1.252	1-1/4"-11.5	0.469	-222	7/16"-14 x 1.50
		32	32	68	79	30	59	41	21	44	32		12		
P563107	LI-24-24P-30	1.50	1.50	3.07	3.66	1.406	2.750	1.77	0.98	2.115	1.502	1-1/2"-11.5	0.531	-225	1/2"-13 x 1.75
		38	38	78	93	36	70	45	25	54	38		13		
P563113	LI-32-32P-30	2.00	2.00	3.54	4.00	1.688	3.062	1.77	0.98	2.490	2.002	2"-11.5	0.531	-228	1/2"-13 x 1.75
		51	51	90	102	43	78	45	25	63	51		13		
P563117	LI-40-40P-30	2.50	2.50	4.09	4.49	2.000	3.500	1.97	0.98	2.995	2.502	2-1/2"-8	0.531	-232	1/2"-13 x 2.25
		64	64	104	114	51	89	50	25	76	64		13		
P563118	LI-48-48P-30	3.00	3.00	4.88	5.28	2.438	4.188	1.97	1.06	3.615	3.002	3"-8	0.656	-237	5/8"-11 x 2.50
		76	76	124	134	62	106	50	27	92	76		17		

4-Bolt NPTF Threaded Flange

Code 61 NPTF Thread, Flat Face (Figure 2)

Donaldson		Port	Pad	Dimensions (in./mm)								J	L Tap
Part No.	Description	Size	Size	A	B	C	D	E	F	G	H	NPTF	UNC-2B
P563163	LIC-16-16P-30	1.00	1.00	2.17	2.75	1.031	2.062	1.50	0.71	1.560	1.002	1"-11.5	3/8"-16
		25	25	55	70	26	52	38	18	40	25		
P563166	LIC-20-20P-30	1.25	1.25	2.68	3.12	1.188	2.312	1.61	0.83	1.750	1.252	1-1/4"-11.5	7/16"-14
		32	32	68	79	30	59	41	21	44	32		
P563171	LIC-32-32P-30	2.00	2.00	3.54	4.00	1.688	3.062	1.77	0.98	2.490	2.002	2"-11.5	1/2"-13
		51	51	90	102	43	78	45	25	63	51		

Code 62 NPTF Thread, O-Ring (Figure 1)

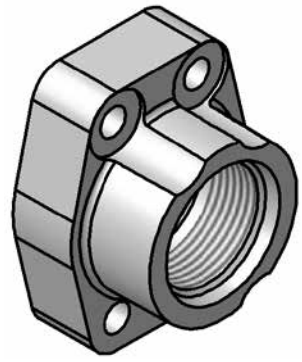
Donaldson		Port	Pad	Dimensions (in./mm)								J	K (Dia.)	Mounting Hardware	
Part No.	Description	Size	Size	A	B	C	D	E	F	G	H	NPTF	Drill	O-Ring	SHCS
P563094	LI-16-16P-60	1.00	1.00	2.56	3.19	1.093	2.250	1.65	0.98	1.560	1.002	1-11.5	0.492	-219	7/16"-14 x 1.50
		25	25	65	81	28	57	42	25	40	25		12		
P563101	LI-20-20P-60	1.25	1.25	3.07	3.75	1.250	2.625	1.77	1.06	1.750	1.252	1-1/4-11.5	0.531	-222	1/2"-13 x 1.50
		32	32	78	95	32	67	45	27	44	32		13		
P563108	LI-24-24P-60	1.50	1.50	3.70	4.41	1.437	3.125	1.97	1.18	2.115	1.502	1-1/2-11.5	0.656	-225	5/8"-11 x 1.75
		38	38	94	112	36	79	50	30	54	38		17		

4-Bolt SAE Threaded Flange

Specifications

- Code 61 and 62
- SAE Straight Thread
- Buna-N® O-Ring
- Mounting hardware and O-Ring included on O-Ring models
- Maximum temperature with O-Ring 250°F/ 121°C

Buna-N® is a registered trademark of E. I. DuPont de Nemours and Company.



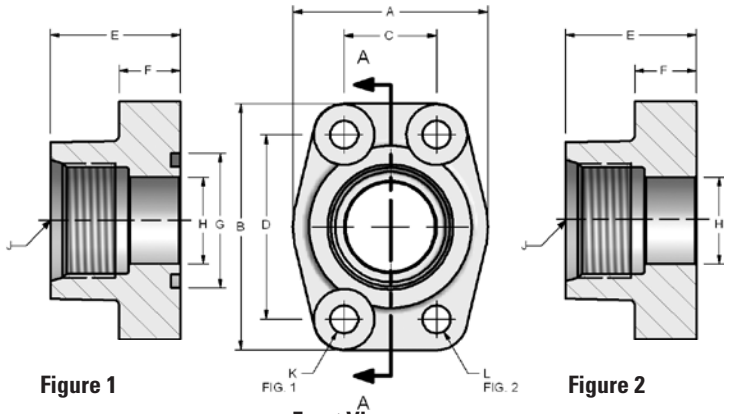


Figure 1 Front View Figure 2

Code 61 Straight Thread, O-Ring (Figure 1)

Donaldson		Port	Pad	Dimensions (in./mm)								J	K (Dia.)	Mounting Hardware	
Part No.	Reference	Size	Size	A	B	C	D	E	F	G	H	UN/UNF-2B	Drill	O-Ring	SHCS
P563090	LI-12-12S-30	0.75/19	0.75/19	1.97/50	2.56/65	0.875/22	1.875/48	1.42/36	0.71/18	1.250/32	0.752/19	1 1/16"-12	0.406/10	-214	3/8"-16 x 1.25
P563095	LI-16-16S-30	1.00/25	1.0/25	2.17/55	2.75/70	1.031/26	2.062/52	1.50/38	0.71/18	1.560/40	1.002/25	1 5/16"-12	0.406/10	-219	3/8"-16 x 1.50
P563102	LI-20-20S-30	1.25/32	1.25/32	2.68/68	3.12/79	1.188/30	2.312/59	1.61/41	0.83/21	1.750/44	1.252/32	1 5/8"-12	0.469/12	-222	7/16"-14 x 1.50
P563109	LI-24-24S-30	1.50/38	1.50/38	3.07/78	3.66/93	1.406/36	2.750/70	1.77/45	0.98/25	2.115/54	1.502/38	1 7/8"-12	0.531/13	-225	1/2"-13 x 1.75
P563115	LI-32-32S-30	2.00/51	2.00/51	3.54/90	4.00/102	1.688/43	3.062/78	1.77/45	0.98/25	2.490/63	2.002/51	2 1/2"-12	0.531/13	-228	1/2"-13 x 1.75

Code 61 Straight Thread, Flat Face (Figure 2)

Donaldson		Port	Pad	Dimensions (in./mm)								J	L Tap
Part No.	Reference	Size	Size	A	B	C	D	E	F	G	H	UN/UNF-2B	UNC-2B
P563162	LIC-12-12S-30	0.75/19	0.75/19	1.97/50	2.56/65	0.875/22	1.875/48	1.42/36	0.71/18	1.250/32	0.752/19	1 1/16"-12	3/8"-16
P563165	LIC-16-16S-30	1.00/25	1.00/25	2.17/55	2.75/70	1.031/26	2.062/52	1.50/38	0.71/18	1.560/40	1.002/25	1 5/16"-12	3/8"-16
P563168	LIC-20-20S-30	1.25/32	1.25/32	2.68/68	3.12/79	1.188/30	2.312/59	1.61/41	0.83/21	1.750/44	1.252/32	1 5/8"-12	7/16"-14

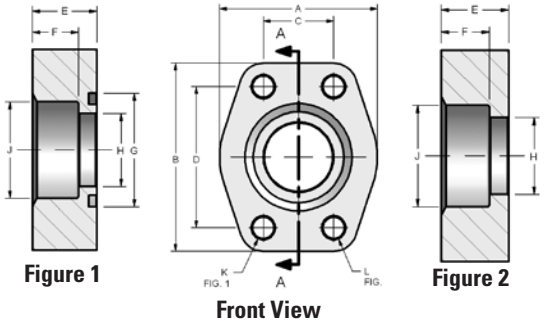
Code 62 Straight Thread, O-Ring (Figure 1)

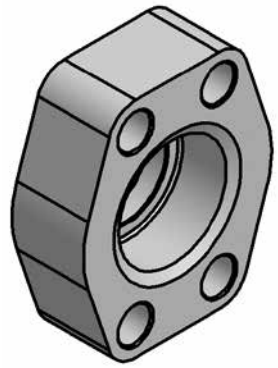
Donaldson		Port	Pad	Dimensions (in./mm)								J	K (Dia.)	Mounting Hardware	
Part No.	Reference	Size	Size	A	B	C	D	E	F	G	H	UN/UNF-2B	Drill	O-Ring	SHCS
P563096	LI-16-16S-60	1.00/25	1.00/25	2.56/65	3.19/81	1.093/28	2.250/57	1.65/42	0.98/25	1.560/40	1.002/25	1 5/16-12	0.492/12	-219	7/16"-14 x 1.50
P563103	LI-20-20S-60	1.25/32	1.25/32	3.07/78	3.75/95	1.250/32	2.625/67	1.77/45	1.06/27	1.750/44	1.252/32	1 5/8"-12	0.531/13	-222	1/2"-13 x 1.75
P563110	LI-24-24S-60	1.50/38	1.50/38	3.70/94	4.41/112	1.437/36	3.125/79	1.97/50	1.18/30	2.115/54	1.502/38	1 7/8"-12	0.656/17	-225	5/8"-11 x 2.25

Flat Socket Weld Flange

Specifications

- Code 61 and 62





Code 61, O-Ring (Figure 1)

Donaldson		Pipe	Pad	Dimensions (in.mm)										Mounting Hardware	
Part No.	Desc.	Size	Size	A	B	C	D	E	F	G	H	J	K	O-Ring	SHCS
P563119	LI-08-08W-30	0.50/13	0.50/13	1.813/46	2.125/54	0.688/17	1.500/38	0.75/19	0.560/14	1.000/25	0.502/13	0.855/22	0.344/9	-210	5/16"-18x1.5
P563120	LI-12-12W-30	0.75/19	0.75/19	2.063/52	2.563/65	0.875/22	1.875/48	0.75/19	0.560/14	1.250/32	0.752/19	1.062/27	0.406/10	-214	3/8"-16x1.5
P563121	LI-16-16W-30	1.00/25	1.00/25	2.313/59	2.750/70	1.031/26	2.063/52	0.88/22	0.630/16	1.560/40	1.002/25	1.328/34	0.406/10	-219	3/8"-16x1.75
P563122	LI-20-20W-30	1.25/32	1.25/32	2.875/73	3.125/79	1.188/30	2.313/59	0.94/24	0.690/18	1.750/44	1.252/32	1.672/42	0.469/12	-222	7/16"-14x1.75
P563123	LI-24-24W-30	1.50/38	1.50/38	3.250/83	3.688/94	1.406/36	2.750/70	1.19/30	0.750/19	2.115/54	1.502/38	1.922/49	0.531/13	-225	1/2"-13x2.25
P563124	LI-32-32W-30	2.00/51	2.00/51	3.813/97	4.000/102	1.688/43	3.063/78	1.38/35	0.875/22	2.495/63	2.002/51	2.406/61	0.531/13	-228	1/2"-13x2.5
P563127	LI-48-48W-30	3.00/76	3.00/76	5.156/131	5.313/135	2.438/62	4.188/106	2.12/54	1.250/32	3.615/92	3.002/76	3.547/90	0.656/17	-237	5/8"-11x3.5

Code 61, Flat Face (Figure 2)

Donaldson		Pipe	Pad	Dimensions (in./mm)									L
Part No.	Desc.	Size	Size	A	B	C	D	E	F	G	H	J	UNC-2B
P563176	LIC-12-12W-30	0.75/19	0.75/19	2.063/52	2.563/65	0.875/22	1.875/48	0.75/19	0.560/14	1.250/32	0.752/19	1.062/27	3/8"-16
P563177	LIC-16-16W-30	1.00/25	1.00/25	2.313/59	2.750/70	1.031/26	2.063/52	0.88/22	0.630/16	1.560/40	1.002/25	1.328/34	3/8"-16
P563178	LIC-20-20W-30	1.25/32	1.25/32	2.875/73	3.125/79	1.188/30	2.313/59	0.94/24	0.690/18	1.750/44	1.252/32	1.672/42	7/16"-14
P563179	LIC-24-24W-30	1.50/38	1.50/38	3.250/83	3.688/94	1.406/36	2.750/70	1.19/30	0.750/19	2.115/54	1.502/38	1.922/49	1/2"-13
P563180	LIC-32-32W-30	2.00/51	2.00/51	3.813/97	4.000/102	1.688/43	3.063/78	1.38/35	0.875/22	2.490/63	2.002/51	2.406/61	1/2"-13
P563181	LIC-40-40W-30	2.50/64	2.50/64	4.281/109	4.500/114	2.000/51	3.500/89	1.75/44	1.000/25	2.995/76	2.502/64	2.906/74	1/2"-13

Reservoir Accessories

- Suction strainers protect pumps from damage
- Diffusers for effectively reducing aeration, foaming, turbulence and noise caused by return lines
- Sight and level gauges available, including standard length, screw-in styles in plastic and steel for use in a variety of applications
- Plugs, caps and vents for small power units and gearboxes
- Filler breathers and caps in chrome, zinc epoxy-coated weatherproof finishes and corrosion-resistance technopolymer – lockable, dipsticks and side-mount versions available

T.R.A.P.™ Breather Technology
(Thermally Reactive Advanced Protection)

T.R.A.P. breathers provide fast-acting protection against airborne moisture and particulate contamination. It stops solid particulate down to 3 µm at 97% efficiency as well as prevents moisture from entering the reservoir. Water-holding capacity is regenerated with every oil return phase for long service life. Its self-regenerating capability enables extended life.

Suction Strainers

Flow Range: 0-300 gpm / 0-1,140 lpm

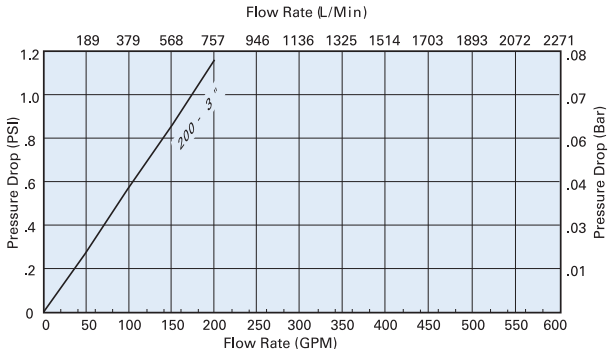
Outlet Port Size: 3/8" NPT to 4" NPT

- Stainless Steel Mesh
- Steel or nylon fittings
- Operating temperatures:
  Steel fitting to 250°F / 121°C
  Nylon fitting to 210°F / 100°C
- Relief valve available

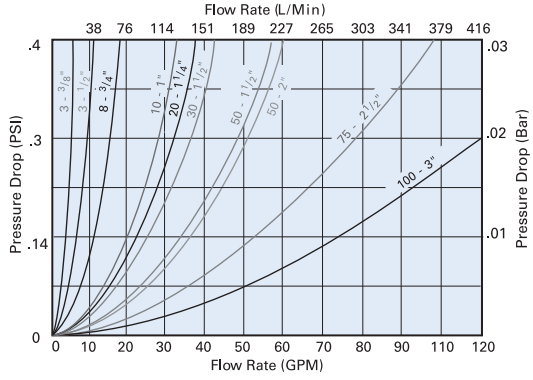
Features

Donaldson suction strainers are zinc-plated, with stainless steel mesh screens and rugged steel core centers epoxy bonded to heavy gauge connector and end caps. Suction strainers filter petroleum-based hydraulic fluids, phosphate esters, water glycols, lubricating oils, coolants, and fuels in fluid reservoirs, sumps and similar applications. They are cleanable and reusable. Clean by swishing in non-caustic solvent, then blow dry from inner diameter to outer diameter with compressed air.

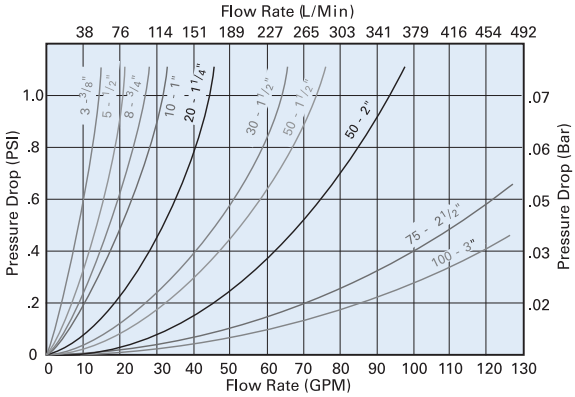
SEC (Steel Fitting) 200-300

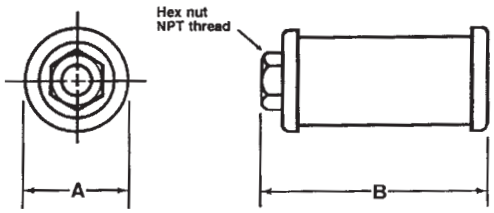


PEC (Nylon Fitting) 3-100



SEH/SEC (Steel Fitting) 3-100





Note:
PEC and SEH model strainers have hex nut style outlet fittings. SEC model strainers have pipe coupling style (round) outlet fittings. All styles have NPT threads inside. Mount a minimum of 4" from the reservoir bottom.

Suction Strainer Choices

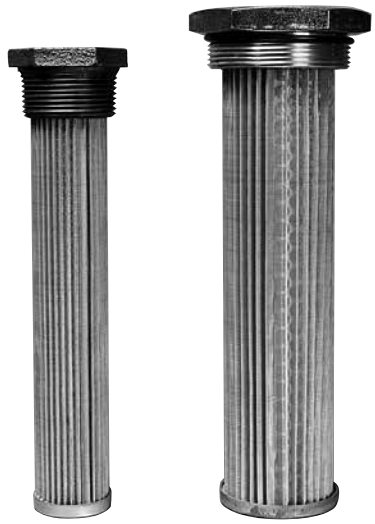
	Donaldson Part No.	Description	Relief Valve Setting	Outlet Pipe Size	Wire Mesh Size	Dim. A (in./mm)	Dim. B (in./mm)	Screen Area (sq. in./sq. cm)	Max. Flow (gpm/lpm)
NYLON FITTING	P562235	PEC-3-3/8-100	n/a	3/8" NPT	100	1.9/48	2.7/69	20/129	3/11
	P562240	PEC-5-1/2-100	n/a	1/2" NPT	100	1.9/48	4.3/109	25/161	5/19
	P562245	PEC-8-3/4-100	n/a	3/4" NPT	100	2.7/69	4.3/109	40/258	8/30
	P562246	PEC-8-3/4-100-RV3	3 psid/0.2 bar	3/4" NPT	100	2.7/69	4.3/109	40/258	8/30
	P562244	PEC-8-1-100	n/a	1" NPT	100	2.7/69	4.3/109	40/258	8/30
	P562226	PEC-10-1-100	n/a	1" NPT	100	2.7/69	5.6/142	70/452	10/38
	P562227	PEC-10-1-100-RV3	3 psid/0.2 bar	1" NPT	100	2.7/69	5.6/142	70/452	10/38
	P562228	PEC-20-1.1/4-100	n/a	1-1/4" NPT	100	3.4/86	5.6/142	128/826	20/75
	P562229	PEC-20-1.1/4-100-RV3	3 psid/0.2 bar	1-1/4" NPT	100	3.4/86	5.6/142	128/826	20/75
	P562231	PEC-20-1.1/4-200	n/a	1-1/4" NPT	200	3.4/86	5.6/142	128/826	20/75
	P562232	PEC-30-1.1/2-100	n/a	1-1/2" NPT	100	3.4/86	5.6/142	128/826	30/113
	P562233	PEC-30-1.1/2-100-RV3	3 psid/0.2 bar	1-1/2" NPT	100	3.4/86	5.6/142	128/826	30/113
	P562236	PEC-50-1.1/2-100	n/a	1-1/2" NPT	100	4/102	8/203	200/1290	50/188
	P562237	PEC-50-1.1/2-100-RV3	3 psid/0.2 bar	1-1/2" NPT	100	4/102	8/203	200/1290	50/188
	P562238	PEC-50-2-100	n/a	2" NPT	100	4/102	10.4/264	200/1290	50/188
	P562239	PEC-50-2-100-RV3	3 psid/0.2 bar	2" NPT	100	4/102	10.4/264	200/1290	50/188
	P562242	PEC-75-2.1/2-100	n/a	2-1/2" NPT	100	5.2/132	8.5/216	316/2039	75/282
	P562243	PEC-75-2.1/2-100-RV3	3 psid0.2 bar	2-1/2" NPT	100	5.2/132	8.5/216	316/2039	75/282
	P562223	PEC-100-3-100	n/a	3" NPT	100	5.2/132	11.5/292	379/2445	100/376
	P562224	PEC-100-3-100-RV3	3 psid/0.2 bar	3" NPT	100	5.2/132	11.5/292	379/2445	100/376
	P562225	PEC-100-3-100-SST	n/a	3" NPT	100	5.2/132	11.5/292	379/2445	100/376
STEEL FITTING	P562221	SEH-3-3/8-100	n/a	3/8" NPT	100	1.9/48	2.5/64	34/219	3/11
	P169012	SEH-5-1/2-100	n/a	1/2" NPT	100	2.63/67	3.1/79	62/400	5/19
	P563305	SEH-5-1/2-100-RV3	3 psid/0.2 bar	1/2" NPT	100	2.7/69	3.1/79	62/400	5/19
	P169013	SEH-8-3/4-100	n/a	3/4" NPT	100	2.63/67	3.55/90	68/439	8/30
	P173910	SEH-8-3/4-100-RV3	3 psid/0.2 bar	3/4" NPT	100	2.63/67	3.55/90	68/439	8/30
	P169014	SEH-10-1-100	n/a	1" NPT	100	2.63/67	5.35/136	110/710	10/38
	P173911	SEH-10-1-100-RV3	3 psid/0.2 bar	1" NPT	100	2.63/67	5.35/136	110/710	10/38
	P169015	SEH-20-1.1/4-100	n/a	1-1/4" NPT	100	3.38/86	6.85/174	162/1045	20/75
	P173912	SEH-20-1.1/4-100-RV3	3 psid/0.2 bar	1-1/4" NPT	100	3.38/86	6.85/174	162/1045	20/75
	P169016	SEH-30-1.1/2-100	n/a	1-1/2" NPT	100	3.38/86	8.01/203	225/1452	30/113
	P173913	SEH-30-1.1/2-100-RV3	3 psid/0.2 bar	1-1/2" NPT	100	3.38/86	8.01/203	225/1452	30/113
	P169017	SEH-50-1.1/2-100	n/a	1-1/2" NPT	100	3.94/100	9.8/249	340/2194	50/188
	P173914	SEH-50-1.1/2-100-RV3	3 psid/0.2 bar	1-1/2" NPT	100	3.94/100	9.8/249	340/2194	50/188
	P562222	SEH-50-1.1/2-60	n/a	1-1/2" NPT	60	3.94/100	9.8/249	340/2194	50/188
	P169018	SEH-50-2-100	n/a	2" NPT	100	3.94/100	9.8/249	340/2194	50/188
	P173915	SEH-50-2-100-RV3	3 psid/0.2 bar	2" NPT	100	3.94/100	9.8/249	340/2194	50/188
	P169019	SEC-75-2.1/2-100	n/a	2-1/2" NPT	100	5.12/130	10.1/257	400/2581	75/282
	P173916	SEC-75-2.1/2-100-RV3	3 psid/0.2 bar	2-1/2" NPT	100	5.12/130	10.1/257	400/2581	75/282
	P169020	SEC-100-3-100	n/a	3" NPT	100	5.12/130	11.78/299	500/3226	100/376
	P173917	SEC-100-3-100-RV3	3 psid/0.2 bar	3" NPT	100	5.12/130	11.78/299	500/3226	100/376
	P562211	SEC-100-3-60	n/a	3" NPT	60	5.12/130	11.78/299	500/3226	100/376
	P562212	SEC-100-3-60-RV3	3 psid/0.2 bar	3" NPT	60	5.12/130	11.78/299	500/3226	100/376
	P562213	SEC-200-3-100	n/a	3" NPT	100	8.1/206	11.3/287	965/6226	200/752
	P562214	SEC-300-4-100	n/a	4" NPT	100	8.1/206	15/381	1370/8839	300/1128
	P171861	FIOA 20	n/a	G3/8"	90	2.05/52	3.03/77	29/184	2.7/10
	P171869	FIOA 50	n/a	G¾"	90	2.95/75	3.74/95	54/348	6.6/25
	P171877	FIOA 90	n/a	G1"	90	2.95/75	5.55/141	86/554	12.0/45
	P171885	FIOA 130	n/a	G1¼"	90	3.74/95	7.24/184		17.3/65
	P171889	FIOA 175	n/a	G1½"	90	5.51/140	4.45/113	183/1178	22.6/85

Tank Mounted Strainers

Flow Range: 0-100 gpm / 0-380 lpm

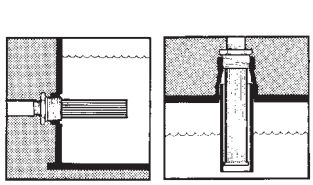
Outlet Port Size: 3/8" NPT to 1¼" NPT or SAE-8 to SAE-20

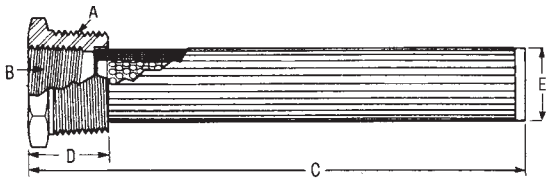
- 140 Micron Stainless Steel Mesh
- Steel SAE bushing
- Cast iron NPT bushing
- Operating temperatures to 250°F / 121°C
- Relief valve available



Features

Tank mounted strainers offer easy installation. Access to reservoir interior is not needed. You can mount these units through a sidewall or through the tank top and into a standpipe.





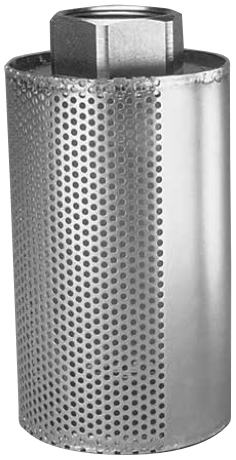
Donaldson Part No.	Description	Relief Valve Setting	Wire Mesh Size	Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Screen Area (sq. in./sq. cm)	Max. Flow (gpm/lpm)
						Dimensions (in./mm)				
P562270	TM-3-100	n/a	100	3/4" NPT	1/2" NPT	4/102	0.97/25	0.87/22	29/187	3/11
P562274	TM-5-100	n/a	100	1" NPT	1/2" NPT	5.34/136	1.06/27	1.17/30	35/226	5/19
P562275	TM-5-100-RV5	5 psid/0.35 bar	100	1" NPT	1/2" NPT	5.34/136	1.06/27	1.17/30	35/226	5/19
P562256	TM-10-100	n/a	100	1-1/4" NPT	3/4" NPT	8.17/208	1.2/30	1.36/35	64/413	10/38
P562257	TM-10-100-RV5	5 psid/0.35 bar	100	1-1/4" NPT	3/4" NPT	8.17/208	1.2/30	1.36/35	64/413	10/38
P562259	TM-10-60-RV5	5 psid/0.35 bar	60	1-1/4" NPT	3/4" NPT	8.17/208	1.2/30	1.36/35	64/413	10/38
P562260	TM-15-100	n/a	100	1-1/2 NPT	1" NPT	8.2/208	1.22/31	1.66/42	86/555	15/56
P562264	TM-15-100-RV5	5 psid/0.35 bar	100	1-1/2 NPT	1" NPT	8.2/208	1.22/31	1.66/42	86/555	15/56
P562266	TM-25-100	n/a	100	2" NPT	1-1/4" NPT	9.04/230	1.35/34	2.12/54	125/806	25/94
P562267	TM-25-100-RV5	5 psid/0.35 bar	100	2" NPT	1-1/4" NPT	9.04/230	1.35/34	2.12/54	125/806	25/94
P562269	TM-25-200-RV5	5 psid/0.35 bar	200	2" NPT	1-1/4" NPT	9.04/230	1.35/34	2.12/54	125/806	25/94
P562271	TM-50-100	n/a	100	3" NPT	2" NPT	9.7/246	1.7/43	3/76	260/1677	50/188
P562272	TM-50-100-RV3	3 psid/0.2 bar	100	3" NPT	2" NPT	9.7/246	1.7/43	3/76	260/1677	50/188
P562273	TM-50-100-RV5	5 psid/0.35 bar	100	3" NPT	2" NPT	9.7/246	1.7/43	3/76	260/1677	50/188
P563306	TM-100-100	n/a	100	4" NPT	3" NPT	11.3/287	1.8/46	4/102	315/2032	100/376
P562255	TM-100-100-RV5	5 psid/0.35 bar	100	4" NPT	3" NPT	11.3/287	1.8/46	4/102	315/2032	100/376
P562253	STM-5-100	n/a	100	1-5/16" -- 12 UN	3/4" -- 16 UN	5.34/136	1.06/27	1.17/30	35/226	5/19
P562254	STM-5-100-RV5	5 psid/0.35 bar	100	1-5/16" -- 12 UN	3/4" -- 16 UN	5.34/136	1.06/27	1.17/30	35/226	5/19
P562247	STM-10-100	n/a	100	1-5/8" -- 12 UN	1-1/16" -- 12 UN	8.17/208	1.2/30	1.36/35	64/413	10/38
P562248	STM-10-100-RV5	5 psid/0.35 bar	100	1-5/8" -- 12 UN	1-1/16" -- 12 UN	8.17/208	1.2/30	1.36/35	64/413	10/38
P562249	STM-15-100	n/a	100	1-7/8" -- 12 UN	1-5/16" -- 12 UN	8.2/208	1.22/31	1.66/42	86/555	15/56
P562250	STM-15-100-RV5	5 psid/0.35 bar	100	1-7/8" -- 12 UN	1-5/16" -- 12 UN	8.2/208	1.22/31	1.66/42	86/555	15/56
P562251	STM-25-100	n/a	100	2-1/2" -- 12 UN	1-5/8" -- 12 UN	9.04/230	1.35/34	2.12/54	125/806	25/94
P562252	STM-25-100-RV5	5 psid/0.35 bar	100	2-1/2" -- 12 UN	1-5/8" -- 12 UN	9.04/230	1.35/34	2.12/54	125/806	25/94

Diffusers

Specifications

- Perforated Steel
- Cast iron bushings (TMD-tank mount)
- Zinc-plated steel (DFD-return line)
- Operating temperatures to 250°F / 121°C

Flow Range: 0-450 gpm / 0-1,710 lpm

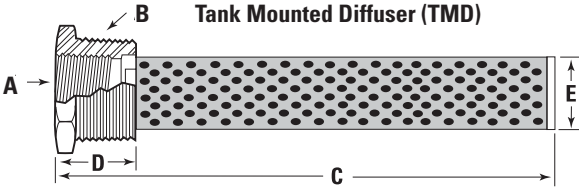


DFD

TMD

Features

Diffusers are highly effective in reducing aeration, foaming, turbulence and noise caused by return lines. Reservoir baffles can usually be eliminated, provided that the holes in the tube are positioned facing away from the pump suction inlet and below the reservoir oil level. Can be vertically or horizontally mounted with discharge side directed away from suction and preferably toward a tank wall or bottom.



Tank Mounted Diffuser (TMD)

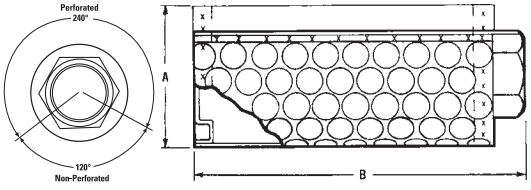
TMD - Tank Mount Diffusers

Donaldson Part No.	Desc.	Rated Flow gpm/l/min	Dim. A Pipe Size	Dim. B Pipe Size	C (in./mm)	D (in./mm)	E (in./mm)
P562281	TMD-5	5/19	1/2" NPT	1" NPT	5.34/135	1.06/28	1.17/29
P562282	TMD-10	10/38	3/4" NPT	1-1/4" NPT	8.17/207	1.2/30	1.36/34
P562283	TMD-15	15/59	1" NPT	1-1/2" NPT	8.2/208	1.22/31	1.66/42
P562284	TMD-25	25/95	1-1/4" NPT	2" NPT	9.04/229	1.35/34	2.12/53
P562285	TMD-50	50/189	2" NPT	3" NPT	9.7/246	1.7/43	3.0/76

DFD - Line Mount Diffusers

Donaldson Part No.	Desc.	Rated Flow gpm/l/min	Pipe Size	A (in./mm)	B (in./mm)
P562287	DFD-30	33/125	3/4" NPT	3.4/86.3	3.0/76
P562288	DFD-60	53/201	1" NPT	3.4/86.3	4.2/107
P562289	DFD-90	93/342	1-1/4" NPT	3.4/86.3	6.5/165
P562290	DFD-120	126/479	1-1/2" NPT	4.5/114.3	6.6/168
P562291	DFD-200	209/794	2" NPT	4.5/114.3	10.3/262
P562292	DFD-250	300/1140	2-1/2" NPT	5.25/133.4	13.0/330
P562293	DFD-300	450/1748	3" NPT	5.25/133.4	15.5/394

Line Mounted Diffuser (DFD)

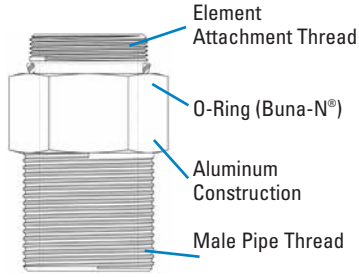


Breathers

Breathers are available in a variety of styles, materials and sizes. Breathers provide clean airflow into reservoirs and other storage containers where there is an exchange of air during changing fluid levels. In high moisture sites or applications with large changes in machine environments, breather caps with pressure relief and vacuum breakers limit air exchange and provide a positive suction head at the pump inlet.

Threaded Adapters for Creating Tank Breathers

Donaldson Part No.	LHA Part No.	Male Pipe Thread	Element Attachment Thread	Length (in./mm)	Material
P173544	GBF-15	3/4" NPT	1"-12 UN	2.50/64	Aluminum
P173545	GBF-50/60	1-1/4" NPT	1-1/2"-16 UN	3.00/76	Aluminum
P562627	GBF-10	3/4" NPT	1-1/8"-16 UN	1.65/42	Steel
P562628	ABGBA	Bayonet Fitting	1-1/8"-16 UN	1.36/35	Technopolymer
P570353	NA	Bayonet Fitting	1-1/2"-16 UN	2.74/70	Technopolymer



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Direct Replacements for Schroeder Breathers

A replacement for Schroeder part ABF-3/10 is available as a breather+adapter set. For other Schroeder replacements and as an alternative on the ABF-3/10, you may purchase adapters and spin-on filters as separate items.

Schroeder Part No.	Donaldson Spin-On Breather + Adapter Set	Adapter	Spin-On Breather
ABF-3/10	P564425	P562627	P564424
ABF-3/10-F	NA	P562628	P564424
MBF-3-M-P20	NA	P173545	P550386
MBF-10-M-P20	NA	P173545	P550388

Replacement for Schroeder ABF3/10

P564425 Spin-On Breather & Adapter

P564424 Spin-On Breather only

Specifications:

Diameter: 3.69" / 93.7mm

Height: 3.6" / 91mm

Threads on adaptor: 3/4"-14 NPT

Spin-On Breather Filters

Donaldson Part No.	Use with Adapter	Micron Rating	Length (in./mm)	Diameter (in./mm)	Flow (scfm/gpm/lpm)
P564424	P562627 or P562628	10 micron nom.	3.6/91	3.7/94	15/112/421
P556005	P562627 or P562628	10 micron nom.	5.4/137	3.7/94	23/172/647
P551551	P173544	10 micron nom.	5.4/137	3.7/94	23/172/647
P560693	P173544	10 micron abs.	5.4/137	3.7/94	23/172/647
P564357	P173544	5 micron abs.	7.9/200	3.7/94	28/216/812
P179089	P173544	10 micron abs.	7.9/200	3.7/94	28/216/812
P550386	P173545	3 micron nom.	6.7/170	5.0/127	35/262/985
P550250	P173545	3 micron nom.	10.7/272	5.0/127	42/314/1181
P167162	P173545	5 micron abs.	6.7/170	5.0/127	59/440/1654
P165762	P173545	5 micron abs.	10.7/272	5.0/127	64/479/1801
P550388	P173545	10 micron nom.	6.7/170	5.0/127	59/440/1654
P550251	P173545	10 micron nom.	10.7/272	5.0/127	64/479/1801
P165875	P173545	10 micron abs.	6.7/170	5.0/127	59/440/1654
P165876	P173545	10 micron abs.	10.7/272	5.0/127	64/479/1801

T.R.A.P.™ Breather

Flow Rates to:	45 cfm 1270 lpm
Particulate Removal to:	3 µm
Moisture Removal:	Reversible Adsorption

Features

Donaldson breathers with Thermally Reactive Advanced Protection (T.R.A.P.™) provide fast-acting protection for hydraulic reservoirs against airborne moisture and particulate contamination. Donaldson T.R.A.P. technology strip moisture vapor from intake air and expel the moisture back to the atmosphere. Moisture is prevented from entering and is actually "pumped" out with each flow cycle. T.R.A.P. media regenerates its water-holding capacity, which leads to longer service life – 3 to 4 times the life of conventional desiccant breathers.

- **Electronic Indicator**
  Actuated by pressure differential, flashes red to indicate changeout is needed. Indicator setting, 1 psid/6.9 kPa. Indicator power source: 3V lithium battery CR2032.
- **Mechanical Indicator Kits**
  Install kit between reservoir and T.R.A.P. breather. Lock-up style indicator with manual reset. Highly visible, bright red band shows when restriction limit is reached. Indicator setting, 20" H2O/5.0 kPa.
- **Oil Splash and Mist Containment**
  Keeps oil inside reservoir.
- **Easy To Install**
  Lightweight—simply hand tighten.
- **Rugged Design**
  Effective to -40°F (-40°C). Robust housing protects media. Because it withstands high vibration, T.R.A.P. is suitable for both stationary and mobile applications.

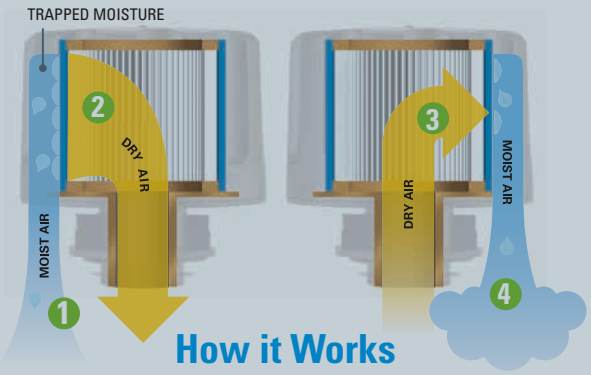
Operating Temperature
- -40°F to 200°F / -40°C to 93°C
- Intermittent operation to 250°F / 121°C

Particulate Removal Efficiency
- 3 µm at 97%

Connection Sizes
- 1" and 3/4" NPT, 3/4" BSP Bayonet
- 1/4" and 3/8" NPT, 9/16"-18UN

Flow Rates
- 45 cfm / 1274 lpm
- 25 cfm / 708 lpm
- 3 cfm / 85 lpm

Indicator Setpoint
- 1 psid / 6.9 kPa



How it Works

INTAKE CYCLE (INHALATION)

1. The circuit "breathes in" air containing moisture vapor.
2. The T.R.A.P. breather strips moisture and particulate from the incoming air, allowing only clean, dry air to enter the circuit.

OUTFLOW CYCLE (EXHALATION)

3. During the "exhalation" cycle, the T.R.A.P. breather allows unrestricted airflow outward.
4. The outflow of dry air picks up the moisture collected by the T.R.A.P. breather during intake, and "blows it back out" – fully regenerating the breather's water-holding capacity.

Self-Regenerating T.R.A.P. Breather Choices

- Refer to the FIK section for additional T.R.A.P. breather options specific to those assembly models only.

T.R.A.P. Breather Sizing

Trap Model	Hydraulic System (gal/l)	In-plant Lube (gal/l)	Outside (gal/l)
Standard	100/375	500/1875	250/938
Metal	40/150	200/750	100/375
Mini	4/15	20/75	10/38

Part No.	Connection	Maximum Flow (cfm/lpm)	Indicator	Moisture Removal	
Standard ABS Plastic Breathers with Oil/Splash Containment					
P566151*	1" NPT	45/1274	opt mechanical	Yes	indicator kit
P564669	1" NPT	45/1274	electronic**	Yes	
P566156	Bayonet	45/1274	none	Yes	
P565616	Bayonet	45/1274	electronic**	Yes	
Medium Epoxy Coated Steel Breathers with Oil/Splash Containment					
P565857*	3/4" NPT	25/708	opt mechanical	Yes	indicator kit
P565858	Bayonet	25/708	none	Yes	
P566037	3/4" BSP	25/708	none	Yes	
P575077	Bayonet with Lock Tab	25/708	none	Yes	

**LED indicators not rated for fuel.

Standard

Medium Metal

Mini

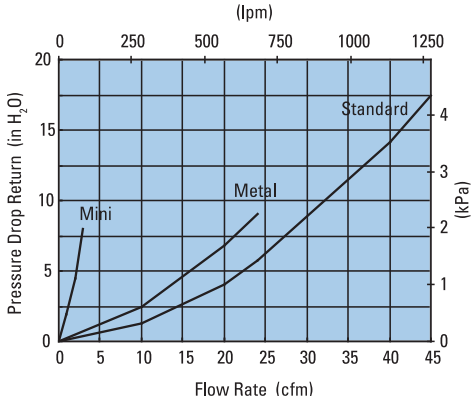
Part No.	Connection	Maximum Flow (cfm/lpm)	Indicator	Moisture Removal
Mini Nylon Breathers with Oil/Splash Containment				
P566174	9/16"-18 UNF	3/85	none	Yes
P567390	3/8" NPT	3/85	none	Yes
P567392	1/4" NPT	3/85	none	Yes

Part No.	Connection	Maximum Flow (cfm/lpm)	Indicator	Moisture Removal
Mini Particulate Only Breathers with Oil Splash Containment				
P567932	3/8" NPT	3/85	none	No
P567933	1/4" NPT	3/85	none	No

Part No.	Connection	Indicator
*Mechanical Indicator Kit - For use with P566151 & P565857 (*requires customer-supplied 3/4"x1" NPT reducer bushing)		
P566168	1" NPT coupling	20" H2O/5 kPa trip point

Part No.	Description	Connection
Bayonet Style Filler Basket - For use with bayonet style T.R.A.P. Breathers		
P566321	3" Stainless steel basket	6-bolt 2.81/71.4 circle
P575080	6" Stainless steel basket with Lock Tab	6-bolt 2.81/71.4 circle
P563874	4" Nylon Basket	6-bolt 2.81/71.4 circle
P563453	6" Stainless steel basket	6-bolt 2.81/71.4 circle
P570353	Bayonet Breather Adaptor	6-bolt 2.74/69.6 circle

T.R.A.P. Performance Data



Activation Instructions for T.R.A.P. Breathers with Electronic Indicator

The T.R.A.P. breather has a service indicator that will indicate when it is time to replace the T.R.A.P. This indicator should be activated before the T.R.A.P. is put into service. Before the T.R.A.P. is activated, it is in a sleep mode to conserve the battery. The T.R.A.P. can remain in a sleep mode for over 6 months without detriment to the battery. While in sleep mode, the LED light will not flash until it is activated.

Activation

1. Remove the T.R.A.P. from the box and turn it upside down - with the neck and thread up.
2. Using a forefinger, insert into the neck of the T.R.A.P. and press on the plastic screen until the LED light begins to flash. The light will flash three times with a shortflash followed by a long flash and then another short flash.
3. Release pressure from the switch immediately after the light begins flashing.

The T.R.A.P. is now activated.

Replacement

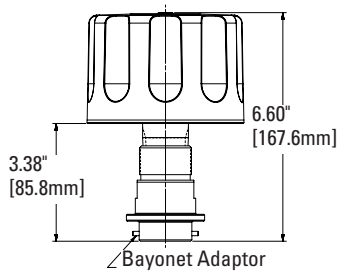
Replace T.R.A.P. with a new one when the light begins to blink.

T.R.A.P.™ Breather Specifications

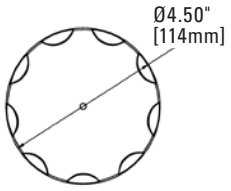
Standard

P565616 (electronic indicator) Bayonet connection
P566156 (no indicator version) Bayonet connection

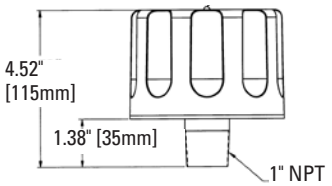
Bayonet connection



Top View

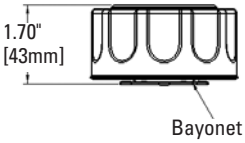


P564669 (optional mechanical) 1" NPT connection
P566151 (no indicator version) 1" NPT connection

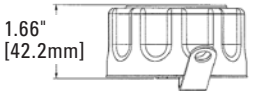


Metal

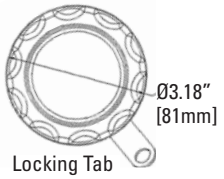
P565858
Bayonet connection



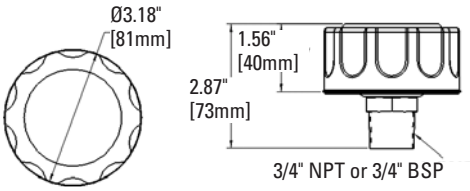
P575077 Bayonet connection with Lock Tab
P570353 Bayonet Breather Adaptor



Top View

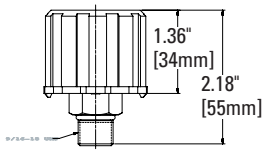


P565857 (3/4" NPT connection, optional mechanical indicator)
P566037 (3/4" BSP connection)

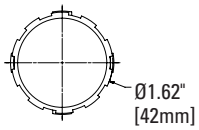


Mini

P566174 9/16-18 UNF
P567390 3/8" NPT
P567392 1/4" NPT



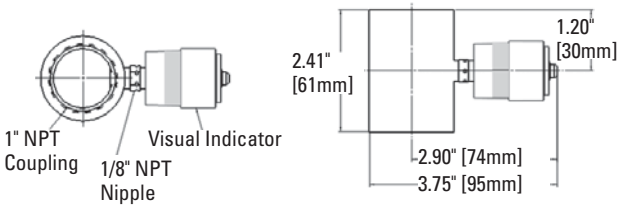
Top View



Mechanical Indicator Kit

P566168
Suitable for use with **P566151** and **P565857***
*Requires additional 3/4" x 1" reducer bushing (supplied by customer)

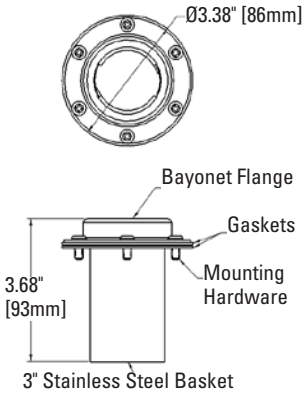
Top View



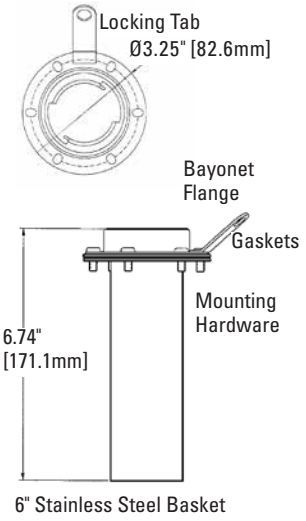
Bayonet Style Filler Basket/Flange Kits

Use with any bayonet style T.R.A.P. Breather

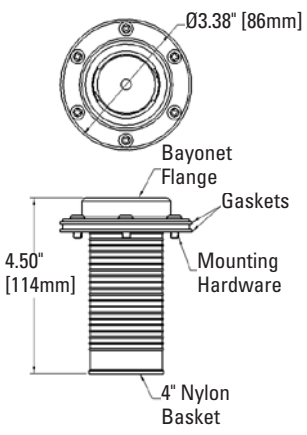
P566321



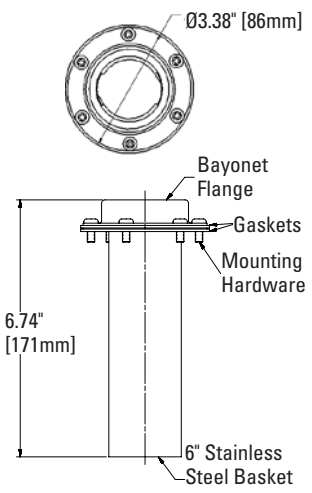
P575080



P563874



P563453



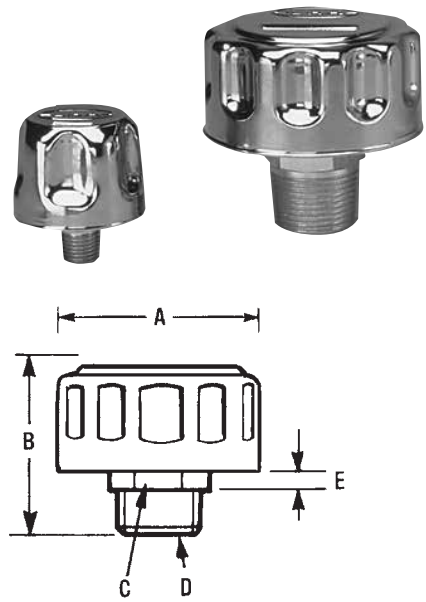
ABS, MBS Series

Specifications

- Chrome plated, epoxy coated or zinc plated steel cap
- Airflow to 30 cfm/850 lpm
- Compatible with petroleum based fluids
- Temperature to 212°F / 100°C
- 1/2", 3/4" and 1" NPT on ABS
- 1/4" and 3/8" NPT on MBS

Options

- 3, 10 and 40 micron (ABS), 10 and 40 micron (MBS)
- Zinc and epoxy coated weather-proof cap versions



Donaldson Part No.	Reference	Micron Rating	Airflow Capacity (cfn/lpm)	A (in./mm)	B (in./mm)	C (in./mm)	D	E (in./mm)	Finish
P562510	MBS-10-N04	10 µm	10/283	1.85/47	2.0/51	.75/19	1/4" NPT	.2/5	Chrome Plated
P562511	MBS-10-N06	10 µm	10/283	1.85/47	2.0/51	.75/19	3/8" NPT	.2/5	Chrome Plated
P562512	MBS-40-N04	40 µm	10/283	1.85/47	2.0/51	.75/19	1/4" NPT	.2/5	Chrome Plated
P562514	MBS-40-N06	40 µm	10/283	1.85/47	2.0/51	.75/19	3/8" NPT	.2/5	Chrome Plated
P562516	MBS-Z-10-N06	10 µm	10/283	1.85/47	2.0/51	.75/19	3/8" NPT	.2/5	Zinc Plated
P562517	ABS-03-N12	3 µm	30/850	3.15/80	2.8/71	1.18/30	3/4" NPT	.5/13	Chrome Plated
P562518	ABS-10-B12	10 µm	30/850	3.15/80	2.8/71	1.18/30	3/4" BSP	.5/13	Chrome Plated
P562519	ABS-10-N08	10 µm	30/850	3.15/80	2.8/71	1.18/30	1/2" NPT	.5/13	Chrome Plated
P562520	ABS-10-N12	10 µm	30/850	3.15/80	2.8/71	1.18/30	3/4" NPT	.5/13	Chrome Plated
P562521	ABS-10-N16	10 µm	30/850	3.15/80	2.8/71	1.18/30	1" NPT	.5/13	Chrome Plated
P562522	ABS-40-N08	40 µm	30/850	3.15/80	2.8/71	1.18/30	1/2" NPT	.5/13	Chrome Plated
P562523	ABS-40-N12	40 µm	30/850	3.15/80	2.8/71	1.18/30	3/4" NPT	.5/13	Chrome Plated
P562524	ABS-40-N16	40 µm	30/850	3.15/80	2.8/71	1.18/30	1" NPT	.5/13	Chrome Plated
P562525	ABS-W-03-N12	3 µm	30/850	3.15/80	2.8/71	1.18/30	3/4" NPT	.5/13	Epoxy Coated Black
P562526	ABS-W-10-N08	10 µm	30/850	3.15/80	2.8/71	1.18/30	1/2" NPT	.5/13	Epoxy Coated Black
P562527	ABS-W-10-N12	10 µm	30/850	3.15/80	2.8/71	1.18/30	3/4" NPT	.5/13	Epoxy Coated Black
P562528	ABS-W-10-N16	10 µm	30/850	3.15/80	2.8/71	1.18/30	1" NPT	.5/13	Epoxy Coated Black
P563901	ABS-W-40-B12	40 µm	30/850	3.15/80	2.8/71	1.18/30	3/4" BSP	.5/13	Epoxy Coated Black
P562529	ABS-W-40-N12	40 µm	30/850	3.15/80	2.8/71	1.18/30	3/4" NPT	.5/13	Epoxy Coated Black
P562530	ABS-W-40-N16	40 µm	30/850	3.15/80	2.8/71	1.18/30	1" NPT	.5/13	Epoxy Coated Black
P562531	ABS-Z-10-N16	10 µm	30/850	3.15/80	2.8/71	1.18/30	1" NPT	.5/13	Zinc Plated
P562532	ABS-Z-40-N08	40 µm	30/850	3.15/80	2.8/71	1.18/30	1/2" NPT	.5/13	Zinc Plated
P562533	ABS-Z-40-N12	40 µm	30/850	3.15/80	2.8/71	1.18/30	3/4" NPT	.5/13	Zinc Plated

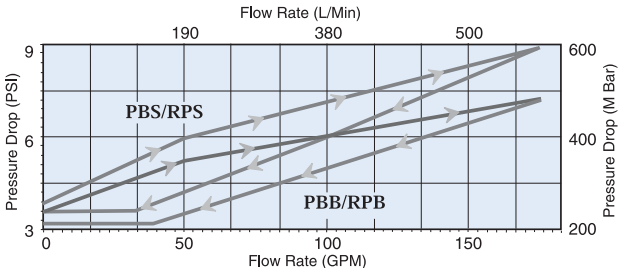
PBS Series Pressure Filler Breather Cap - Screw In Style

Specifications

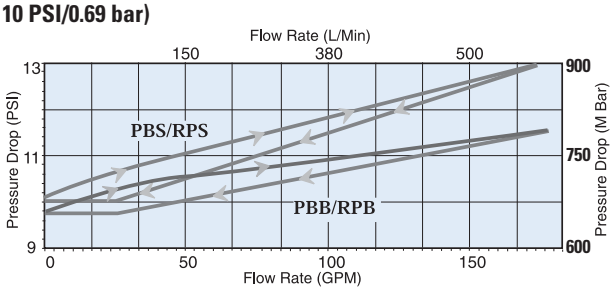
- Chrome plated or epoxy coated steel cap
- Air intake valve opens at 0.435 psi/3 kPa
- Compatible with petroleum based fluids
- Temperature range: -22°F to +240°F / -30°C to 115°C
- Buna-N® gaskets standard
- 10 and 40 micron available
- Relief valve settings at 5 psi / 0.34 bar or 10 psi / 0.69 bar full rate flow

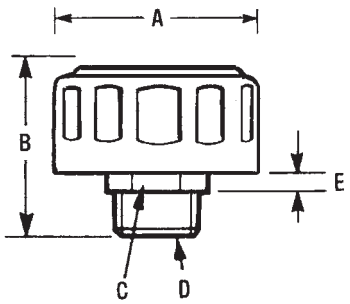
Buna-N® is a registered trademark of E. I. DuPont de Nemours and Company.

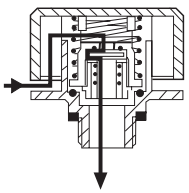
5 PSI/0.34 bar



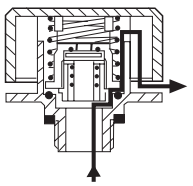
10 PSI/0.69 bar)







Air intake in the reservoir through vacuum breaker when pressure decreases (.435 psi)



Venting to atmosphere through relief valve to maintain a 5 or 10 psi full rated flow

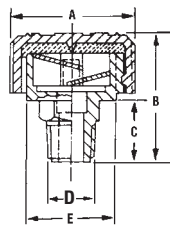
Donaldson Part No.	Description	Micron Rating	Airflow Capacity (cfm/lpm)	Relief Valve Setting (psi/bar)	Dimensions (in./mm) Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Finish
P563362	PBS-10-10-N12	10 µm	30/850	10/0.69	3.15 / 80	2.8 / 71	1.18 / 30	3/4" NPT	.5 / 13	Chrome Plated
P563363	PBS-10-10-N16	10 µm	30/850	10/0.69	3.15 / 80	2.8 / 71	1.18 / 30	1" NPT	.5 / 13	Chrome Plated
P563365	PBS-10-5-N12	10 µm	30/850	5/0.34	3.15 / 80	2.8 / 71	1.18 / 30	3/4" NPT	.5 / 13	Chrome Plated
P563366	PBS-10-5-N16	10 µm	30/850	5/0.34	3.15 / 80	2.8 / 71	1.18 / 30	1" NPT	.5 / 13	Chrome Plated
P563367	PBS-40-10-N12	40 µm	30/850	10/0.69	3.15 / 80	2.8 / 71	1.18 / 30	3/4" NPT	.5 / 13	Chrome Plated
P563368	PBS-40-5-N12	40 µm	30/850	5/0.34	3.15 / 80	2.8 / 71	1.18 / 30	3/4" NPT	.5 / 13	Chrome Plated
P563369	PBS-40-5-N16	40 µm	30/850	5/0.34	3.15 / 80	2.8 / 71	1.18 / 30	1" NPT	.5 / 13	Chrome Plated
P563370	PBS-W-10-5-N12	10 µm	30/850	5/0.34	3.15 / 80	2.8 / 71	1.18 / 30	3/4" NPT	.5 / 13	Epoxy Coated Black
P563371	PBS-W-40-10-N12	40 µm	30/850	10/0.69	3.15 / 80	2.8 / 71	1.18 / 30	3/4" NPT	.5 / 13	Epoxy Coated Black
P563372	PBS-W-40-5-N12	40 µm	30/850	5/0.34	3.15 / 80	2.8 / 71	1.18 / 30	3/4" NPT	.5 / 13	Epoxy Coated Black

Filler Breather Caps

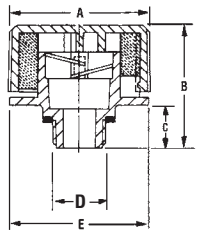
Specifications

- High impact-resistant technopolymer construction
- Cap diameters 1.22"/31mm, 1.65"/42 mm, 2.24"/57 mm and 2.75"/70 mm
- Compatible with petroleum and water based fluids
- Temperature range -22°F to +240°F / -30°C to +115°C
- Displacements to 250 gpm/9461 lpm without baffle
- Displacements to 144 gpm/547 lpm with anti-splash baffle

CPS / DPS / LPS



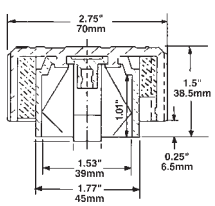
BPS / RPS



Donaldson Part No.	Description*	Micron Rating	Airflow Capacity (cfm/lpm)	Relief Valve Setting (psi/bar)	Dimensions (in./mm) Dim. A	Dim. B	Dim. C	Dim. D	Dim. E
P562494	DPS-40-N04	40 µm	4.9/139	n/a	1.65/42	2.05/52	.71/18	1/4" NPT	1.2/30
P562495	DPS-40-N04-A	40 µm	2.1/59	n/a	1.65/42	2.05/52	.71/18	1/4" NPT	1.2/30
P563614	DPS-40-N06	40 µm	11.7/331	n/a	1.65/42	2.05/52	.71/18	3/8" NPT	1.2/30
P562497	DPS-40-N06-A	40 µm	5/142	n/a	1.65/42	2.05/52	.71/18	3/8" NPT	1.2/30
P562501	DPS-40-N08	40 µm	11.7/331	n/a	1.65/42	2.05/52	.71/18	1/2" NPT	1.2/30
P562502	DPS-40-N12	40 µm	12.5/354	n/a	1.65/42	2.05/52	.71/18	3/4" NPT	1.2/30
P562503	DPS-40-N12-A	40 µm	5.4/153	n/a	1.65/42	2.05/52	.71/18	3/4" NPT	1.2/30
P562483	CPS-40-N12	40 µm	27/765	n/a	2.24/57	1.85/47	.87/22	3/4" NPT	1.53/39
P562484	CPS-40-N12-A	40 µm	13.5/382	n/a	2.24/57	1.85/47	.87/22	3/4" NPT	1.53/39
P562480	BPS-10-N12-A	10 µm	19.3/547	n/a	2.75/70	2.48/63	.83/21	3/4" NPT	2.68/68
P562481	BPS-40-N12	40 µm	33.4/946	n/a	2.75/70	2.48/63	.83/21	3/4" NPT	2.68/68
P562482	BPS-40-N12-A	40 µm	19.3/547	n/a	2.75/70	2.48/63	.83/21	3/4" NPT	2.68/68
P562492	RPS-40-5-N12	40 µm	30/850	5/0.34	2.75/70	2.48/63	.83/21	3/4" NPT	2.68/68

* -A = anti-splash

ABO



Donaldson Part No.	Desc.	Micron Rating	Airflow Capacity (cfm.lpm)	Dimensions (in./mm) Dim. A	Dim. B	Dim. C	Dim. D	Comment
P562476	ABO-10	10 µm	30/850	2.75/70	1.5/39	.25/7	1.77/45	Fits over 1.50" OD tube
P562477	ABO-40	40 µm	30/850	2.75/70	1.5/39	.25/7	1.77/45	Fits over 1.50" OD tube

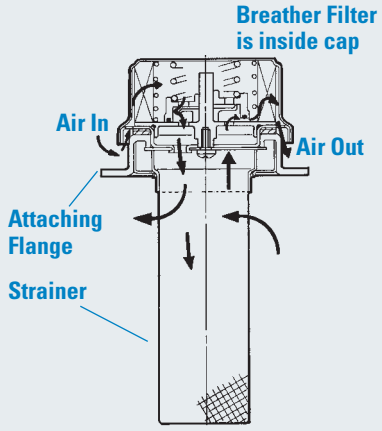
Filler Breather Assemblies

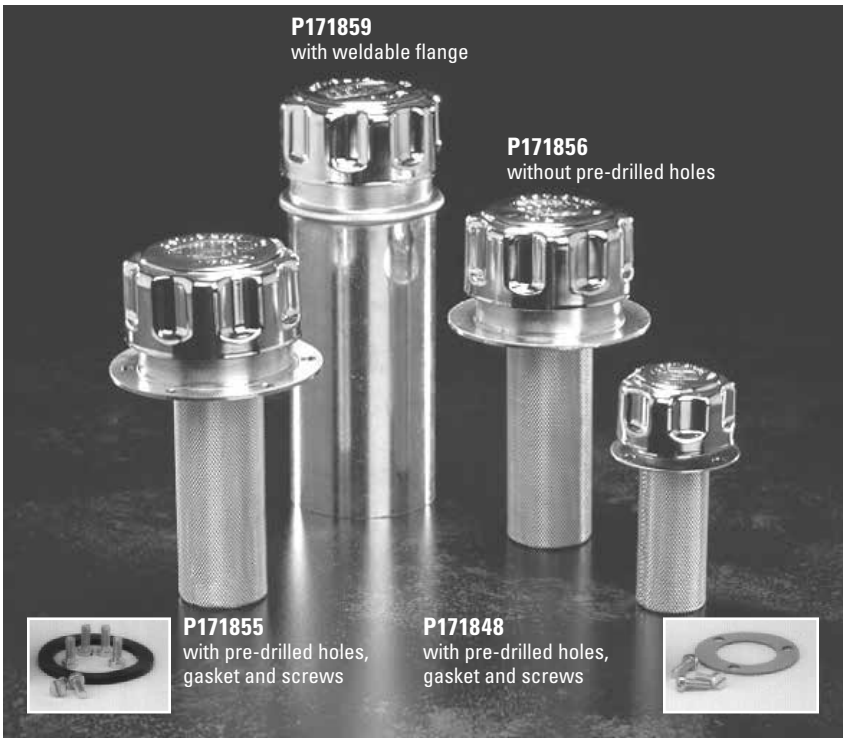
Features

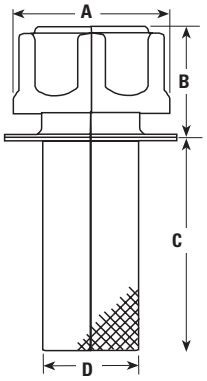
- Removable 500 µm mesh strainer. (Except model P171848, which has a non-removable strainer.)
- 10 µm air breather/filter.
- Models P171855 & P171848 include drilled flanges with attaching screws.

How it Works

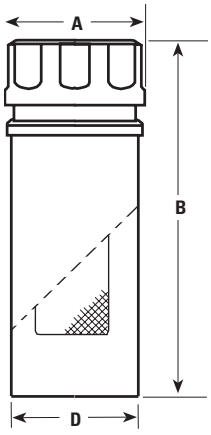
As fluid levels rise and fall inside the reservoir, air flows in and out through the strainer and breather as shown below. The breather filter inside the cap removes contaminants as small as 10 µm from the air to keep airborne contaminant from entering the fluid. The strainer removes large particles from fluid as it is added to the reservoir.







P171848
P171855
P171856



P171859
P171860

Filler Breather Specifications

FLANGE SPECIFICATIONS						FILLER BREATHER SPECIFICATIONS			
Part No.	Outer Dia. (in./mm)	No. of Holes	Hole Dia. (in./mm)	Bolt Circle	Flow (gpm/lpm)	A	B	C	D
						Dimensions (in./mm)			
P171848	2.01/51	3	.22/5.5	1.61/41	70/270	1.81/45	1.38/35	2.48/63	1.1/28
P171855	3.31/84	6	.22/5.5	2.88/73	124/470	2.76/70	1.81/46	3.94/100	1.5/38
P171856	3.31/84	n/a	n/a		124/470	2.76/70	1.81/46	3.94/100	1.15/38
P171859		n/a - weldable			124/470	2.76/70	7.09/180	2.50/64	
P171860 *		n/a - weldable			124/470	2.76/70	7.09/180	2.50/64	

* For pressurized reservoirs at 5.8 psi/0.4 bar relief pressure.

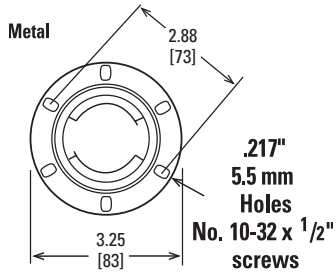
Filler Cap Only (Replacement)

P173292 --- fits P171855, P171856, P171859
P173364 for pressurized reservoir --- fits P171860

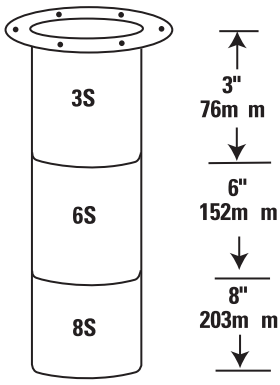
ABB Series Filler Breathers - Bayonet Style

Specifications

- Chrome plated, epoxy coated or zinc plated steel caps
- Airflow to 30 cfm/850 lpm
- Compatible with petroleum based fluids
- 30 mesh technopolymer basket
- Self tapping screws for flange mount
- Cork gaskets
- 3, 10, or 40 micron

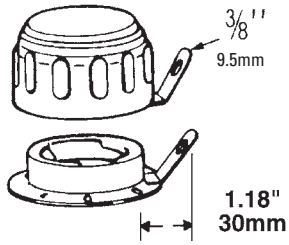


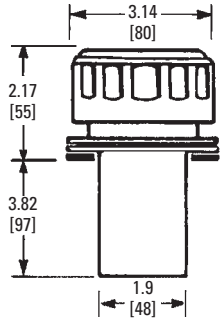
30 MESH STAINLESS STEEL BASKETS



INNER GUARDS

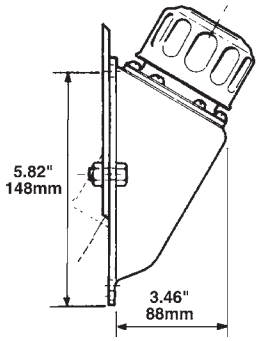
LOCKING TABS (AB ONLY)

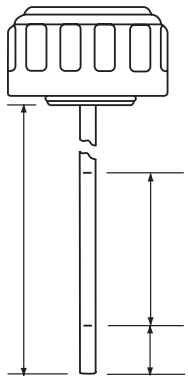




Donaldson Part No.	Reference	Features	Micron Rating	Finish
P562610	ABB-W-03-8S-IG	8" STAINLESS BASKET, INNER GUARD	3 µm	Epoxy Coated, Black
P562611	ABB-W-10-3S	3" STAINLESS BASKET	10 µm	Epoxy Coated, Black
P562612	ABB-W-10-3S-LT	3" STAINLESS BASKET, LOCK TAB	10 µm	Epoxy Coated, Black
P562614	ABB-W-10-N	NYLON BASKET	10 µm	Epoxy Coated, Black
P562616	ABB-W-10-N-R	NYLON BASKET, BUNA-N® GASKET	10 µm	Epoxy Coated, Black
P562618	ABB-W-40-3S	3" STAINLESS BASKET	40 µm	Epoxy Coated, Black
P562619	ABB-W-40-6S	6" STAINLESS BASKET	40 µm	Epoxy Coated, Black
P562620	ABB-W-40-N	NYLON BASKET	40 µm	Epoxy Coated, Black
P562623	ABB-Z-40-3S	3" STAINLESS BASKET	40 µm	Zinc Plated
P562624	ABB-Z-40-3S-LT	3" STAINLESS BASKET, LOCK TAB	40 µm	Zinc Plated
P562625	ABB-Z-40-N	NYLON BASKET	40 µm	Zinc Plated
P562626	ABB-Z-40-N-R	NYLON BASKET, BUNA-N GASKET	40 µm	Zinc Plated

Side Mount
P563609 Side Mount Kit
Can be used with all Bayonet and Threaded Flange Breathers (except MBB & Pressurized Breathers). Maximum torque for fastening 112 in. lbs. with washers.





Dipsticks available for some models. See Features section on assembly tables.

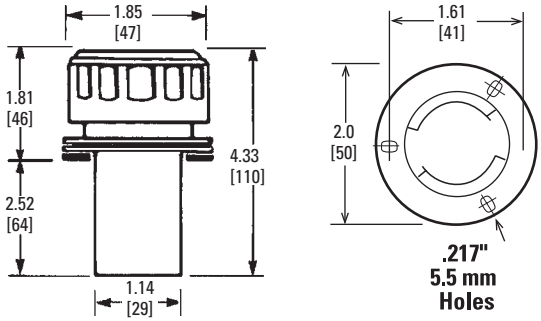
Chrome ABB Series Filler Breathers - Bayonet Style

Airflow to 30 cfm/850 lpm

Donaldson Part No.	Description	Features	Micron Rating
P562573	ABB-03-N	NYLON BASKET	3 µm
P562574	ABB-10	FLANGE, SCREWS & GASKET, NO BASKET	10 µm
P562575	ABB-10-3S	3" STAINLESS BASKET	10 µm
P562576	ABB-10-3S-LT	3" STAINLESS BASKET, LOCK TAB	10 µm
P562577	ABB-10-3S-R	3" STAINLESS BASKET, BUNA-N GASKET	10 µm
P562578	ABB-10-3S-SMB	3" STAINLESS BASKET, SIDE MOUNT KIT	10 µm
P562579	ABB-10-6S	6" STAINLESS BASKET	10 µm
P562580	ABB-10-6S-LT	6" STAINLESS BASKET, LOCK TAB	10 µm
P562581	ABB-10-6S-R	6" STAINLESS BASKET, BUNA-N GASKET	10 µm
P562582	ABB-10-8S	8" STAINLESS BASKET	10 µm
P562584	ABB-10-N	NYLON BASKET	10 µm
P562585	ABB-10-N-LT	NYLON BASKET, LOCK TAB	10 µm
P562587	ABB-10-N-R	NYLON BASKET, BUNA-N GASKET	10 µm
P562589	ABB-40	FLANGE, SCREWS & GASKET, NO BASKET	40 µm
P562590	ABB-40-3S	3" STAINLESS BASKET	40 µm
P562592	ABB-40-3S-R	3" STAINLESS BASKET, BUNA-N GASKET	40 µm
P562593	ABB-40-3S-SMB	3" STAINLESS BASKET, SIDE MOUNT KIT	40 µm
P562594	ABB-40-6S	6" STAINLESS BASKET	40 µm
P562595	ABB-40-6S-D	6" STAINLESS BASKET, DIPSTICK	40 µm
P562596	ABB-40-6S-LT	6" STAINLESS BASKET, LOCK TAB	40 µm
P562598	ABB-40-8S	8" STAINLESS BASKET	40 µm
P562599	ABB-40-8S-D	8" STAINLESS BASKET, DIPSTICK	40 µm
P562600	ABB-40-8S-LT	8" STAINLESS BASKET, LOCK TAB	40 µm
P562601	ABB-40-CWOF	CAP ONLY	40 µm
P562602	ABB-40-LT	LOCK TAB, NO BASKET	40 µm
P562603	ABB-40-N	NYLON BASKET	40 µm
P562605	ABB-40-N-LT	NYLON BASKET, LOCK TAB	40 µm
P562608	ABB-40-N-R	NYLON BASKET, BUNA-N GASKET	40 µm
P562609	ABB-40-N-SMB	NYLON BASKET, SIDE MOUNT KIT	40 µm

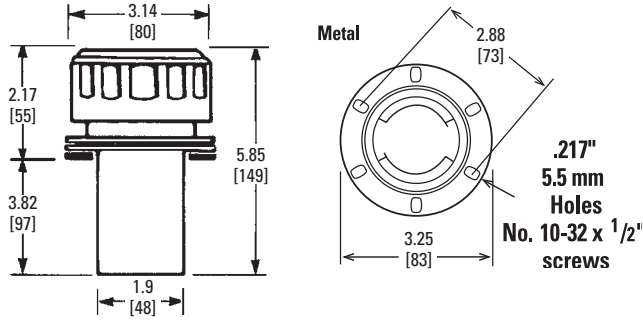
Mini Filler Breather

Donaldson Part No.	Description	Micron Rating	Airflow Capacity (cfm/lpm)	Finish
P562561	MBB-10-N	10 µm	10/283	Chrome
P562562	MBB-40-N	40 µm	10/283	Chrome



Non-Vent Filler Cap, Bayonet

Donaldson Part No.	Description	Feature	Finish
P562563	NVB-00-3S	FILLER CAP ASSY W/3" STAINLESS BASKET	Chrome
P562564	NVB-00-N	FILLER CAP ASSY W/ NYLON BASKET	Chrome
P562565	NVB-W-00-8S	FILLER CAP ASSY W/8" STAINLESS BASKET	Epoxy coated, Black



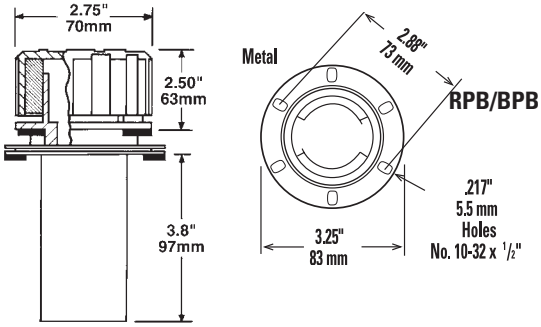
Filler Breathers

Specifications

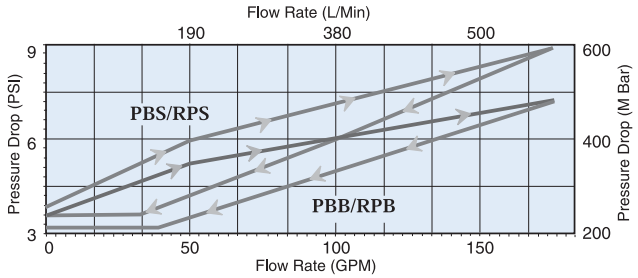
- High impact black technopolymer
- Temperature range
  -22°F to +240°F / -30°C to +115 °C
- 2.75" diameter cap
- Available with bayonet or threaded flange
- Airflow to 30 cfm/850 lpm
- Compatible with petroleum and water based fluids
- 30 mesh technopolymer basket

Options

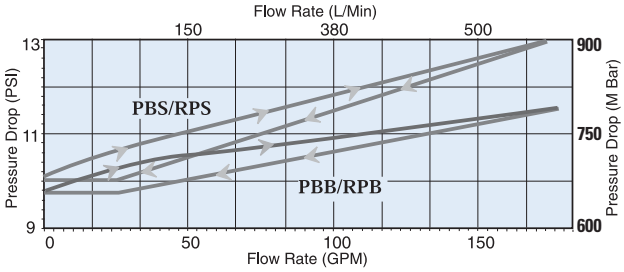
- Dipstick
  3"/76 mm, 6"/152 mm and 8"/ 203 mm stainless steel baskets



5 PSI/0.34 bar



10 PSI/0.69 bar)



Bayonet Style (RPB) (BPB)

Donaldson Part No.	Description	Feature	Micron Rating	Airflow Capacity (cfm/lpm)	Relief Valve Setting (psi/bar)
P562554	RPB-40-5-3S	3" STAINLESS BASKET	40 µm	30/850	5/0.34
P562555	RPB-40-5-6S	6" STAINLESS BASKET	40 µm	30/850	5/0.34
P562556	RPB-40-5-N	NYLON BASKET	40 µm	30/850	5/0.34
P562534	BPB-10-A CAP ONLY	BREATHER CAP	10 µm	30/850	N/A
P562536	BPB-10-N-A	BREATHER	10 µm	30/850	N/A
P563813	BPB-40 CAP ONLY	BREATHER CAP	40 µm	30/850	N/A
P562537	BPB-40-3S	BREATHER W/3" STEEL BASKET	40 µm	30/850	N/A
P562538	BPB-40-3S-A	BREATHER	40 µm	30/850	N/A
P562539	BPB-40-6S-D	FILLER BREATHER W/DIP STICK	40 µm	30/850	N/A
P562541	BPB-40-N	BREATHER	40 µm	30/850	N/A
P562542	BPB-40-N-A	BREATHER	40 µm	30/850	N/A
P562544	BPB-40-N-SMB	BREATHER W/SIDE MOUNT KIT	40 µm	30/850	N/A

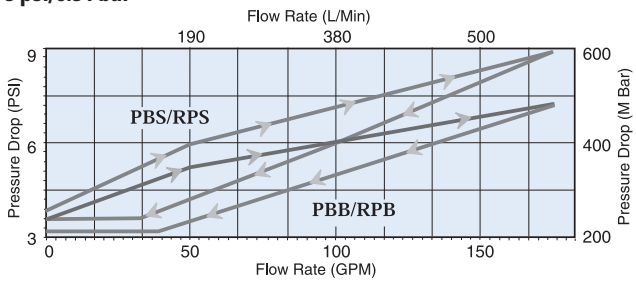
PBB Series Pressure Filler Breather Cap - Bayonet Style

Specifications

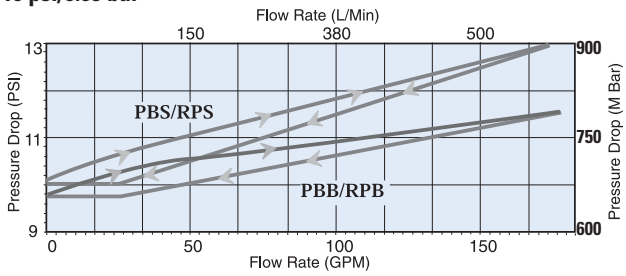
- Chrome plated, epoxy coated or zinc plated steel cap
- Air intake valve opens at 0.435 psi/3 kPa
- Compatible with petroleum based fluids
- Temperature range -22°F to +240°F / -30°C to 115°C
- Buna-N® gaskets standard
- 10 and 40 micron available
- Relief valve settings at 5 or 10 psi/0.34 or 0.69 bar full rate flow

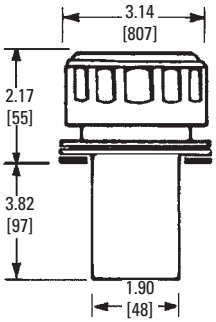
Buna-N® is a registered trademark of E. I. DuPont de Nemours and Company.

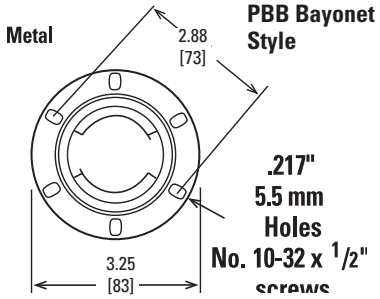
5 psi/0.34 bar



10 psi/0.69 bar



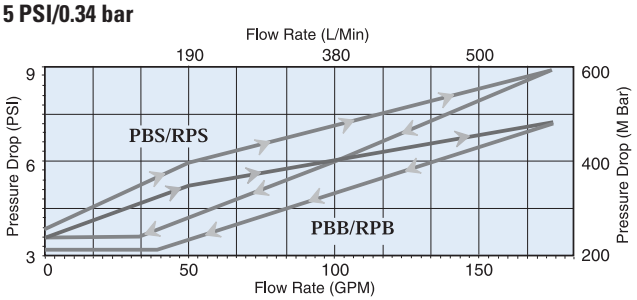




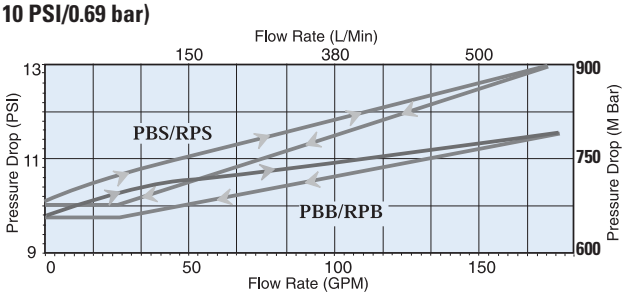
PBB Series Pressure Filler Breather Cap - Bayonet Style

Donaldson Part No.	Description	Feature	Micron Rating	Airflow Capacity (cfm/lpm)	Relief Valve Setting (psi/mm)	Finish
P563346	PBB-10-5-3S	3" STAINLESS BASKET	10 µm	30/850	5/0.34	Chrome
P563347	PBB-10-5-6S	6" STAINLESS BASKET	10 µm	30/850	5/0.34	Chrome
P563348	PBB-10-5-N	NYLON BASKET	10 µm	30/850	5/0.34	Chrome
P563349	PBB-10-5-N-LT	NYLON BASKET, LOCK TAB	10 µm	30/850	5/0.34	Chrome
P563350	PBB-40-10-N	NYLON BASKET	40 µm	30/850	10/0.69	Chrome
P563351	PBB-40-5	FLANGE, SCREWS & GASKET, NO BASKET	40 µm	30/850	5/0.34	Chrome
P563352	PBB-40-5-3S	3" STAINLESS BASKET	40 µm	30/850	5/0.34	Chrome
P563353	PBB-40-5-6S	6" STAINLESS BASKET	40 µm	30/850	5/0.34	Chrome
P563354	PBB-40-5-8S	8" STAINLESS BASKET	40 µm	30/850	5/0.34	Chrome
P563355	PBB-40-5-N	NYLON BASKET	40 µm	30/850	5/0.34	Chrome
P563356	PBB-W-10-5-N	NYLON BASKET	10 µm	30/850	5/0.34	Epoxy Coated, Black
P563357	PBB-W-10-5-N-LT	NYLON BASKET, LOCK TAB	10 µm	30/850	5/0.34	Epoxy Coated, Black
P563358	PBB-W-40-5-3S	3" STAINLESS BASKET	40 µm	30/850	5/0.34	Epoxy Coated, Black
P563361	PBB-Z-10-5-N	NYLON BASKET	10 µm	30/850	5/0.34	Zinc Plated
P563326		3" STAINLESS BASKET ONLY				
P563465		6" STAINLESS BASKET ONLY				
P563466		8" STAINLESS BASKET ONLY				
P563322		4" NYLON BASKET ONLY				

5 PSI/0.34 bar



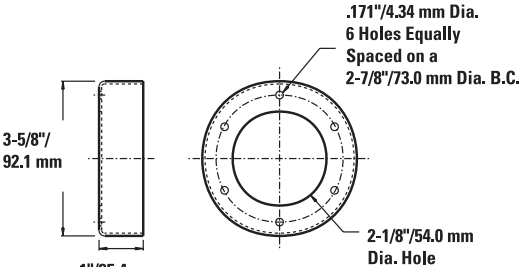
10 PSI/0.69 bar)



Weld Risers for Filler Breathers

Donaldson Part No.	Description	Height (in./mm)
P562668	WR-5565	1/25.4

- Steel stamped construction
- Predrilled holes align with standard breather tank flanges
- Provides for easy installation of filler breathers



Reservoir Air Dryer

Water/moisture in fluid tanks and reservoirs is a big problem. It creates corrosion, pump cavitation, viscosity changes, additive dropout, oxidation and a host of other major system issues. Our new Reservoir Air Dryer removes damaging water, while eliminating the need to continually replace conventional desiccant breathers, or to dry fluids with vacuum dehydration units.

How it works. The Reservoir Air Dryer combats ambient ingression of moisture by introducing a steady flow of clean, dry air to the reservoir/tank. This flow of air keeps the relative humidity low in the headspace, driving moisture from the fluids and preventing condensation.

Easy Installation. With no electrical hookups, installation is easy. Just connect compressed air to the inlet and the outlet to the top of the reservoir. A coalescing pre-filter (the only part that needs servicing – takes seconds to replace) and outlet regulator are pre-installed.

Don't Forget The T.R.A.P™. When you combine the Reservoir Air Dryer with a T.R.A.P. Breather – the complete system keeps moisture and contamination out, even if fluid flow rate out of the tank surpasses the Reservoir Air Dryer flow rate into the tank. The Reservoir Air Dryer also regenerates the T.R.A.P. Breather, increasing life and reducing the total cost of ownership.

If you've got a water problem in your reservoirs or storage tanks, or would like to prevent moisture from entering your system, contact your Donaldson distributor or representative for a complete site audit or for more information.

Reservoir Air Dryer

Features

- Designed to operate with Standard Plant Air — instrument quality air is not required!
- Submicron Coalescing Air Filter — collects oil and water droplets and fine particles present in the inlet air.
- Automatic Drain — purges captured liquid. No intervention required
- Visual Indicator — monitors filter condition
- Membrane Air Dryer — reduces the plant air dew point by as much as 150°F (66°C)
- Pressure Regulator — depressurizes the air and ensures that the proper volume of air is introduced into the reservoir
- The Clean Dry Air Sweep dehydrates the reservoir headspace and removes dissolved moisture from exposed oils and fuels*

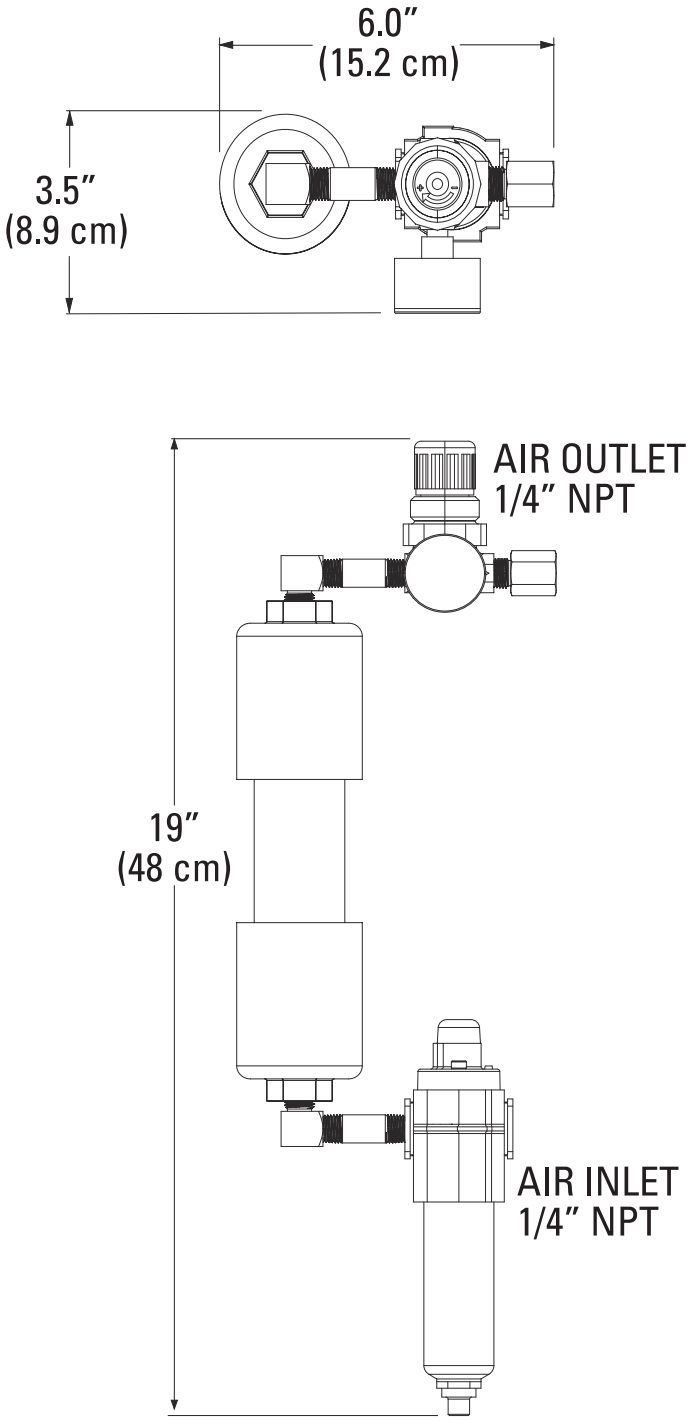
*The Reservoir Air Dryer is not recommended for use on gasoline holding tanks, or for the head space of any flammable liquid (Flash Point below 100°F / 38°C)

P575852
Reservoir Air Dryer Specifications

Efficiency	Reduces dew point as much as 150°F (66°C)*
Fluid Compatibility	Petroleum and Phosphate Ester Fluids, Diesel Fuels
Outlet Flow Volume @100 psi and dew point suppression	0.5 scfm (14.2 slpm) maximum
Inlet Air required @ 100 psi	0.8 scfm (22.7 slpm) maximum
Inlet/Outlet	¼" NPT
Pre-Filter Condition	Visual Indicator (Green/Red)
Pressure Regulator	Dial Gauge
Drain Plug	¼" NPT
Coalescer Drain	Automatic Float Type
Electrical	N/A
Max Working Pressure	116 psi (800 kPa / 8.00 bar)
Max Operating Temperature	125°F (52°C)
Mounting Bracket	3/8" - 16 UN Threaded Nut
Weight	<5 lbs (<3kgs)

*The Reservoir Air Dryer is not recommended for use on gasoline holding tanks, or for the head space of any flammable liquid (Flash Point below 100°F / 38°C)

Reservoir Air Dryer



Sight Glasses

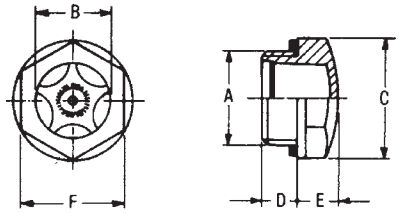
Specifications

- Working pressure: 29 psi / 200 kPa / 2 bar
- Transparent polyamid construction
- Shock resistant
- Anodized aluminum reflector
- Operating temperature range: -20°F to 210°F / -29°C to 100°C
- Buna-N® seal
- For use with mineral, petroleum and water-based fluids
- Any contact with alcohol or solvents must be avoided
- Design HFTX

Buna-N® is a registered trademark of E. I. DuPont de Nemours and Company.

Features

Leak-free sight glasses come in plastic or metal with a variety of threads, seals and lenses. In low visibility areas, prism lens sight glasses are a good solution for quick and accurate readings. In applications involving high pressure or temperatures, steel sight glasses are preferred. Locking nuts provide mounting into sheet metal with minimum thickness and without welding.



Donaldson Part No.	Description	A -Thread Size	Dimensions (in./mm) B	C	D	E	F
P562419	SG-04	1/4" BSP	.35/9	.71/18	.28/7	.24/6	.59/15
P562420	SG-06	3/8" BSP	.43/11	.87/22	.32/8	.28/7	.75/19
P562421	SG-08	1/2" BSP	.55/14	1.02/26	.32/8	.32/8	.87/22
P562423	SG-08-S	3/4" - 16 UN	.51/13	1.02/26	.59/15	.32/8	.87/22
P562426	SG-12	3/4" BSP	.79/20	1.22/31	.35/9	.39/10	1.06/27
P562427	SG-12-S	1-1/16" - 12 UN	.75/19	1.38/35	.59/15	.39/10	1.18/30
P562430	SG-20	1-1/4" BSP	1.18/30	1.85/47	.47/12	.51/13	1.61/41

Prism Sight Glasses

Specifications

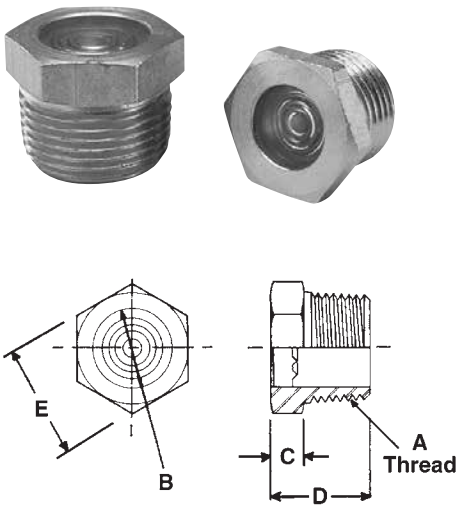
- Prism lenses: special translucent polyamide technopolymer
- For low light applications
- Body: special black polyamide technopolymer
- Available in ¾" and 1" NPT sizes
- Resistant to solvents, oils, greases, alkaline acids
- Avoid alcohol and detergents containing alcohol
- Flat Buna-N® seal

Buna-N® is a registered trademark of E. I. DuPont de Nemours and Company.

Donaldson			Dimensions (in./mm)				
Part No.	Description	A -Thread Size	B	C	D	E	F
P562417	PSG-12	3/4" NPT	0.70/18	1.38/35	0.40/10	0.33/8.5	1.26/32
P562418	PSG-16	1" NPT	0.90/23	1.70/43	0.43/11	0.36/9	1.50/38

Specifications

- Working pressure: 500 psi / 3,450 kPa / 34.5 bar
- All nickel-plated steel construction
- Glass prism lenses hermetically sealed
- Leak-proof service
- Greater mechanical strength
- Easy installation
- Reflects light in the presence of any liquid
- Maximum operating temp. 500°F / 260°C
- Suitable for petroleum and water based fluids



Donaldson			Dimensions (in./mm)			
Part No.	Description	A -Thread Size	B	C	D	E
P562408	SVM-04	1/4" NPT	0.34/8	0.19/5	0.44/11	0.63/16
P562409	SVM-06	3/8" NPT	0.44/11	0.22/6	0.5/13	0.75/19
P562410	SVM-08	1/2" NPT	0.56/14	0.22/6	0.56/14	0.94/24
P562411	SVM-12	3/4" NPT	0.75/19	0.31/8	0.63/16	1.06/27
P562412	SVM-16	1" NPT	0.94/24	0.31/8	0.94/24	1.38/35
P562413	SVM-20	1-1/4" NPT	1.19/30	0.41/10	0.81/21	1.75/44
P562414	SVM-24	1-1/2" NPT	1.44/37	0.41/10	0.81/21	2.00/51
P562415	SVM-32	2" NPT	1.88/48	0.41/10	0.88/22	2.50/64

Fluid Level Gauges

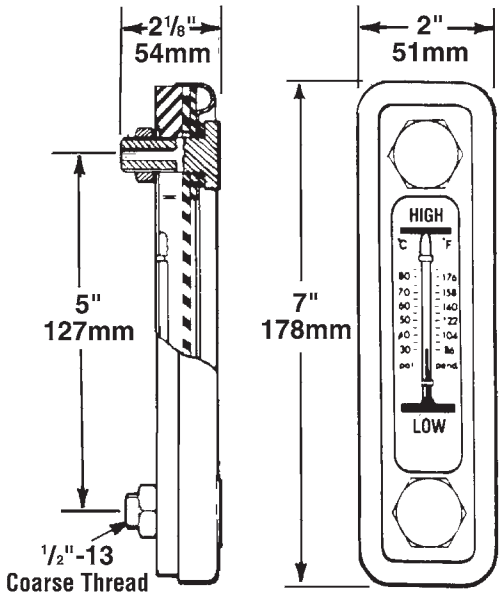
Specifications

- Steel frame
- Acrylic lens
- Steel zinc plated bolts
- 5" (127 mm) mounting bolt centers
- Maximum wall thickness: ½"/12.7 mm
- Maximum temperature:
  SLT 225°F / 107°C; SLG 180°F / 80°C

SLT-1214
P562433

Features

Donaldson offers a wide variety of fluid level gauges that let you accurately measure fluid levels in your tanks and reservoirs. Gauges are made with transparent lens material and are suitable for lubricants, mineral, petroleum and water based fluids. They offer 180° visibility of fluid level.



Donaldson Part No.	Desc.	Feature	Seals
P562433	SLT-1214	5"/127 mm Level Gauge w/ Red Thermometer, Chrome Steel Frame	Neoprene

Bolt torque: 15 ft.-lbs../20 Nt-m. Do not exceed 20 ft.-lbs./27 Nt-m.

Fluid Level Gauges

Specifications

- Transparent lens material
- Buna-N® seals
- Maximum working pressure for pressurized tanks: 14.5 psi / 1 bar / 100 kPa.
- Oil level and temperature or oil level only
- Temperature scale: 35° to 210°F / 0° to 100°C.

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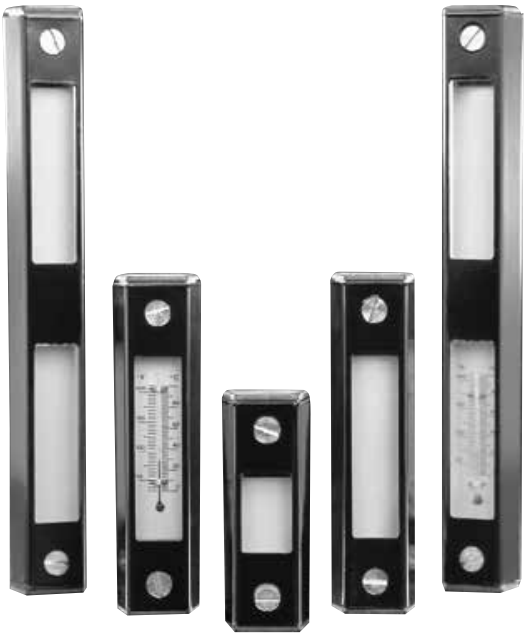
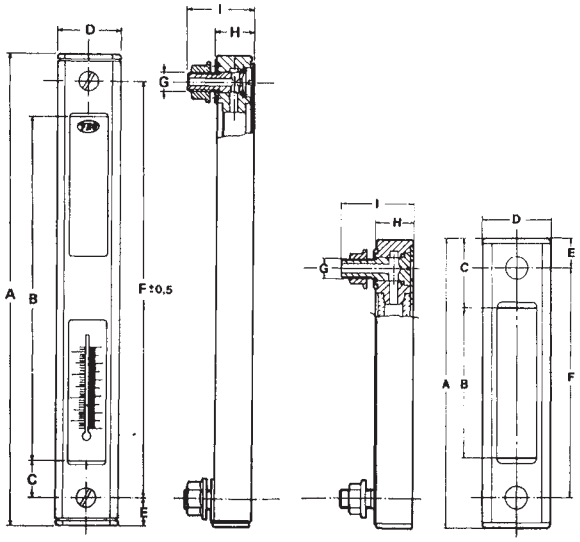




Bolt torque: 10 ft.-lbs/Nt-m. Inside nut for tightening directly on the tank. Suggested mounting hole diameter: 11mm or 13mm.

Oil Level/Temperature Gauge Specifications (35°- 210°F / 0°- 100°C)

Part	Dimensions (in./mm)								
No.	A	B	C	D	E	F	G-Thread	H	I
P171920	6.22/158	3.22/82	.89/22.5	1.57/40	.61/15.5	5/127	M12 x 1.75	.78/20	1.57/40
P171922	11.22/285	8.23/209	.89/22.5	1.57/40	.61/15.5	10/254	M12 x 1.75	.78/20	1.57/40

Oil Level Gauge Specifications

Part	Dimensions (in./mm)								
No.	A	B	C	D	E	F	G-Thread	H	I
P171918	6.22/1.58	3.23/82	.89/22.5	1.57/40	.61/15.5	5/127	M12 x 1.75	.78/20	1.57/40
P171913	4.21/107	1.22/31	.89/22.5	1.57/40	.61/15.5	3/76	M10 x 1.5	.78/20	1.57/40

Fluid Level Gauges

Specifications

- Ultrasonically welded polyamide
- Suitable for pressurized reservoirs
- Operating temperature range: -20°F to 212°F / -29°C to 100°C
- Scale: 32°F to 212°F / 0°C to 100°C
- Maximum wall thickness:
  - LG-3 - 1/2"/12.7 mm
  - LG-5/LG-10 - 3/8"/8.3 mm
- Buna-N® O-ring seals
- Zinc plated bolts
- Metric bolts

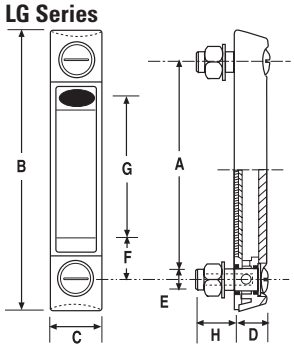
Note:
Any contact with alcohol, alcohol-based washing fluids, or petroleum distillates must be avoided. Do not chamfer tank mounting holes. Not for water-glycol applications

Buna-N® is a registered trademark of E. I. DuPont de Nemours and Company.

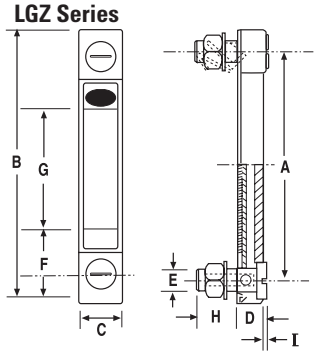
Options:

- 1/2"-13 bolts (LG-5)
- Protective guard (LG-5)
- Viton seals
- Red and blue thermometers
- Alcohol resistant version
- Fast mount kit (requires no internal access or threads to mount)

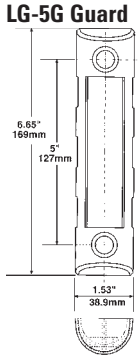
LG Series



LGZ Series



LG-5G Guard



Bolt torque: 9 ft.-lbs./12 Nt-m
(7 ft.-lbs./9.5 Nt-m fast mount)

LG-3 FM option E dia. = 0.625 (5/8)
LG-5, 10 FM option E dia. = 0.688 (11/16)

Fluid Level Gauge Guard (LG-5 Series only)

Donaldson Part No.	Description	Feature	Bolt Center A (in./mm)	B (in./mm)	C (in./mm)	D (in./mm)
P562453	LG-G	5"/127 mm Level Gauge Guard	5.00/127	6.65/169	1.53/39	.98/25

Transparent Polyamide Fluid Level Gauges

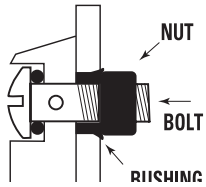
Level Gauge Choices

Donaldson Part No.	Description	Feature	Dimensions (in./mm) Bolt Center A	B	C	Hole Dia. D	E	Bolt Size	F	G	H	I
P562438	LG-3	3" Level Gauge	3.00/76	4.17/106	1.06/27	.63/16	.42/10	M10 x 1.5	.71/18	1.31/33	.83/21	
P562440	LG-3-FM	3" Level Gauge w/ Fast Mount kit	3.00/76	4.17/106	1.06/27	.63/16	.625/16	M10 x 1.5	.71/18	1.31/33	.83/21	
P562441	LG-3-T	3" Level Gauge w/ Red Thermometer	3.00/76	4.17/106	1.06/27	.63/16	.42/10	M10 x 1.5	.71/18	1.31/33	.83/21	
P562442	LG-3-TB	3" Level Gauge w/ Blue Thermometer	3.00/76	4.17/106	1.06/27	.63/16	.42/10	M10 x 1.5	.71/18	1.31/33	.83/21	
P562454	LG-Z-3	3" Level Gauge	3.00/76	3.90/99	.90/22	.57/14.5	.42/10	M10 x 1.5	.70/18	1.30/33.6	.90/23	0.06/1.5
P562444	LG-5	5" Level Gauge	5.00/127	6.34/161	1.22/31	.71/18	.47/12	M12 x 1.75	.90/23	2.91/74	.90/23	
P562445	LG-5-13	5" Level Gauge w/ 1/2" -13 bolt kit	5.00/127	6.34/161	1.22/31	.71/18	.50/13	1/2" - 13 UNC	.90/23	2.91/74	.90/23	
P562447	LG-5-FM	5" Level Gauge w/ Fast Mount kit	5.00/127	6.34/161	1.22/31	.71/18	.688/17.5	M12 x 1.75	.90/23	2.91/74	.90/23	
P562448	LG-5-T	5" Level Gauge w/ Red Thermometer	5.00/127	6.34/161	1.22/31	.71/18	.47/12	M12 x 1.75	.90/23	2.91/74	.90/23	
P562449	LG-5-T-13	5" Level Gauge w/ Red Thermometer & 1/2"-13 bolt kit	5.00/127	6.34/161	1.22/31	.71/18	.50/13	1/2" - 13 UNC	.90/23	2.91/74	.90/23	
P562450	LG-5-TB	5" Level Gauge w/ Blue Thermometer	5.00/127	6.34/161	1.22/31	.71/18	.47/12	M12 x 1.75	.90/23	2.91/74	.90/23	
P562451	LG-5-T-FM	5" Level Gauge w/ Red Thermometer & Fast Mount kit	5.00/127	6.34/161	1.22/31	.71/18	.688/17.5	M12 x 1.75	.90/23	2.91/74	.90/23	
P563913	LG-5-T-G	5" Level Gauge w/ Red Thermometer & Guard	5.00/127	6.34/161	1.22/31	.71/18	.47/12	M12 x 1.75	.90/23	2.91/74	.90/23	
P562452	LG-5-T-SS	5" Level Gauge w/ Red Thermometer, Stainless Bolt kit	5.00/127	6.34/161	1.22/31	.71/18	.47/12	M12 x 1.75	.90/23	2.91/74	.90/23	
P562456	LG-Z-5	5" Level Gauge	5.00/127	5.9/150	.90/22	.57/14.5	.47/12	M12 x 1.75	.93/23.5	2.90/73.7	.90/23	0.06/1.5
P562458	LG-Z-5-V	5" Level Gauge w/ Viton seals	5.00/127	5.9/150	.90/22	.57/14.5	.47/12	M12 x 1.75	.93/23.5	2.90/73.7	.90/23	0.06/1.5
P562434	LG-10	10" Level Gauge	10.00/254	11.42/290	1.38/35	.71/18	.47/12	M12 x 1.75	1.02/26	7.60/193	.90/23	
P562435	LG-10-LF	10" Level Gauge w/ Level Float	10.00/254	11.42/290	1.38/35	.71/18	.47/12	M12 x 1.75	1.02/26	7.60/193	.90/23	
P562436	LG-10-T	10" Level Gauge w/ Red Thermometer	10.00/254	11.42/290	1.38/35	.71/18	.47/12	M12 x 1.75	1.02/26	7.60/193	.90/23	
P562437	LG-10-TB	10" Level Gauge w/ Blue Thermometer	10.00/254	11.42/290	1.38/35	.71/18	.47/12	M12 x 1.75	1.02/26	7.60/193	.90/23	
P563909	LG-10-TB-SS	10" Level Gauge w/ Blue Thermometer & Stainless Bolt kit	10.00/254	11.42/290	1.38/35	.71/18	.47/12	M12 x 1.75	1.02/26	7.60/193	.90/23	

Fast-Mount Kits

Donaldson Part No.	Description
P563513	LG-3/3T
P563514	LG-5/5T, 10/10T

Fast Mount Assembly Instructions



Installation: Tighten nuts on bolts to the point where nuts are snug against bushings. Apply one drop of thread lock to last exposed thread at end of bolts. Mount on tank and tighten to 7 ft.-lbs./1kg-m. **(DO NOT OVER-TIGHTEN).**

Removal: Loosen bolts and remove. (IMPORTANT: THREAD LOCK PREVENTS OVER-LOOSENING OF BOLTS TO POINT WHERE NUTS DROP OFF INTO TANK.)

What Can Fluid Analysis Do For You?

Fluid analysis is a snapshot of what is happening inside your equipment. It summarizes the condition of your oil and identifies component wear and contamination in virtually any application.

- Identify opportunities for optimizing filtration performance
- Safely extend drain intervals
- Minimize downtime by identifying minor problems before they become major failures
- Maximize asset reliability
- Extend equipment life

Section Index

Suggested Sampling Intervals and Methods

Fluid analysis is most effective when samples are representative of typical operating conditions. Always take samples at regularly scheduled intervals and from the same sampling point each time. How critical a piece of equipment is to production should be a major consideration for determining sampling frequency.

Hydraulic	250-500 hours	By vacuum pump through oil fill port of system reservoir at mid-level
Gearboxes	750 hours	By vacuum pump through oil level plug or dipstick retaining tube
Compressors	Monthly or at least every 500 hours	By vacuum pump through oil fill port of system reservoir at mid-level
Turbines	Monthly or at least every 500 hours	By vacuum pump through oil level plug or dipstick retaining tube

Test Kits and Sampling Products Outside of North America: The fluid sampling program featured in this section is used by North American customers. If you're located outside of North America, we recommend you contact your local Donaldson distributor to discuss availability.

Fluid Analysis Program

The Donaldson Advanced Fluid Analysis Kit is designed to monitor component wear, contamination and fluid condition.

Benefits

- Partnership with a total filtration solutions provider
- High quality testing by an ISO 17025 A2LA accredited laboratory
- Results available immediately upon sample processing completion
- Innovative data management tools that will help you affect change in daily maintenance practices.

Fluid Sampling Products	Part No.
Fluid Analysis Kit	X009330
Sample Extraction Pump	P176431
Sample Extraction Tubing	P176433

How Send Samples to the Laboratory

STEP A | Sample Information

First-time users need to establish a Horizon® account, and new components (sample point) need to be added to your account. Go to this address: www.eoilreports.com/login

Next, fill out the QR code label with the corresponding Component ID and Sample Date. Attach the label to the sample jar and retain the other label for your records.

To improve accuracy and ensure faster processing, use the Sample Submission feature in Horizon to send the sample information to the laboratory. Once the information is submitted online, the QR code will contain all required sample information needed for processing.

NOTE: Provide the laboratory with as much detailed equipment and fluid information as possible. More in-depth analysis is possible when the analyst knows the time on both the unit and fluid and whether the fluid and/or filter have been changed since last sampled.

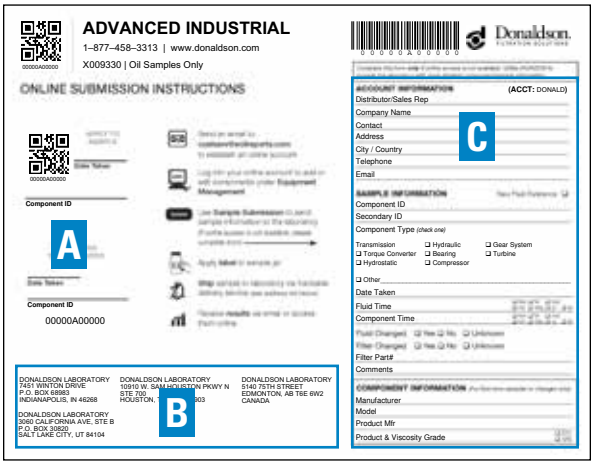
STEP B | Laboratory Locations

A list of available laboratory locations is included on the form. Label your package with the laboratory address of your choice and ship it using a trackable shipping service, such as UPS or FedEx.

STEP C | Online Access

If the sample information cannot be submitted online, complete the simple form on the right, detach the form and submit it to the laboratory with the sample.

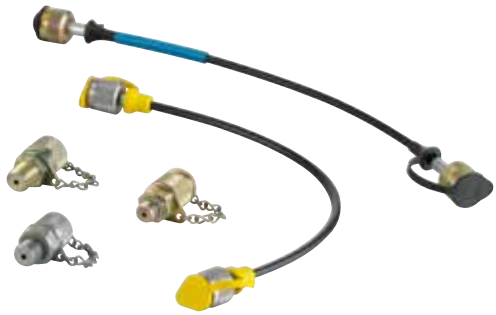
IMPORTANT: Samples will be placed on hold if the component ID does not match an ID in your account and no component information is included on the paper form. Components can be added to your account online via Horizon or by contacting Customer Service. Samples placed on hold for more than 30 days will be disposed.



Test Points, Adapters and Hose Assemblies

If you have filters installed in hard-to-access locations, test points, adapters and hose assemblies can be used to plumb up a bulkhead to read pressure differentials.

See Accessories Section for complete offering!

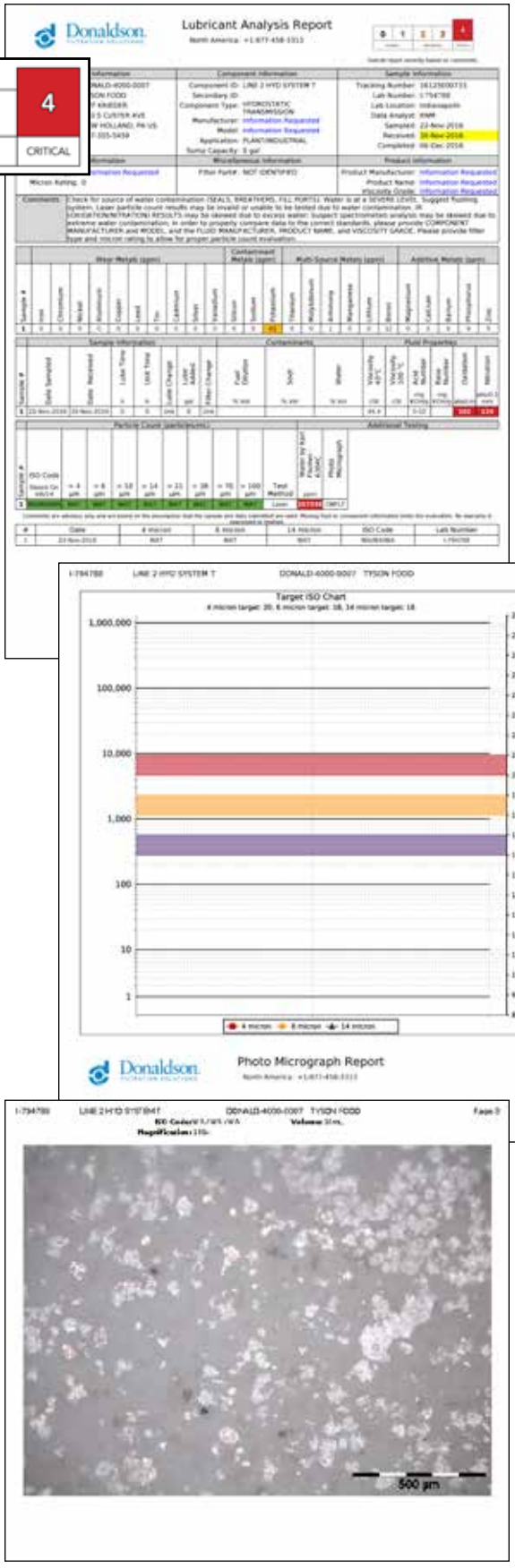


Test Results / Reports from Your Sample

Your Donaldson test report color codesindividual results by severity for a better understanding of the overall severity of the report. It also provides a graphical representation of the cleanliness level of the fluid with a photo micropatch accompanied by the Target ISO Chart done on each sample.

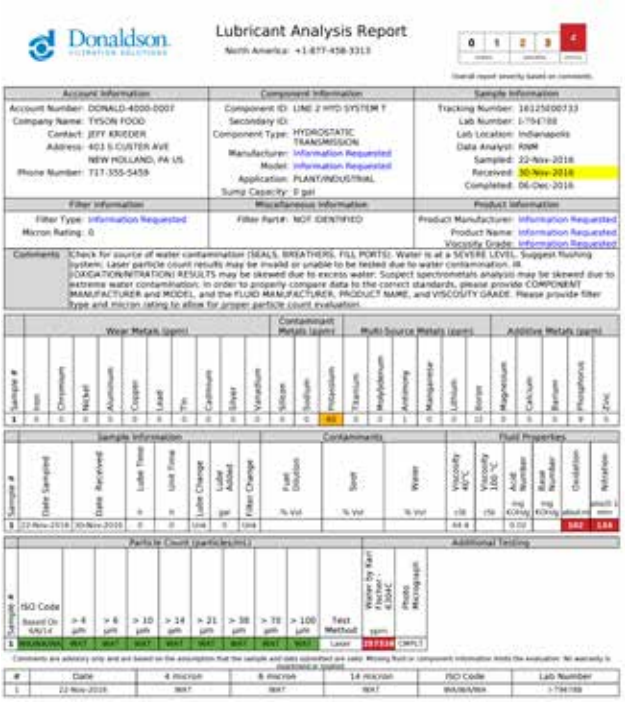
With Donaldson, you're also on track for total program management with problem summary reports, sample processing turnaround tracking and data mining capabilities that allow you to affect positive change in your daily maintenance practices.

- Get test results almost immediately – online
- Identify significant trends in fluid cleanliness
- Use management reports to pinpoint problems with critical units
- Identify bottlenecks in sample turnaround time
- Influence equipment purchasing decisions
- Access your information from anywhere there is an internet connection



How to Read the Donaldson Fluid Analysis Report

Reading a fluid analysis report can be an overwhelming and sometimes seemingly impossible task without an understanding of the basic fundamentals for interpreting laboratory results and recommendations. Referring to the report descriptions and explanations below will help you better understand your results and, ultimately, better manage a productive, cost-saving reliability program.


Donaldson
Lubricant Analysis Report
North America: +1-877-458-3313
Account Information
Component Information
Sample Information
Filter Information
Miscellaneous Information
Product Information
Comments
Wear Metals (ppm)
Contaminant Metals (ppm)
Multi-Source Metals (ppm)
Additive Metals (ppm)
Sample Information
Contaminants
Fluid Properties
Particle Count (particles/mL)
Additional Testing

Customer, Equipment and Sample Information

The information submitted with a sample is as important to who is reading the report as it is to the analyst interpreting the test results and making recommendations. Know your equipment and share this information with your laboratory. Accurate, thorough and complete lube and equipment information not only allows for in-depth analysis, but can eliminate confusion and the difficulties that can occur when interpreting results.

Unit, Lube, Turnaround Time and Account information are listed on the left side of the report emphasizing the data most critical to laboratory processing and data interpretation. Details such as what kind of compressor, gearbox, engine, etc. influences flagging parameters and depth of analysis.

Second ID is each customer's opportunity to uniquely identify units being tested and their location.

Severity is represented on a sliding scale and is color-coded so that critical units are more apparent at first glance. Overall severity is based on report Comments—not individually flagged results.

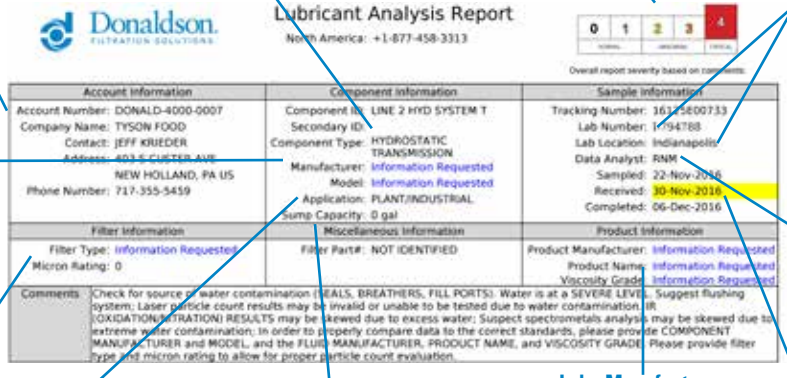
0—Normal

1—At least one or more items have violated initial flagging points yet are still considered minor.

2—A trend is developing.

3—Simple maintenance and/or diagnostics are recommended.

4—Failure is eminent if maintenance not performed. Occasionally, a test result can violate the S4 excursion level. But, if there is no supporting data or a clear indicator of what is actually happening within the unit, maintenance action may not be recommended.


Donaldson
Lubricant Analysis Report
North America: +1-877-458-3313
0 1 2 3 4
Overall report severity based on comments
Account Information
Account Number: DONALD-4000-0007
Company Name: TYSON FOOD
Contact: JEFF KRIEDER
Address: 403 S CUSTER AVE
NEW HOLLAND, PA US
Phone Number: 717-355-5459
Component Information
Component ID: LINE 2 HYD SYSTEM T
Secondary ID:
Component Type: HYDROSTATIC TRANSMISSION
Manufacturer: Information Requested
Model: Information Requested
Application: PLANT/INDUSTRIAL
Sump Capacity: 0 gal
Sample Information
Tracking Number: 161258D0733
Lab Number: I-794788
Lab Location: Indianapolis
Data Analyst: RNM
Sampled: 22-Nov-2016
Received: 30-Nov-2016
Completed: 06-Dec-2016
Filter Information
Filter Type: Information Requested
Micron Rating: 0
Miscellaneous Information
Filter Part#: NOT IDENTIFIED
Product Information
Product Manufacturer: Information Requested
Product Name: Information Requested
Viscosity Grade: Information Requested
Comments
Check for source of water contamination (SEALS, BREATHERS, FILL PORTS). Water is at a SEVERE LEVEL. Suggest flushing system; Laser particle count results may be invalid or unable to be tested due to water contamination. IR (OXIDATION/NITRATION) RESULTS may be skewed due to excess water; Suspect spectrometals analysis may be skewed due to extreme water contamination; In order to properly compare data to the correct standards, please provide COMPONENT MANUFACTURER and MODEL, and the FLUID MANUFACTURER, PRODUCT NAME, and VISCOSITY GRADE. Please provide filter type and micron rating to allow for proper particle count evaluation.

Manufacturer and Model can also identify metallurgies involved as well as the OEM's standard maintenance guidelines and possible wear patterns to expect.

The laboratory at which testing was completed is denoted by an **I for Indianapolis and an H for Houston**. The following Lab # is assigned to the sample upon entry for processing and should be the reference number used when notifying the lab with questions or concerns.

Data Analyst Initials

Filter Types and their Micron Ratings are important in analyzing particle count—the higher the micron rating, the higher the particle count results.

Application identifies in what type of environment the equipment operates and is useful in determining exposure to possible contaminants.

Sump Capacity identifies the total volume of oil (in gallons) in which wear metals are suspended and is critical to trending wear metal concentrations.

Lube Manufacturer, Type and Grade identifies a lube's properties and its viscosity and is critical in determining if the right lube is being used.

Make note of the difference between the Date Sampled and the Date Received by the lab. Turnaround issues may point to storing samples too long before shipping or shipping service problems.

Recommendations

A data analyst's job is to explain and, if necessary, recommend actions for rectifying significant changes in a unit's condition. Reviewing comments before looking at the actual test results will provide a roadmap to the report's most important information. Any actions that need to be taken are listed first in order of severity. Justifications for recommending those actions immediately follow.

Comments	Check for source of water contamination (SEALS, BREATHERS, FILL PORTS). Water is at a SEVERE LEVEL. Suggest flushing system; Laser particle count results may be invalid or unable to be tested due to water contamination. IR (OXIDATION/NITRATION) RESULTS may be skewed due to excess water; Suspect spectrometals analysis may be skewed due to extreme water contamination; In order to properly compare data to the correct standards, please provide COMPONENT MANUFACTURER and MODEL, and the FLUID MANUFACTURER, PRODUCT NAME, and VISCOSITY GRADE. Please provide filter type and micron rating to allow for proper particle count evaluation.

	Wear Metals (ppm)										Contaminant Metals (ppm)			Multi-Source Metals (ppm)						Additive Metals (ppm)				
Sample #	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
1	0	0	0	0	0	0	0	0	0	0	0	0	60	0	0	1	0	0	12	0	0	0	9	0

	Sample Information						Contaminants			Fluid Properties					
Sample #	Date Sampled	Date Received	Lube Time h	Unit Time h	Lube Change	Lube Added gal	Filter Change	Fuel Dilution % Vol	Soot % Vol	Water % Vol	Viscosity 40°C cSt	Viscosity 100 °C cSt	Acid Number mg KOH/g	Base Number mg KOH/g	Oxidation abs/cm	Nitration abs/0.1 mm
1	22-Nov-2016	30-Nov-2016	0	0	Unk	0	Unk				44.4		0.02		102	134

"Highlighted" numbers denote test results the analyst has flagged because they exceed pre-set warning parameters and warrant closer examination or require action. Individual results are flagged by severity color to better explain the overall severity assigned to the sample.

Elemental Analysis

Elemental Analysis, or Spectroscopy, identifies the type and amount of wear particles, contamination and additives. Determining metal content can alert you to the type and severity of wear occurring in the unit. Measurements are expressed in parts per million (ppm).

Combinations of these Wear Metals can identify components within the machine that are wearing. Knowing what metals a unit is made of can greatly influence an analyst's recommendations and determine the value of elemental analysis.

Knowledge of the environmental conditions under which a unit operates can explain varying levels of Contaminant Metals. Excessive levels of dust and dirt can be abrasive and accelerate wear.

Additive and Multi-Source Metals may turn up in test results for a variety of reasons. Molybdenum, antimony and boron are additives in some oils. Magnesium, calcium and barium are often used in detergent/dispersant additives. Phosphorous is used as an extreme pressure additive in gear oils. Phosphorous, along with zinc, are used in anti-wear additives (ZDP).

	Wear Metals (ppm)										Contaminant Metals (ppm)			Multi-Source Metals (ppm)						Additive Metals (ppm)				
Sample #	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
1	0	0	0	0	0	0	0	0	0	0	0	0	60	0	0	1	0	0	12	0	0	0	9	0

Test Data

Test results are listed according to age of the sample—oldest to most recent, top to bottom—so that trends are apparent. Significant changes are flagged and printed in the gray areas of the report.

Samples* appear in an oldest to newest **numbered sequence** so that results are easily associated with them throughout the report and depth of analysis.

Water in oil decreases lubricity, prevents additives from working and furthers oxidation. Its presence can be determined by crackle or FTIR and is reported in % of volume. Water by Karl Fischer determines the amount of water present. These results appear in the Special Testing section of your report.

Viscosity measures a lubricant's resistance to flow at temperature and is considered its most important physical property. Depending on lube grade, it is tested at 40 and/or 100 degrees Centigrade and reported in centistokes.

	Sample Information							Contaminants			Fluid Properties					
Sample #	Date Sampled	Date Received	Lube Time h	Unit Time h	Lube Change	Lube Added gal	Filter Change	Fuel Dilution % Vol	Soot % Vol	Water % Vol	Viscosity 40°C cSt	Viscosity 100 °C cSt	Acid Number mg KOH/g	Base Number mg KOH/g	Oxidation abs/cm	Nitration abs/0.1 mm
1	22-Nov-2016	30-Nov-2016	0	0	Unk	0	Unk				44.4		0.02		102	134

	Particle Count (particles/mL)										Additional Testing	
Sample #	ISO Code Based On 4/6/14	> 4 µm	> 6 µm	> 10 µm	> 14 µm	> 21 µm	> 38 µm	> 70 µm	> 100 µm	Test Method	Water by Karl Fischer - 6304C ppm	Photo Micrograph
1	WA/WA/WA	WAT	WAT	WAT	WAT	WAT	WAT	WAT	WAT	Laser	257338	CMPLT

Comments are advisory only and are based on the assumption that the sample and data submitted are valid. Missing fluid or component information limits the evaluation. No warranty is expressed or implied.

#	Date	4 micron	6 micron	14 micron	ISO Code	Lab Number
1	22-Nov-2016	WAT	WAT	WAT	WA/WA/WA	I-794788

The **ISO Code** is an index number that represents a range of particles within a specific micron range, i.e. 4, 6, 14. Each class designates a range of measured particles per one ml of sample. The particle count is a cumulative range between 4 and 6 microns. This test is valuable in determining large particle wear in filtered systems.

Fuel and **Soot** results are all reported in % of volume. High fuel dilution decreases unit load capacity. Excessive soot is a sign of reduced combustion efficiency.

Oxidation measures the breakdown of a lubricant due to age and operating conditions. Oxidation prevents additives from working and therefore promotes increased acid content, as well as increased viscosity. **Nitration** is an indication of excessive "blow-by" from cylinder walls and/or compression rings and indicates the presence of nitric acid, which speeds up oxidation. Too much disparity between oxidation and nitration can indicate air to fuel ratio problems. As Oxidation/Nitration increases, TAN will also increase and TBN will begin to decrease.

Special Testing

Special testing is often done when additional, or more specific, information is needed. For example, an Analytical Ferrograph might be requested when a ferrous metal larger than 5 microns has been detected by Direct Read Ferrography. The AF can determine actual size of the particle, its composition—iron, copper, etc.—and the type of wear it's creating—rubbing, sliding, cutting, etc. Additional special testing could include, Water by Karl Fischer and RPVOT (Rotating Pressure Vessel Oxidation Test).

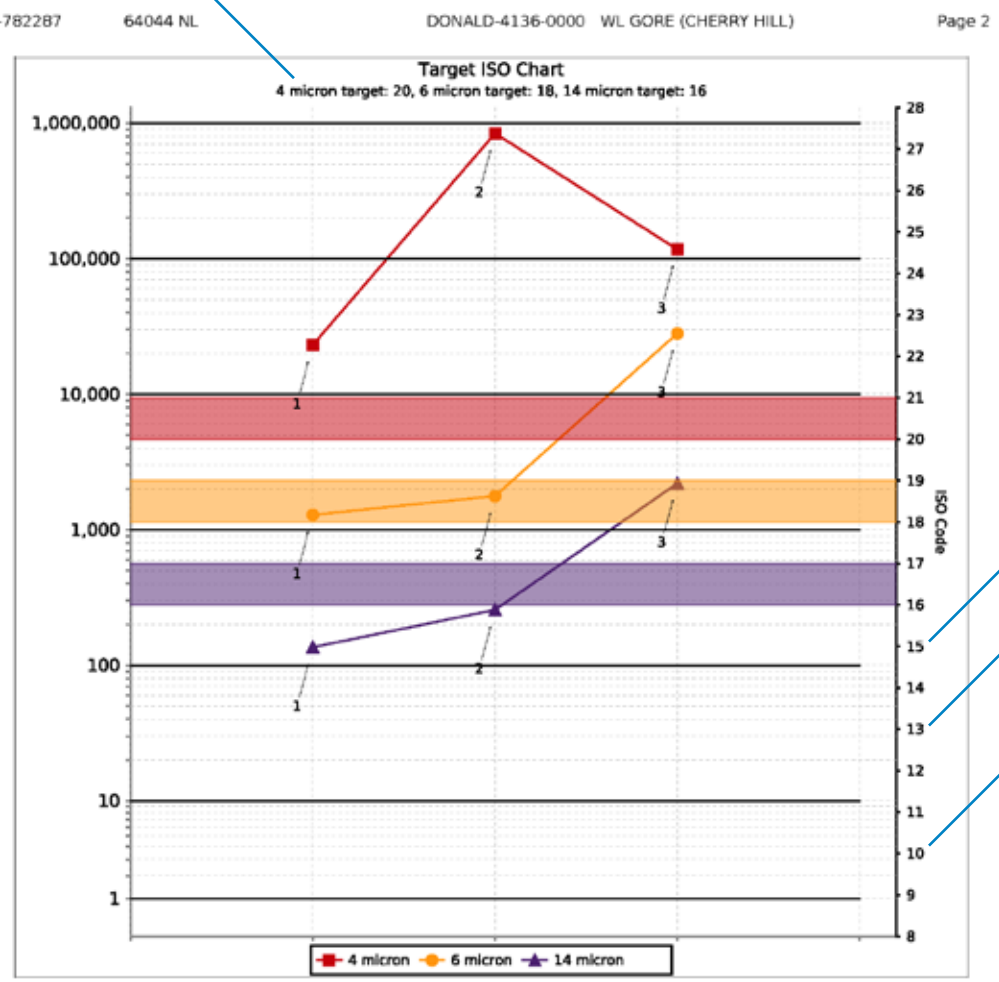
Photo Micropatch

A photo Micropatch is included with each test report and provides digital imagery of the wear debris, contamination and/or filter media particles found in each fluid sample. It is taken at a 100x magnification and includes the sample's ISO code and a 10 micrometer scale for particle size comparison.

500 micrometer scale

Target ISO Chart

If target ISO codes are provided on the Component Registration Form, it will appear above the unit ID.



Particle count results are reported in particles per milliliter or particles per 100 milliliters at a given size (microns) and ISO Cleanliness Code. When sampling units for the first time, you must include on the Component Registration Form the target ISO Cleanliness Codes specific to each of your applications. These unit-specific codes will then pre-fill on each test report. If target ISO codes are not provided, the target ISO field will be determined by the type of hydraulics and pressure rating listed on the Component Registration Form. The 4, 6 and 14 micron particle ranges are then graphed for each sample tested.

The ISO 4406 standard utilizes a three number system to classify system cleanliness — The first number represents the number of particles present measuring greater than 4 µm. The second represents particles greater than 6 µm and the third represents those greater than 14 µm.

expressed or implied.

#	Date	4 micron	6 micron	14 micron	ISO Code	Lab Number
1	22-Nov-2016	WAT	WAT	WAT	WA/WA/WA	I-794788

Each of the ISO Code's three numbers represents an ISO range. For example, the ISO Cleanliness Code for the most recent sample in this report is 19/18/15. Because the number of 4µm particles is between 2,500 and 5,000, the corresponding ISO code is 19. Because the number of 6µm particles is between 1,300 and 2,500, the corresponding ISO code is 18. Because the number of 14 µm particles is between 160 and 320, the corresponding ISO code is 15.

Portable Fluid Analysis Kit

Fluid analysis is a snapshot of what is happening inside your equipment. It tells you the condition of the lubricant and identifies component wear and contamination in virtually any application. The Donaldson Portable Fluid Analysis Kit **(Part No. X009329)** allows you to conduct immediate on-site particulate analysis in as little as ten minutes.

Using the patch test method, you can quickly and reliably assign a three-digit cleanliness code per ISO 4406-1999 to a given fluid sample. Simply pull a 25 ml fluid sample through a patch membrane filter and compare oil sample particle distribution with the Fluid Cleanliness Comparison Guide (included) to assign an ISO Cleanliness Code.

- Use this kit to determine which systems need improved filtration.
- When improvements are made, use it to monitor the cleanliness status of the system.
- A great alternative to expensive, portable electronic devices.

Benefits

- Easy to use
- Results in as little as 10 minutes
- Measures particulate levels
- Provides reliable results

The **Donaldson Portable Fluid Analysis Kit** includes enough supplies for 200 fluid samples. All apparatus is securely packaged and well-protected with laser-etched foam in a sturdy carrying case.

Kit Contents

Kit Part Number X009329

Case Size: Height: 14.5"/368.3mm | Width: 19.25"/489mm | Depth: 7.75"/197mm | Case Weight: 9.95 lbs./4.51 kg

Portable Fluid Analysis Kit

Basic Steps for Use

Kit includes detailed operating instructions and visual comparison guide.

1. Assemble waste bottle, funnel-patch assembly, and vacuum pump to form the sample processing assembly. Tighten the vacuum pump o-ring on the funnel-patch assembly tube by turning the aluminum locking device.

2. Install solvent* dispensing tube and install solvent filter on end of the dispensing tube.

*Mineral spirits are the most commonly used solvent

3. Rinse the funnel-patch assembly with the filtered solvent to remove background contamination. The patch should not be in place for this process.

4. Separate the funnel from the patch supporter and install a filter patch with ink grid up. (If the patch has an ink grid).

5. Reattach the funnel to the filter patch base with filter patch. Twist lock the funnel to the base.

6. Agitate the sample fluid bottle and pour 25ml into the funnel. 25ml is denoted by the first line on the funnel (closest to the patch).

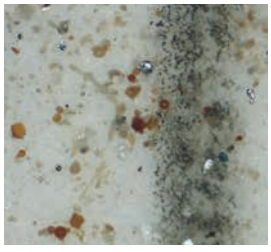
7. Draw the sample fluid through the patch by pulling on the vacuum pump handle.

8. Once the entire sample has passed through the patch rinse the funnel with filtered solvent and draw through the patch. Continue to pull air through until the patch starts to dry. Then separate the funnel from the patch supporter and remove the patch with forceps.

9. Place the sample (ink/dirty side up) on a clean index card and cover it immediately with a plastic laminate patch cover.

10. Analyze the sample with the 100x magnification field microscope.

11. For best results, stand the microscope (without the lens cap or base) direcly over the sample.



12. Use the reference photos at the back of the manual to make approximate ISO code correlation and identify contaminant types.

Off-Line Filtration:

Where and Why Used

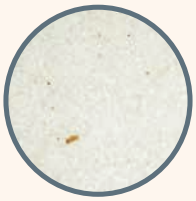
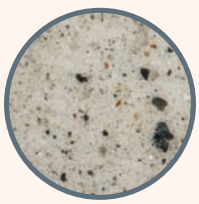
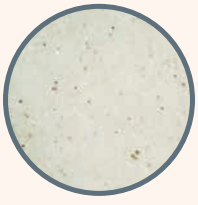
The Donaldson Filter Cart, Filter Panel and Filter Buddy™ offer convenient off-line filtration, flushing and fluid transfer.* Use them with your in-plant machinery and mobile hydraulic equipment to achieve and maintain proper ISO cleanliness levels.

*Not for use with diesel fuel or gasoline.

Section Index

New oil isn't clean oil.

To optimize system performance and lengthen component life, new oil should be filtered before being transferred into a reservoir or gearbox.

Typical Fluid Applications	Viscosity	Target ISO Cleanliness & Photo Micropatch	
Hydraulic Oil Transmission Oil Glycols (<150°F) Hydraulic Based Water Emulsions	0-500 cSt	**16/14/11** 	**ISO 22/21/18** Typical Cleanliness of New, Delivered Fluids 
Gear Oils Glycols Phosphate Esters	0-6000 cSt	**18/16/13** 	

Recommended Storage Practices

Donaldson Filter Carts, Filter Buddy™, and Panels include electric motors and indoor storage is required. Exposure to rain, snow and other elements may cause electric motors to fail. Failures that result from misapplication, improper use or storage are not covered by the Donaldson warranty.

Reference document no. F110064 at *www.donaldson.com/en/engine/support/datalibrary/000194.pdf*

Calculating the Time Required to Filter All Your Fluid Once

When using offline filtration the fluid will need to pass through the filter cart approximately seven times to filter all your fluid once. Use to following formula to calculate the amount of time needed to filter all your fluid once:

(Reservoir Size x 7) / Flow Rate = Time*

For example: if you have a 50 gallon reservoir, it will take approximately 35* minutes to filter all your fluid once.

(50 gallons x 7) / 10 gpm = 35 minutes

*Times will vary depending on initial cleanliness of oil, system ingression, choice of media grades and other variables.

Custom Product Configurations

The following pages highlight Donaldson's stocked off-line filtration offering for quick access and convenient ordering. If an appropriate solution is not available, Donaldson is able to configure a custom solution to meet most specifications requirements. Please be prepared to provide the following information prior to contacting our qualified solutions partner. Note: product lead times will vary.

Operating Conditions

Flow Rate: _____ gpm

Temperature: ☐ ° C or ☐ ° F

Ambient _____ Normal Operating _____

Fluid Type:

☐ Mineral Hydraulic Oil ☐ Water-glycol

☐ Synthetic Hydraulic Oil ☐ HWBF

☐ Synthetic Gear Oil ☐ Turbine Oil

☐ Industrial Gear Oil ☐ Food Grade Oil

☐ Phosphate-ester ☐ Other _____

Viscosity: (2 required)

_____ cSt or Ssu @ 40° C Temp

_____ cSt or Ssu @ 100° C Temp

Brand of Fluid: _____

Target ISO Cleanliness

In the chart to the right, circle the target cleanliness for the most stringent component in the circuit.

$Beta_{x(c)}$ = 1000: _____ µm

Current ISO Level: _____ (18/16/13)

Capacity of Reservoir: _____ gallons/liters

Application: _____ (power unit)

Filter Media: ☐ Synthetic ☐ Cellulose ☐ Wire Mesh

Electrical

☐ 115 Volt ☐ 230 Volt

Use and Storage

☐ Indoor ☐ Outdoor

Pumps	ISO Ratings
Fixed Gear Pump	19/17/15
Fixed Vane Pump	19/17/14
Fixed Piston Pump	18/16/14
Variable Vane Pump	18/16/14
Variable Piston Pump	17/15/13
Valves	
Directional (solenoid)	20/18/15
Pressure (modulating)	19/17/14
Flow Controls (standard)	19/17/14
Check Valves	20/18/15
Cartridge Valves	20/18/15
Load-sensing Directional Valves	18/16/14
Proportional Pressure Controls	18/16/13
Proportional Cartridge Valves	18/16/13
Servo Valves	16/14/11*
Actuators	
Cylinders	20/18/15
Vane Motors	19/17/14
Axial Piston Motors	18/16/13
Gear Motors	20/18/15
Radial Piston Motors	19/17/15

Filter Cart

The Donaldson Filter Cart provides a convenient portable mode of off-line/kidney loop filtration, flushing and fluid transfer. Use it with your in-plant machinery and hydraulic equipment to achieve and maintain proper ISO cleanliness levels.

Dual in-series HMK05 pressure filters can provide coarse/fine particle removal or, install a water absorbing filter to obtain particulate and water removal. A SP50/60 suction filter is required to protect the pump. The powerful one horsepower motor won't bog down and when coupled with a gear pump, it provides efficient fluid transfer and filtration. Convenient features include a rear mounted motor for better balance, a removable angled drip tray and clear braided hoses.

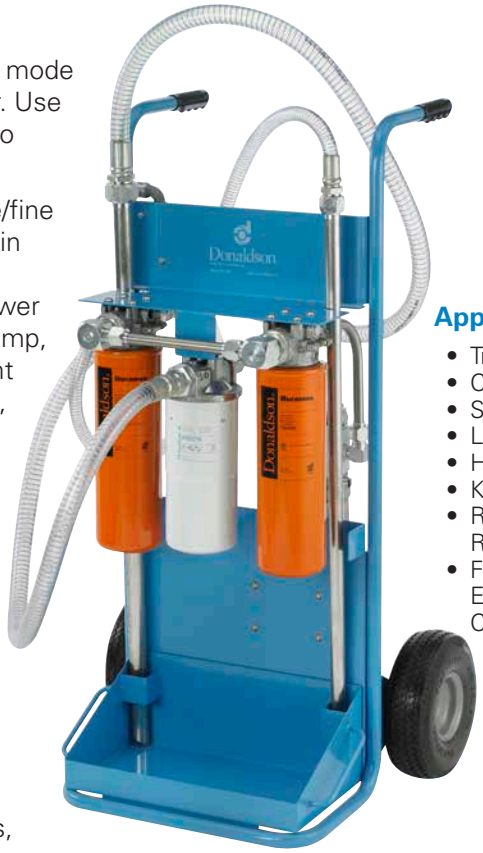
Notice

Donaldson Filter Carts include electric motors and indoor use is recommended. Exposure to rain, snow and other elements may cause electric motors to fail. Failures that result from misapplication, improper use or storage are not covered by the Donaldson warranty.

Reference the aftermarket warranty: document no. F110064.

Fluid Compatibility

Not for use with diesel fuel or gasoline. For fuel solutions, please contact the Donaldson Clean Solutions team at clean.solutions@donaldson.com or 800-374-1374.



Applications

- Transferring New Oil
- Cleaning Stored Oil
- System Draining
- Line Flushing
- Hose Cleaning
- Kidney Loop Filtration
- Repairs & Equipment Rebuild Flushing
- Flushing During Equipment Commissioning

Features	Benefits
Rugged and durable frame	Enables long service life
High efficiency media	Cost effective filtration
Two pressure filters	Two-stage filtration – coarse/fine or particulate/water
Safety relief valve	Prevents over pressurizing and damage to pump, hoses and filters
Overload protected switch	Prevents motor from overheating

Applications	
Filter new fluid	New fluids are usually above the recommended ISO cleanliness levels
Offline filtration	Filter cart can be used to supplement existing filtration
Water removal	Using Donaldson water removal filters to remove free water from the system.
Transferring fluid	Fluid is transferred from a storage container (tote, drum, tank, etc.) to a machine's reservoir
Flushing	After repairs & builds machines need to be flushed thoroughly before returning to service. During equipment commissioning, new machines have original fabrication debris and dirt that has ingressed during transport and storage.

Filter Cart

Filter Cart Features

Stainless steel wands
- Will not break, corrosion resistant

Differential pressure indicators
- Lets you know when to change filters

Two pressure filters mounted in series
- Allows for particulate/water removal or coarse/fine particle removal

Removable angled drip tray
- Easy clean up, fluid will not leak out when tipped back

Clear braided hoses
- Visually shows fluid flowing
- 85 psi working pressure

Suction filter
- Protects pump

Overload protected switch
- Protects motor from overheating

Oil sampling valve
- Monitors filter performance and cleanliness of oil

Motor/Pump
- Industrial brand 10 gpm / 38 lpm flow

Motor mounted on back
- Better balance
- Fluid will not drip on motor when changing filters

Integrated safety relief valve
- Protects against over pressurizing
- Set at 150 psi

Foam filled tires
- Tires will not go flat

Filter Cart Assembly Choices

NOTE: FILTERS ORDERED SEPARATELY

The Importance of Temperature When Selecting a Filter Cart

Consider operating temperature ranges when determining the proper viscosity filtration solution. It's crucial to select the proper viscosity option to maintain adequate flow and avoid restriction. Refer to the oil viscosity with temperature chart located on the front cover of the catalog.

Example: ISO Grade 32 Hydraulic Oil @ 68°F = 86.7 (cSt)

Assembly Part No.	**Low Viscosity** **Max Viscosity 500 SUS (108 cSt)*** Filters ordered separately **X011297‡**	**High Viscosity** **Max Viscosity 8000 SUS (1700 cSt)*** Filters ordered separately **X011298‡**
Operating Temperature Range:	---------- -10° F to 160° F (-23° C to 71° C) ----------	
Filter Bypass Valve Settings:	Suction – 5 psid/0.34 bar	Suction – Y strainer
	Pressure – 25 psid/1.7 bar	Pressure – 25 psid/1.7 bar
Electrical Service:	---------- 115 volts: 14 amp, single phase, 60 Hz ----------	
Cord Length:	---------- 7 ft. /2.1 m cord with storage for 50 ft./15 m ----------	
Gear Pump Flow Rate*:	10.4 gpm/38 lpm	2 gpm/8 lpm
TEFC Motor:**	1 hp, 1800 RPM	1 hp, 1200 RPM
Fluid Compatibility:	---------- Mineral-based fluids, water glycols, polyol esters ----------	
Dry Weight:	Approximately 140 lbs. (63.5 kg)	Approximately 175 lbs. (79.38 kg)
Dimensions:	Height: 47" (1194 mm) Width: 24" (610 mm) Length: 23" (585 mm)	
	---------- Hose/Wand assembly length: 10' (3.05 m) ----------	
FIlter Notes:	Requires 3 filters: 2 pressure, 1 suction	Requires 4 pressure filters

‡These part numbers now have relief valves in the pump. The relief valve setting is: 10.3 bar (150 PSI)

Pressure Filter Choices

Media Type	$ß_{x(c)} = 2$ Rating based on ISO 16889	$ß_{x(c)} = 1000$	Length in	Length mm	Donaldson Part No.	Comments
Synteq Synthetic		<4 µm	14.2	361	P564468	
		6 µm	11.6	294	P165675	
		6 µm	11.6	294	P171274[1]	
		6 µm	14.2	361	P179763	
		11 µm	7.6	193	P176207	
		11 µm	11.6	294	P165659	
		11 µm	11.6	294	P171275[1]	
		11 µm	14.2	361	P170949	
		23 µm	7.6	193	P176208	
		23 µm	11.6	294	P165569	
		23 µm	11.6	294	P171276[1]	
		23 µm	14.2	361	P173789	
		50 µm	11.6	294	P165672	
		50 µm	14.2	361	P573353	
Water Absorbing	10 µm		11.6	294	P179075	Absorbs 300 ml water

[1]Viton® O-ring, Epoxy

Suction Filter Choices

Media Type	$ß_{x(c)} = 2$ Rating based on ISO 16889	Length in	Length mm	Donaldson Part No.
Wire Mesh	150 µm	6.7	170	P550275
	150 µm	10.7	271	P550276

***Contact Donaldson for special order options**

**Totally Enclosed Fan-Cooled

Filter Notes

- Refer to table in the Technical Reference Guide for fluid compatibility with our filter media.
- Thread sizes are1 3/4"-12 UNF-2B (HMK05) and 1 1/2"-16 UN-2B (suction filter)
- Filters with seals made of Viton® (a fluoroelastomer) are required when using diester, phosphate ester fluids, water glycol, water/oil emulsions, and HWCF (high water content fluids) over 150°F. Filters with seals made of Buna-N® are appropriate for most applications involving petroleum oil.
- Viton® is a registered trademark of E. I. DuPont de Nemours and Company.

Filter Buddy™
Handheld Portable Filtration System

The Donaldson Filter Buddy™ is a handheld portable system allowing you to kidney loop reservoirs that you normally cannot with larger filter carts. Its small size and light weight allows carrying up and down stairs and into tight or confined spaces. It also fits on top of a drum for convenient transferring and filtering from a drum to a reservoir.

The Filter Buddy features dual HMK04 filtration utilizing Donaldson's exclusive high efficiency Synteq™ media. The filters are plumbed in series giving you the option of coarse/fine particle removal or install a water absorbing filter for water/ particle removal.

Notice

Donaldson Filter Buddys include electric motors and indoor use is recommended. Exposure to rain, snow and other elements may cause electric motors to fail. Failures that result from misapplication, improper use or storage are not covered by the Donaldson warranty.

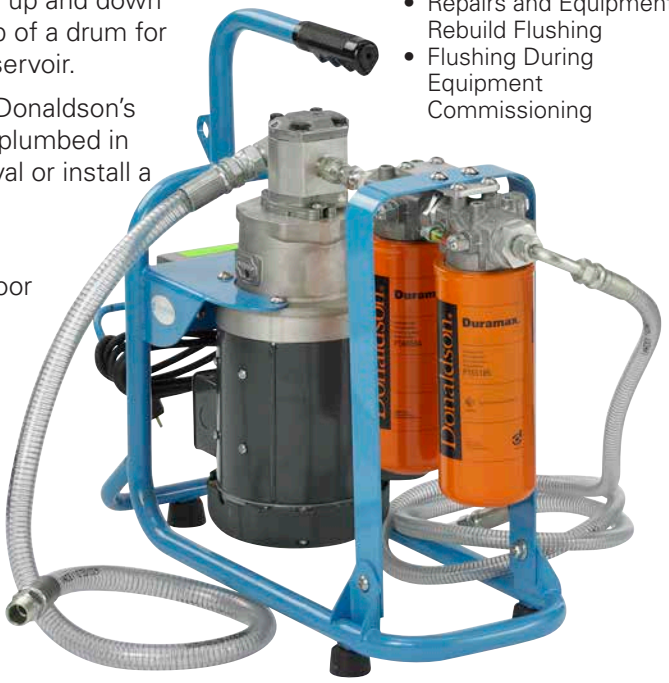
Reference the aftermarket warranty: document no. F110064.

Fluid Compatibility

Not for use with diesel fuel or gasoline. For fuel solutions, please contact the Donaldson Clean Solutions team at clean.solutions@donaldson.com or 800-374-1374.

Applications

- Transferring New Oil
- Cleaning Stored Oil
- System Draining
- Line Flushing
- Hose Cleaning
- Kidney Loop Filtration
- Repairs and Equipment Rebuild Flushing
- Flushing During Equipment Commissioning



Features	Benefits
Rugged and durable frame	Enables long service life
Compact size	Allows filtration in hard to reach locations
High efficiency media grades	Cost effective filtration
Dual stage filtration	Coarse/fine or water/particulate removal
Overload protected switch	Prevents motor from overheating
Sample ports	Enables system cleanliness measurements
Integrated safety relieve valve	Protects against over pressurization

Applications	
Fluid transfer	Ensure that the fluid you are transferring from a drum or tote is clean.
Offline filtration	Supplement existing filtration to achieve target ISO cleanliness levels.
Water removal	Using Donaldson water removal filters to remove free water from the system.
Filter new fluid	Clean up new fluids because they are usually highly contaminated. Don't contaminate your equipment with new fluids. Protect your equipment with proper filtration.

Filter Buddy™ Assembly Choices

NOTE: FILTERS ORDERED SEPARATELY

The Importance of Temperature When Selecting a Filter Cart

Consider operating temperature ranges when determining the proper viscosity filtration solution. It's crucial to select the proper viscosity option to maintain adequate flow and avoid restriction. Refer to the oil viscosity with temperature chart located on the front cover of the catalog.

Example: ISO Grade 32 Hydraulic Oil @ 68°F = 86.7 (cSt)

Assembly Part No.	Low Viscosity Max Viscosity 900 SUS (200 cSt)* Filters ordered separately	High Viscosity Max Viscosity 8000 SUS (1700 cSt)* Filters ordered separately	
	X011303‡	**X011304‡**	**X011305‡**
Operating Temperature Range:	---------- -10° F to 160° F (-23° C to 71° C) ----------		
Electrical Service:	115 volts: 8.4 amp, single phase, 60 Hz		
Gear Pump Flow Rate*:	2 gpm (7.6 lpm)	1.8 gpm (6.8 lpm)	5 gpm (18.9 lpm)
TEFC Motor: Totally Enclosed Fan-Cooled**	1/2 hp, 1725 rpm	3/4 hp, 1725 rpm	11/2 hp, 1725 rpm
Compatibility:	---------- Mineral-based fluids, water glycols, polyol esters ----------		
Hose: terminated with male NPT connections	**Suction:** 4' (1.2m) Length, ¾" (1.9 cm) OD **Discharge:** 7' (2.1m) Length, ½" (1.3 cm) OD	**Suction:** 4' (1.2m) Length, 1" (2.5cm) OD **Discharge:** 7' (2.1m) Length, ¾" (1.9 cm) OD	
P573154 Stainless Steel Wand Kit (optional):	---------- Suction: 40" (1.0 m) Length Discharge 20" (.5 m) Length ----------		
Dry Weight:	Approximately 55 lbs. (25 kg)	Approximately 65 lbs. (29 kg)	Approximately 90 lbs. (40 kg)
Dimensions:	Height: 21" (533 mm) Width: 13" (330 mm) Length: 26" (660 mm)	Height: 25" (635 mm) Width: 13" (330 mm) Length: 26" (660 mm)	
Filter Notes:	---------- Requires 2 Filters ----------		

‡These part numbers now have relief valves in the pump. The relief valve setting is: 10.3 bar (150 PSI)

Filter Choices for X011303 and X011304

Media Type	$ß_{x(c)} = 2$	$ß_{x(c)} = 1000$	Length in	Length mm	Donaldson Part No.
	Rating based on ISO 16889				
Synteq Synthetic		<4 µm	9.4	240	P165185[1]
		6 µm	5.97	152	P165354
		6 µm	9.4	240	P165332
		11 µm	5.97	152	P163542[2]
		11 µm	5.97	152	P164375
		11 µm	9.4	240	P164378
		13 µm	9.4	240	P164056[1]
		14 µm	9.4	240	P177047
		22 µm	9.4	240	P164059[1]
		23 µm	9.4	240	P163567[2]
		23 µm	5.97	152	P164381
		23 µm	9.4	240	P164384
		50 µm	5.97	152	P165335
		50 µm	9.4	240	P165338
Water Absorbing	10 µm		9.4	240	P560584

Filter Choices for X011305

Media Type	$ß_{x(c)} = 2$	$ß_{x(c)} = 1000$	Length in	Length mm	Donaldson Part No.	Comments
	Rating based on ISO 16889					
Synteq Synthetic		<4 µm	14.2	361	P564468	
		6 µm	11.6	294	P165675	
		6 µm	11.6	294	P171274[1]	
		6 µm	14.2	361	P179763	
		11 µm	7.6	193	P176207	
		11 µm	11.6	294	P165659	
		11 µm	11.6	294	P171275[1]	
		11 µm	14.2	361	P170949	
		23 µm	7.6	193	P176208	
		23 µm	11.6	294	P165569	
		23 µm	11.6	294	P171276[1]	
		23 µm	14.2	361	P173789	
		50 µm	11.6	294	P165672	
		50 µm	14.2	361	P573353	
Water Absorbing	10 µm		11.6	294	P179075	Absorbs 300 ml water

[1]Viton® O-rings are required when using diester, phosphate ester fluids, water glycol, water/oil emulsions and HWCF (high water content fluids) over 150°F.

[2]500 psi collapse

Filter Notes:
- Standard filter collapse rating is 150 psi, except as noted.
- X011303 and X011304 thread sizes: 1 3/8"-12 UNF-2B (HMK04)
- X011305 thread size: 1 3/4"-12 UNF-2B (HMK05)
- Refer to table in the Technical Reference Guide for fluid compatibility with our filter media.

Filter Panels

Fixed-Mounted Off-Line Filtration

Donaldson Filter Panels provide fixed-mount offline/ kidney loop filtration and a turnkey approach to supplemental filtration for your in-plant machinery and hydraulic equipment – helping to reduce costs and achieve and maintain proper ISO cleanliness levels.

Donaldson filter panels are offered with 4 different pump flow rates. Reservoir size, fluid viscosity and fluid temperature will help determine the correct flow rate. Filter panels feature dual HMK05 filtration utilizing Donaldson's exclusive high efficiency Synteq™ media. The filters are plumbed in series giving you the option of coarse/fine particle removal or install a water absorbing filter for water/particle removal.

Notice

Donaldson Filter Panels include electric motors and indoor installation is recommended. Exposure to rain, snow and other elements may cause electric motors to fail. Failures that result from misapplication, improper use or storage are not covered by the Donaldson warranty.

Reference the aftermarket warranty: document no. F110064.

Fluid Compatibility

Not for use with diesel fuel or gasoline. For fuel solutions, please contact the Donaldson Clean Solutions team at clean.solutions@donaldson.com or 800-374-1374.

Applications

- Transferring New Oil
- Cleaning Stored Oil

Features	Benefits
High efficiency media grades	Cost effective filtration
Dual-stage filtration	Coarse/Fine or Water/Particulate removal
Differential pressure indicators	Alerts you when to change filters
Optional overload protected switch	Prevents motor from overheating
Sample port	Enables system cleanliness measurements
Integrated safety relieve valve	Protects against over pressurization

Applications	
Offline filtration	Supplement existing filtration to achieve target ISO cleanliness levels.
Water removal	Using Donaldson water removal filters to remove free water from the system.
Filter new fluid	Clean up new fluids because they are usually highly contaminated. Don't contaminate your equipment with new fluids. Protect your equipment with proper filtration.

Filter Panel Assembly Choices

NOTE: FILTERS ORDERED SEPARATELY

The Importance of Temperature When Selecting a Filter Cart
Consider operating temperature ranges when determining the proper viscosity filtration solution. It's crucial to select the proper viscosity option to maintain adequate flow and avoid restriction. Refer to the oil viscosity with temperature chart located on the front cover of the catalog.
Example: ISO Grade 32 Hydraulic Oil @ 68°F = 86.7 (cSt)

Assembly Part No.	**Low Viscosity** **Max Viscosity 500 SUS (108 cSt)*** Filters ordered separately			**High Viscosity** **Max Viscosity 8000 SUS (1700 cSt)*** Filters ordered separately
	X011299‡	**X011300‡**	**X011301‡**	**X011302‡**
Operating Temperature:	---------- -10° F to 160° F (-23° C to 71° C) ----------			
Gear Pump Flow Rate*:	3 gpm (11.4 lpm)	5 gpm (18.9 lpm)	10 gpm (37.9 lpm)	2 gpm (7.57 lpm)
TEFC Motor:**	1/2 hp, 1800 rpm	3/4 hp, 1800 rpm	1 hp, 1800 rpm	1 hp, 1200 rpm
Fluid Compatibility:	---------- Mineral-based fluids, water glycols, polyol esters ----------			
Connections	Inlet (pump) : SAE 12 O-Ring Outlet: SAE 20 O-Ring			Inlet (pump) : SAE 12 O-Ring Outlet: SAE 20 O-Ring
Electrical Service: 115 volts, 60 Hz single phase	8.4 amp	14 amp	14 amp	14 amp
Dry Weight:	Approx. 95 lbs. (43 kg)			Approx. 120 lbs. (54 kg)
Dimensions:	Height: 20" (508 mm) Width: 36" (915 mm) Depth: 8" (203 mm)			
Filter Notes:	Requires 2 Filters			Requires 4 Filters

**Totally Enclosed Fan-Cooled

‡*These part numbers now have relief valves in the pump. The relief valve setting is: 10.3 bar (150 PSI)*

Filter Choices

Media Type	**$ß_{x(c)} = 2$** Rating based on ISO 16889	**$ß_{x(c)} = 1000$**	**Length in**	**mm**	**Donaldson Part No.**	**Comments**
Synteq Synthetic		<4 µm	14.2	361	P564468	
		6 µm	11.6	294	P165675	
		6 µm	11.6	294	P171274[1]	
		6 µm	14.2	361	P179763	
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		23 µm	14.2	361	P173789	
		50 µm	11.6	294	P165672	
		50 µm	14.2	361	P573353	
Water Absorbing	10 µm		11.6	294	P179075	Absorbs 300 ml water

[1]Viton® O-ring, Epoxy are required when using diester, phosphate ester fluids, water glycol, water/oil emulsions and HWCF (high water content fluids) over 150°F.

The Donaldson Filter Buddy™ in use – cleaning up dirty oil in a small power unit.

Donaldson Delivers
Performance Under any Pressure

Section Index

Achieve More.

Donaldson Delivers

Superior Bulk Fluid Filtration

- Lower Total Cost of Ownership
- Avoid Unplanned Downtime
- Maximize Fuel Efficiency
- Low Installation Costs
- Custom Designs
- Modular Solutions
- Compact Installation
- Low Inventory Costs
- Easily Shipped
- Easily Serviced

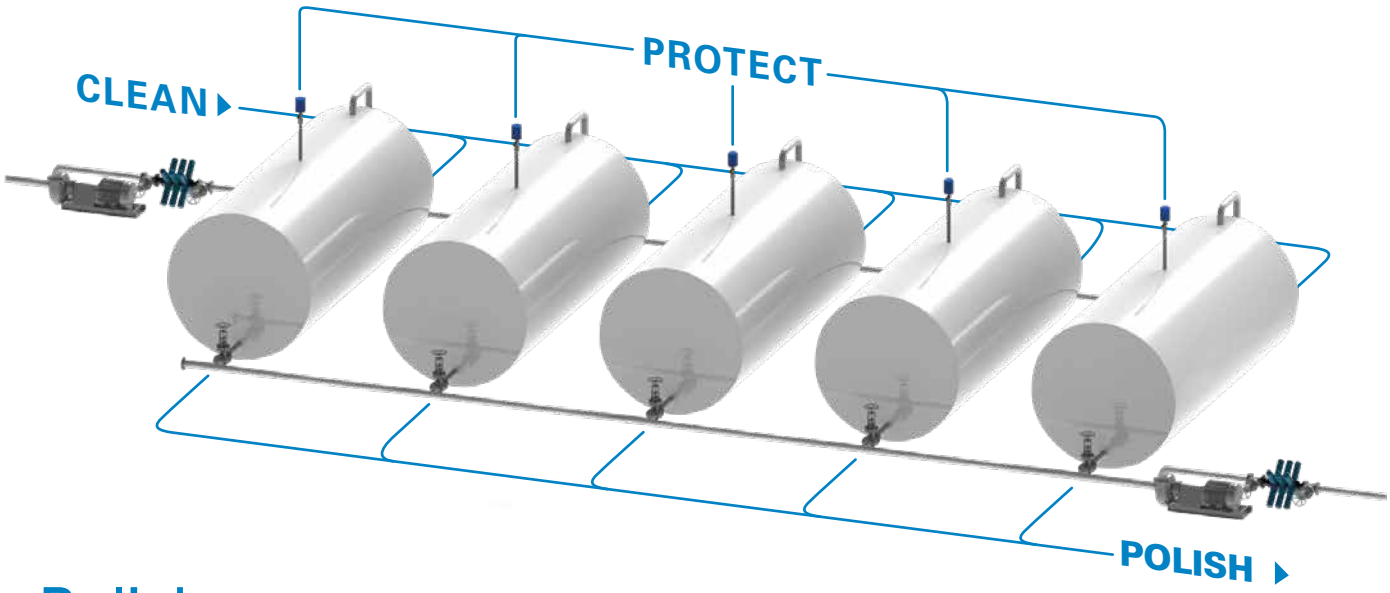
Clean.

Donaldson single-pass filtration on the inlet removes contamination before it can enter your storage tank and contaminate it.

Compact and easy to replace, Donaldson filters are an important line of defense in maintaining fluid quality and can be configured for high flow rates while minimizing pressure drop.

Protect.

Water absorbing filters, T.R.A.P.™ Breathers and Reservoir Air Dryers reduce the risk of moisture and contaminants entering a bulk storage tank so fluids are kept clean and dry. Used together, they'll help guard fluids from free water, airborne contamination and microbial growth for as long as they stay in storage.



Polish.

Unstable fluids and the tank itself can be a source of contamination. Final filtration on the outlet with Donaldson filters ensures that targeted ISO cleanliness levels are achieved before fluids are pumped into your system.

Achieve More.

Clean Fuel & Lubricant Solutions

Donaldson FILTRATION SOLUTIONS

Filters

Max. Working Pressure: 350 psi/2413 kPa/24.1 bar
Rated Static Burst: 800 psi/5516 kPa/55.2 bar

Part Number	Fluid Type	Max. Flow Range	Target ISO Cleanliness	Filter Efficiency
DBB5333	All diesel fuels	32 gpm/121 lpm	14/13/11	4 micron @ Beta 2000
DBB7733	All diesel fuels	32 gpm/121 lpm	16/14/11	7 micron @ Beta 2000
DBB2533	Engine and gear oils	32 gpm/121 lpm	18/16/15	25 micron @ Beta 2000
DBB8666	All diesel fuels	65 gpm/246 lpm	14/13/11	4 micron @ Beta 2000
DBB8777	All diesel fuels	65 gpm/246 lpm	16/14/11	7 micron @ Beta 2000
DBB8664	Engine and gear oils	65 gpm/246 lpm	18/16/13	25 micron @ Beta 2000
DBB8665	Transmission and hydraulic oils	65 gpm/246 lpm	16/14/11	7 micron @ Beta 2000
DBB0248	Ethanol-free fluids*	65 gpm/246 lpm	N/A	N/A

*Designed with expanding, water-absorbing media that prevents water from entering storage or equipment tanks.

Filter Heads

Max. Working Pressure: 350 psi/2413 kPa/24.1 bar
Rated Static Burst: 800 psi/5516 kPa/55.2 bar

Part Number	Filter Qty	Mounting Connection	Max. Flow Range	Bypass
P570329	1	SAE-20 O-ring	65 gpm/246 lpm	No
P570330	1	1 1/4" NPTF	65 gpm/246 lpm	No
P568583	2	1 1/2" SAE 4-Bolt	125 gpm/473 lpm	No

Pictured with
Direct Gauge Adapter: P563809
Gauge: P562709
Use test points and
direct guge adapters.

Filter Manifolds

Part Number	Filter Qty	Mounting Connection	Max. Flow Range
P561880	4	2" ANSI 150 Flange	250 gpm/946 lpm
P568932	8	4" ANSI 150 Flange	500 gpm/1893 lpm
P568933	10	4" ANSI 150 Flange	600 gpm/2271 lpm
DFF1012	up to 12	4" ANSI 150 Flange	700 gpm/2650 lpm

T.R.A.P.™ Breathers

T.R.A.P. breathers protect the fluids in your storage tank from airborne particulate moisture contamination and ambient moisture.

Assembly Part Number	Mounting Connection	Max.Flow Range	Filter Efficiency	Replacement Part Number
X920006	1-1/2 in NPT Female	400 gpm/1500 lpm	97% @ 3 micron	P923075

Reservoir Air Dryer

The Reservoir Air Dryer combats ambient ingression of moisture by introducing a steady flow of clean, dry air to the reservoir. No electrical requirements.

Part Number	Outlet Flow Volume @100 psi & dew point suppression	Inlet Air required @ 100 psi	Inlet/ Outlet
P575852	0.5 scfm (14.2 slpm)	0.8 scfm (22.7 slpm)	1/4" NPT

DEF Filter and Housing

Max. Working Pressure: 300 psi/2068 kPa/20.7 bar

Part Number	Filter Element*	Mounting Connection	Max. Flow Range	Efficency
P575057	P575059	1" NPT	10 gpm/38 lpm	1 micron @ Beta 5000 (99.98%)
P575058	P575059	1" BSPT		

*Filter element sold seperately.

Bulk hP Filters

Designed for higher pressure delivery systems out of bulk storage tanks, typically on air pump fed hose reels in lube shops, mobile service trucks and other refer pressure single pass applications.

Element Collapse Rating: 300 psi/2068 kPa/20.7 bar
Max. Working Pressure: 1000 psi/6895 kPa/68.9 bar
Rated Static Burst: 2200 psi/15168 kPa/151.7 bar

Part Number	Fluid Type	Max. Flow Range	Target ISO Cleanliness	Filter Efficiency
P565184	Petroleum based oil	50 gpm/189 lpm	14/13/11	4 micron @ Beta 2000
P565185	Petroleum based oil	50 gpm/189 lpm	16/14/11	8 micron @ Beta 2000
P565183	Petroleum based oil	50 gpm/189 lpm	18/16/13	14 micron @ Beta 2000

Plastic filter cartridges and metal housings are easily separated for recycling.

Bulk hP Filter Heads

Max. Working Pressure: 1000 psi/6895 kPa/68.9 bar

Part Number	Filter Qty	Mounting Connection	Max. Flow Range	Bypass Valve
P566023	1	SAE-16 O-ring	50 gpm/189 lpm	No
P566024				50 PSI

For more information about bulk filtration systems, contact Donaldson:

Email: ..... clean.solutions@donaldson.com
Web: ..... mycleandiesel.com
Phone: 855-518-7784

More detailed product information can be found in the **F111500 Bulk Filtration Product Guide.**

Donaldson provides this technical reference as a short course in "Hydraulic Filtration 101"— for those who want to gain a better understanding of hydraulic filtration.

In industrial and mobile applications at factories all over the world, we too often see hydraulic circuits that don't include proper fluid filtration, or include it as an afterthought. Good filtration needs to be an integral part of the hydraulic circuit to ensure the long life and proper operation of the pumps, valves and motors. A $100 filter protects your $100,000 equipment.

This section is offered to aid in choosing the filter that will help you achieve the ideal cleanliness levels and longest life for your critical components.

Topics

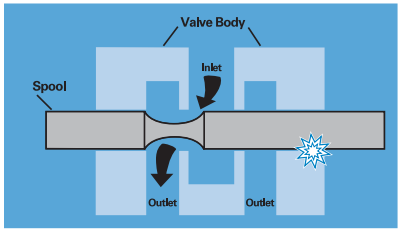
Symbols Used

ß	Beta Ratio
cSt	Centistokes
ΔP	Pressure Drop or Differential Pressure
ISO	International Standards Organization
µm	Micron or micrometer
ppm	Parts per million
SSU SUS	Saybolt Seconds Universal

Why Hydraulic Components Need Protection

Fluid power circuits are designed in all shapes and sizes, both simple and complex in design, and they all need protection from damaging contamination. Abrasive particles enter the system and, if unfiltered, damage sensitive components like pumps, valves and motors. It is the job of the hydraulic filter to remove these particles from the oil flow to help prevent premature component wear and system failure. As the sophistication of hydraulic systems increases, the need for reliable filtration protection becomes ever more critical.

How Contamination Damages Precision Parts



This illustration of a simple hydraulic valve illustrates how particles damage components. In normal operation, the spool slides back and forth in the valve body, diverting oil to one side of the valve or the other. If a particle lodges between the spool and valve body, it will erode small wear particles from the metal surfaces. As these wear particles are moved back and forth by the action of the spool, they can roll into a burr that jams the spool and disables the valve.

Component Damage

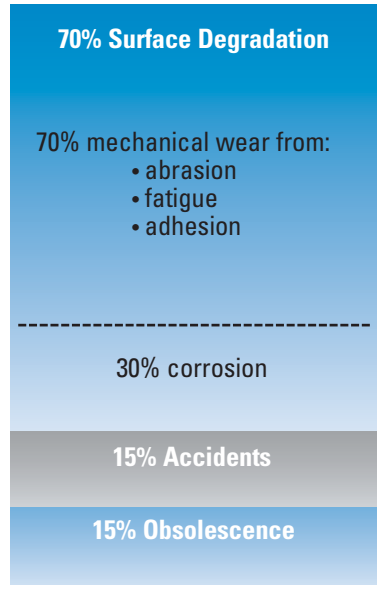
Looking down the barrel of an hydraulic cylinder, we can see the scratches along the inside surface. Don't cut costs by eliminating hydraulic filters. It could cost you more in the long run in major component repairs.

Types of Contaminant

- Many different types of contamination may be present in hydraulic fluid, causing various problems. Some are:
- Particulate (dust, dirt, sand, rust, fibers, elastomers, paint chips)
- Wear metals, silicon, and excessive additives (aluminum, chromium copper, iron, lead, tin, silicon, sodium, zinc, barium, phosphorous)
- Water
- Sealants (Teflon®* tape, pastes)
- Sludge, oxidation, and other corrosion products
- Acids and other chemicals
- Biological, microbes (in high water based fluids)

Typical Factors in Component Life

Studies show that most (typically 70%) of hydraulic component replacement is necessary because of surface degradation, and most of that is due to mechanical wear. Proper filtration of hydraulic fluids can lengthen component life.



Disaster Strikes

When filters are not a main component of the hydraulic circuit, disaster awaits. Here, piston rings were eaten away by contaminants.

* Teflon is a registered trademark of E.I. Dupont de Nemours & Co., Inc.

Where Contamination Comes From

There are a surprising number of contaminated sources in a hydraulic system or circuit.

New Hydraulic Fluid

Adding new fluid can be a source; even though it's fresh from the drum, new hydraulic fluid isn't clean. (It may look clean, but, remember, the human eye can only see a particle the size of about 40 µm.) Oil out of shipping containers is usually contaminated to a level above what is acceptable for most hydraulic systems: typically, new fluid has a cleanliness level about the same as ISO Code 23/21/19, and water content is typically 200 to 300 ppm. Never assume your oil is clean until it has been filtered. One very effective way of ensuring thorough fluid conditioning is with a dedicated off-line circulation loop, or "kidney" loop filtration.

Built-In

Built-in contamination, also called primary contamination, is caused during the manufacture, assembly and testing of hydraulic components. Metal filings, small burrs, pieces of Teflon tape, sand and other contaminants are routinely found in initial clean up filtration of newly manufactured systems.

Ingressed

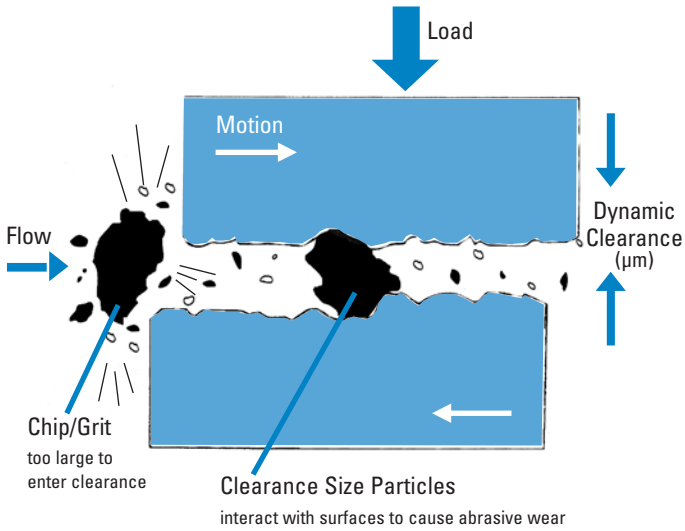
Ingressed or external contamination comes from the environment surrounding the system. Dirt can enter the hydraulic fluid supply through leaking seals, reservoir breather caps, and worn cylinder rod seals. Ingressed moisture, particularly, can cause long-term problems. As a hot system cools at night, cool moisture-laden air can be drawn into the reservoir; as the air condenses, water is released into the reservoir. Water in excess of 0.5% by volume in a hydrocarbon-based fluid accelerates the formation of acids, sludge and oxidation that can attack internal components, cause rust, and adversely affect lubrication properties. The severity of ingression and type of contaminant are dictated by the applications and environment.

Induced

Maintenance procedures can introduce contamination into the system. Opening the system allows airborne particles to enter. Leaving the system open during operation provides continuous ambient particle ingression. Keep your system closed as much as possible.

In-Operation

The major source of contamination are the pump and actuators, the hydraulic cylinder, or the hydraulic motor. Wear-generated contaminants are a hazard during normal hydraulic system operation. The circuit actually generates additional particles as the fluid comes into contact with the precision machined surfaces of valves, motors and pumps. Contaminant levels can keep doubling with every new particle generated. The result can be catastrophic if these contaminants are not properly filtered out of the system.



Rubber & Elastomers

Due to temperature, time, and high-velocity fluid streams, rubber compounds and elastomers degrade — thus releasing particulates into the fluid. This may be from hoses, accumulator bladders, seals, or other elastomer products.

High Water Based Fluids

The water in HWBF tends to support biological growth and generate organic contamination and microbes.

Replacement of Failed Components

Failure to thoroughly clean fluid conductor lines after replacing a failed hydraulic pump will cause premature catastrophic failure.
Donaldson recommends frequent oil sampling to ensure proper contamination control. Sample test points should be close to hydraulic pumps and at other key locations that provide safe, reliable access to the fluid while under full system pressure.

Fluid Conditioning

Fluid Conditioning is the term for the overall conditioning of the fluid in the hydraulic system, and encompasses particulate removal via filters along with other various methods for removing silt, air, water, heat, acid, sludge or chemicals.

Particulate Removal

Particulate removal is usually done with mechanical filters. A well designed reservoir that allows settling will also help in keeping particulates out of the mainstream fluid. For ferrous particulates and rust, reservoir magnets or strainer band magnets can also be used. Other methods such as centrifuging or electrostatic filtration units can also be used, particularly in continuous batch processing and fluid reclamation.

Removal of Silt

Silt, defined as very fine particulate under 5 µm in size, requires very fine filtration or "oil polishing."

Air Removal

Getting air out of the system is best done by adding 100 mesh screen in the reservoir, approximately 30° from horizontal to coalesce entrained air and allow larger bubbles to rise to the surface when reservoir velocities are low.

Water Removal

A number of techniques exist to prevent water or moisture ingression or to remove water once it is present in a hydraulic or lube oil system. The best choice of technique for removal is dependent on the whether or not the water exists as a separate phase (dissolved or free), and also on the quantity of water present. For example, the presence of water or moisture can be reduced or prevented from entering a fluid reservoir through the use of absorptive breathers or active venting systems. However once free water is present in small quantities, water absorbing filters or active venting systems usually provide adequate removal means.

For large quantities of water, vacuum dehydration, coalescence, and centrifuges are appropriate techniques for its removal. However, as each of these techniques operates on different principles, they have various levels of water removal effectiveness. The chart below provides comparative information on these techniques and their relative effectiveness. Care should be taken to apply the best technique to a given situation and its demands for water removal.

Chemical Removal

Removal of acids, sludge, gums, varnishes, soaps, oxidation products and other chemicals generally requires an adsorbent (active) filter with Fuller Earth, active type clays, charcoal, or activated alumina.

Heat Removal

Removing heat is important to maintain viscosity and prevent fluid breakdown. Usually performed with heat exchangers, including air-to-oil and water-to-oil types, finned coolers, or refrigerated units.

Heat Addition

Added heat is used for cold temp start-up to get fluid viscosities within operational limits. Use heaters, immersion or in-line.

Kidney Loop Filtration

One very effective way of ensuring thorough fluid conditioning is with a dedicated off-line circulation loop, or "kidney" loop. This system uses a separate circulation pump that runs continuously, circulating and conditioning the fluid. Multiple stages and types of filters can be included in the circuit, as well as heat exchangers and in-line immersion heaters.

Water Prevention and Removal Techniques

	Usage	Prevents Humidity Ingression	Removes Dissolved Water	Removes Free Water	Removes Large Quantities of Free Water	Limit of Water Removal
Adsorptive Passive Breather	prevention	Y				n/a
Active Venting System	prevention and removal	Y	Y	Y		down to <10% saturation
Water Absorbing Cartridge Filter	removal			Y		only to 100% saturation
Centrifuge	removal			Y	Y	only to 100% saturation
Coalescer	removal			Y	Y	only to 100% saturation
Vacuum Dehydrator	removal		Y	Y	Y	down to ~20% saturation

Proper Filter Application

When selecting a new filter assembly or replacement filter, it's important to first answer some basic questions about your application. Where will the filter be used? What is the required cleanliness level (ISO code) of your system? What type of oil are you filtering? Are there specific problems that needed to be addressed?

It's also important to think about the viscosity of the fluid in your system. In some machinery lubrication applications, for example, the oil is very thick and has a tougher time passing through the layer of media fibers. Heating techniques and the addition of polymers can make the liquid less viscous and therefore easier to filter. Another option is to install a filter with larger media surface area, such as the Donaldson W041 or HRK10 low pressure filters, that can accommodate more viscous fluids.

Next, think about duty cycle and flow issues. Working components such as cylinders often create wide variations in flow—also called pulsating flow —that can be problematic for filters with higher efficiency ratings. On the other hand, dedicated off-line filtration (also called "kidney loop") produces a very consistent flow, so it makes sense to use a more efficient filter.

Filters used in applications with steady, continuous operation at lower pressures will last longer than filters that must endure cycles of high pressure pulsating flow. Generally, the lower the micron rating of a filter, the more often it needs to be changed since it is trapping more particles.

Finally, it's wise to ask yourself, "How much is my equipment worth?" Calculate how much it would cost to replace the equipment in your system, in case of component failure, and make sure those areas are well protected with proper filtration. (For example, high performance servo valves are very sensitive, costly components that need to be protected with finer filtration media.)

Minimizing maintenance costs through good contamination control practices requires proper filter application based on the specific contamination problems. Good contamination control means cost-effective filtration. When looking for a filter, first assess the needs of your system and any problem areas.

Characteristics to Consider When Specifying a Filtration System

1) Oil Viscosity
2) Flow
3) Pressure
4) What Components will be protected by the filter
5) Cleanliness level required (expressed in ISO code)
6) Type of oil/fluid
7) Environment (the system, the surrounding conditions, etc.)
8) Duty cycle
9) Operating Temperature

Fluid Properties

Lubricity The property of the fluid that keeps friction low and maintains an adequate film between moving parts.

Viscosity The thickness of the fluid as measured by resistance to flow. The fluid must be thin enough to flow freely, heavy enough to prevent wear and leakage. Hydraulic fluids thicken when they cool and thin out as they heat up. Because some hydraulic systems work under wide temperature extremes, viscosity can be an important factor.

Viscosity Index (VI) The rate of viscosity change with temperature: the higher the index, the more stable the viscosity as temperature varies. VI can sometimes be improved by additives, usually polymers.

Rust Resistance Rust inhibiting chemicals in hydraulic fluids help overcome the effects of moisture from condensation.

Oxidation Resistance Oxidation inhibitors delay the sludgy/acidic effects of air, heat, and contamination in the system.

Foaming Resistance Although control of foaming depends largely on reservoir design, anti-foaming additives in the fluid also help.

Types of Hydraulic Fluid

There are many kinds of fluids used for power, but they can basically be called petroleum-based fluids, biodegradable fluids, and fire-resistant fluids. A brief description of some of the types in each category are listed below; for details on these or others, consult your filter supplier or refer to a reputable manual on hydraulics, such as the Lightning Reference Handbook, published by Berendsen Fluid Power, Whittier, CA 90601.

Petroleum Based (Hydrocarbon)

These are the most commonly used fluids in hydraulic systems. Their major advantages are low cost, good lubricity, relatively low/non-toxicity, and common availability. This type of fluid is not just plain oil; rather, it is a special formulation with additives that make it suitable for hydraulic systems. Mostly, the additives inhibit or prevent rust, oxidation, foam and wear.

Variations:

- Straight oils: same as petroleum-based oil but without the additives.
- Automatic transmission fluids (ATF): excellent low temp viscosity and very high VI.
- Military hydraulic fluids (ie: MIL-H-5606 and MIL-H-83282): also called 'red oil' because of the color. Low viscosity, good for cold temp operations, but may have to be modified for pumps.

Fire Resistant Fluids

There are two types of fire-resistant fluids commonly used in hydraulic applications: Phosphate Esters and High Water Based Fluids (HWBF). Although generally not as viscous at cold temperatures as petroleum-based fluids, they are fire resistant due to their high content of noncombustible material. Very useful in overcoming the likelihood of fire caused by a broken hydraulic line spraying petroleum fluid into a pit of molten metal, onto a hot manifold, into a heat-treating furnace, or other ignition source.

Some types of HWBF:

- Oil-in-water emulsions (HFA): typically 95% water and 5% oil, with the oil droplets dispersed throughout the water. Provide some fire resistance, but due to oil content, other fluids are superior.
- Water-in-oil emulsions (invert emulsion HFB): typically 40% water and 60% oil, with the water dispersed in the oil. Provide some fire resistance, but due to oil content, other fluids are superior.
- Water-glycol (HFC): typically 40% water and 60% glycol. Excellent fire resistance. Since glycol is an antifreeze, water-glycol can be used at lower temps.

NOTE: HWBF may require reduced pressure rating of pumps and other components.

HFD Fluids

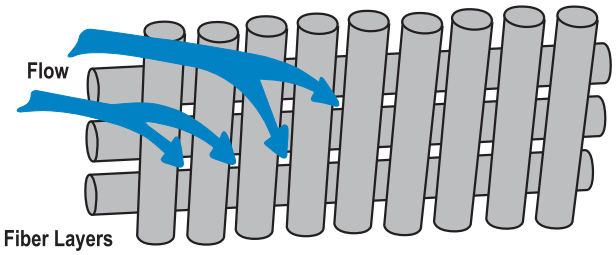
The HFD group is a classification given to several different types of synthetic products that do not contain petroleum oil or water. Phosphate ester fluids were the first HFD fluids and are the most fire resistant within the HFD family. Not as popular today, their use declined due to poor environmental performance, limited compatibility, and high cost. Certain phosphate esters have very high auto-ignition temperatures and are still used in specific applications, such as aircraft and power generation. A common brand is known as Skydrol® (registered trademark of Solutia Inc., a subsidiary of Eastman Chemical Company). Skydrol requires EPR seal for chemical compatibility. Today most phosphate esters have been replaced by polyol esters. Based on organic esters, polyol esters are the most common HFD fluids used today. They offer good inherent fire resistance, good compatibility with system materials, excellent hydraulic fluid performance, and easy conversion from petroleum oil. In addition, the organic nature of these fluids gives them good environmental performance in biodegradability and aquatic toxicity. Another type of synthetic, fire resistant fluids have been formulated for certain niche markets. Water free polyalkylene glycols (PAGs) feature extended fluid life and good environmental performance. Technically an HFD fluid, PAGs (also known as polyalphaolefins (PAOs) are more often used for their biodegradability and overall environmental friendliness. This group also contains the synthetic silicone (siloxane) oils, known for their anti-foaming properties.

Biodegradable

With increasing concern about the environmental impact of hydraulic system leaks and spills, biodegradable fluids are receiving expanded usage, particularly in Europe. There are two types of common biodegradable hydraulic fluids: 1) vegetable-based oils, such as sunflower or rapeseed oils, and 2) synthetic oils like diesters, etc. Generally, systems using biodegradable fluids are derated for maximum and minimum temperatures. Users who replace standard hydraulic oils with biodegradable oils must check with filtration component manufacturers to confirm that the fluid and components are compatible.

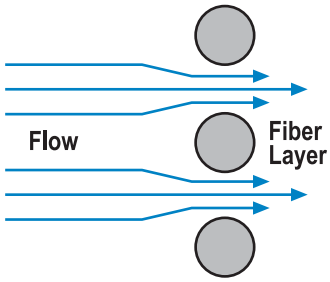
How Filter Media Functions In a Filtration System

The job of the media is to capture particles and allow the fluid to flow through. For fluid to pass through, the media must have holes or channels to direct the fluid flow and allow it to pass. That's why filter media is a porous mat of fibers that alters the fluid flow stream by causing fluid to twist, turn and accelerate during passage.



The fluid changes direction as it comes into contact with the media fibers, as illustrated above. As the fluid flows through the media, it changes direction continuously as it works its way through the maze of media fibers. As it works its way through the depths of the layers of fibers, the fluid becomes cleaner and cleaner. Generally, the thicker the media, the greater the dirt-holding capacity it has.

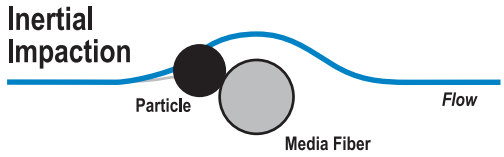
Looking at a cross-section view of the fibers, we can see how the flowstream is accelerated as it flows into the spaces between the fibers.



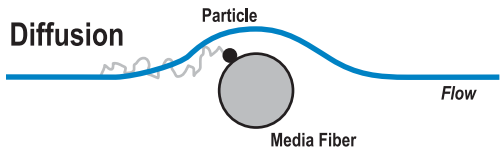
How Filter Media Collects Particles

There are four basic ways media captures particles.

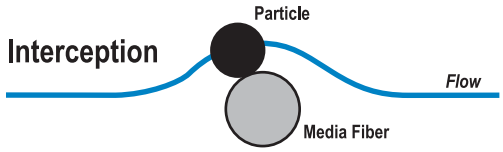
The first, called **inertia**, works on large, heavy particles suspended in the flow stream. These particles are heavier than the fluid surrounding them. As the fluid changes direction to enter the fiber space, the particle continues in a straight line and collides with the media fibers where it is trapped and held.



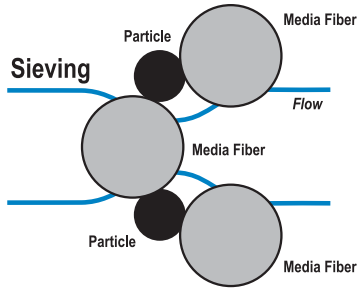
The second way media can capture particles is by **diffusion**. Diffusion works on the smallest particles. Small particles are not held in place by the viscous fluid and diffuse within the flow stream. As the particles traverse the flow stream, they collide with the fiber and are collected.



The third method of particle entrapment is call **interception**. Direct interception works on particles in the mid-range size that are not quite large enough to have inertia and not small enough to diffuse within the flow stream. These mid-sized particles follow the flow stream as it bends through the fiber spaces. Particles are intercepted or captured when they touch a fiber.



The fourth method of capture is called **sieving** and is the most common mechanism in hydraulic filtration. As shown at right, this is when the particle is too large to fit between the fiber spaces.



Basic Types of Hydraulic Filter Media

Filter Media

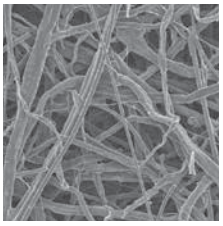
Media is a term used to describe any material used to filter particles out of a fluid flow stream. There are six basic types used to remove contamination in hydraulic applications:

Cellulose Media (Traditional)

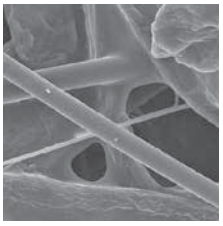
Cellulose fibers are actually wood fibers, microscopic in size and held together by resin. Fibers are irregular in both shape and size. Cellulose often has lower beta ratings, which means there are smaller pores in the media. Smaller media pores cause more flow resistance, resulting higher pressure drop.

While cellulose provides effective filtration for a wide variety of petroleum-base fluids, in certain applications it results in poor filtration performance as compared to synthetic media.

SEM 100X

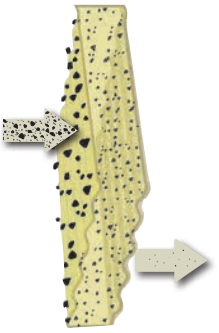


SEM 600X



MEDIA IMAGE

HOW IT WORKS



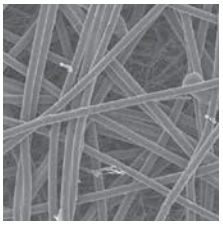
Synteq™ Media (Full Synthetic)

Synthetic fibers are man-made, smooth, rounded and provide the least resistance to flow. Their consistent shape allows for control of the fiber size and distribution pattern throughout the media mat to create the smoothest, least inhibited fluid flow. Consistency of fiber shape allows the maximum amount of contaminant-catching surface area and specific pore size control. The result is media with predictable filtration efficiencies removing specified contaminants and maximum dirt holding capacity.

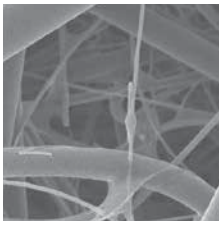
The low resistance of synthetic media to fluid flow makes it ideal for use with synthetic fluids, water glycols, water/oil emulsions, HWCF and petroleum-based fluids.

Synteq™

SEM 100X



SEM 600X



MEDIA IMAGE

HOW IT WORKS

Synteq XP™ Media (Synthetic & Cellulose)

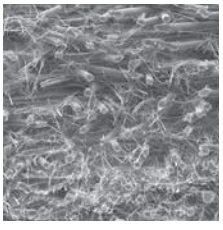
High-performance Synteq XP media was developed specifically to overcome the evolving challenges of today's fuels. This ground-breaking filter media takes fuel filtration performance to a whole new level by providing enhanced engine and system component protection options including:

- Higher efficiency for optimal engine protection, or
- Extended filter life (up to 2 to 3 times that of traditional filter media)

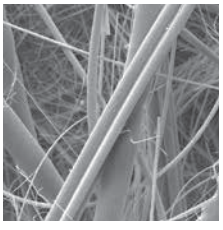
Versatile and smaller filter packaging configuration options are available for secondary fuel filtration.

Synteq XP™

SEM 100X



SEM 600X



MEDIA IMAGE

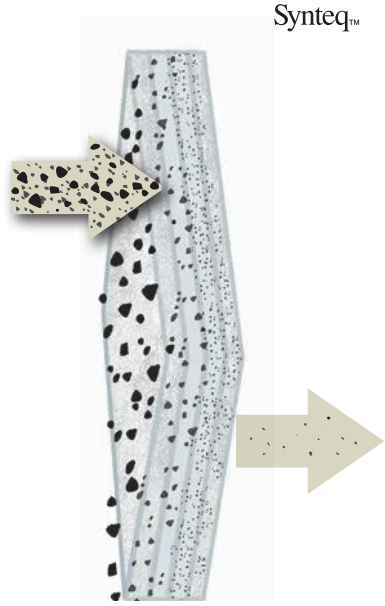
HOW IT WORKS

DT Synteq™ Media (High-Performance)

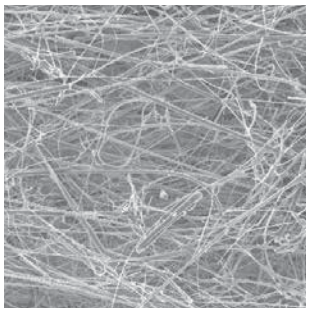
Donaldson high-performance DT grades of Synteq media utilize a blend of borosilicate glass fiber whose matrix is bonded together with an epoxy-based resin system. Donaldson filter media scientists found this to provides the best available chemical resistance for the broadest array of hydraulic applications.

DT Synteq is ideal for use with phosphate ester and water glycol fluids.

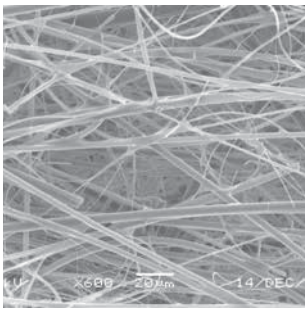
HOW IT WORKS



SEM 100X



SEM 600X

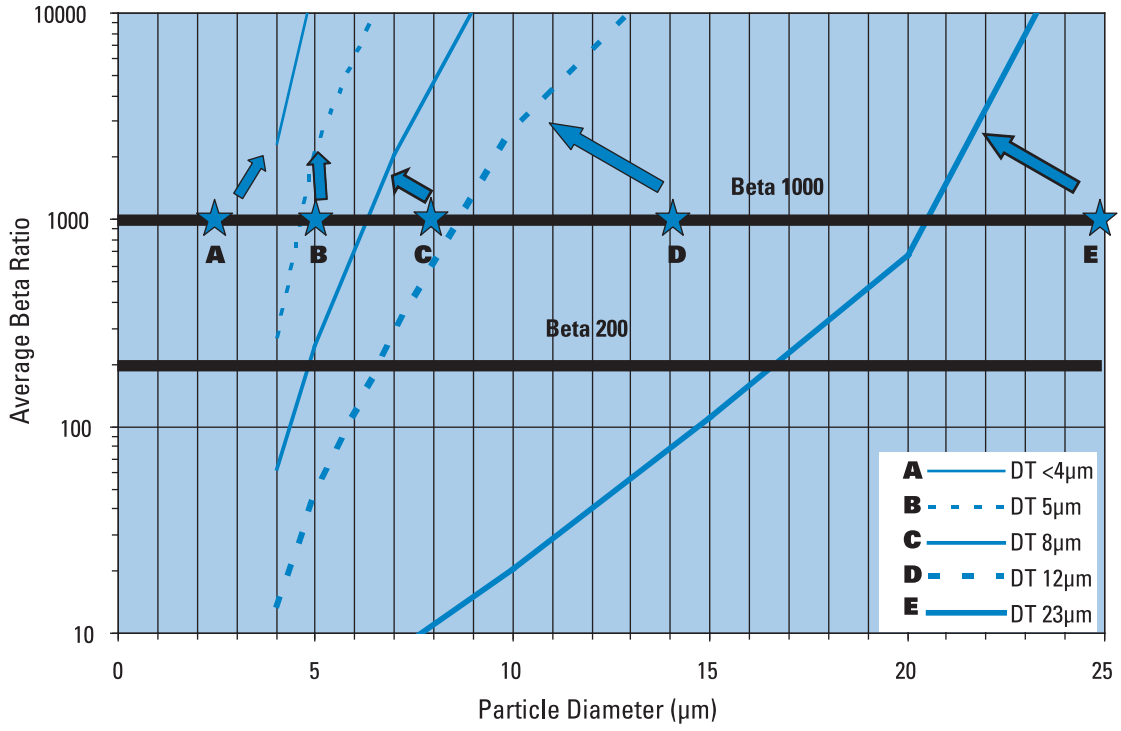


MEDIA IMAGE

The chemical and thermal compatibility of fluid filters is an increasingly difficult design challenge due to the complex variety of fluid systems. Today's fluid systems are often tailored towards the special needs fire resistance, biodegradability, and electrical insulating ability. Fortunately, there are chemical solutions available to meet these challenges.

Donaldson DT grades of Synteq media utilize a blend of borosilicate glass fiber whose matrix is bonded together with an epoxy-based resin system. Donaldson filter media scientists found this to provide the best available chemical resistance for the broadest array of hydraulic, fuel, and lube oil filtration applications.

Donaldson DT Synteq™ Media



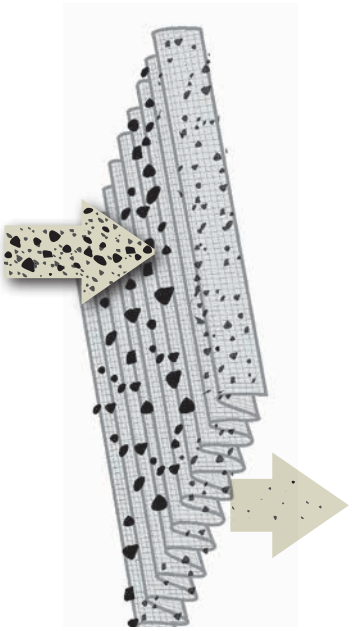
Wire Mesh Media

Wire mesh media consists of stainless steel, epoxy-coated wire mesh available in 3 mesh sizes:

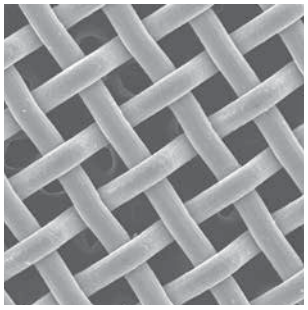
- 100 mesh yields 150 µm filtration
- 200 mesh yields 74 µm filtration
- 325 mesh yields 44 µm filtration

Typically wire-mesh filters will be applied to catch very large, harsh particulate that would rip up a normal filter. You may also find this media useful as a coarse filter in viscous fluid applications.

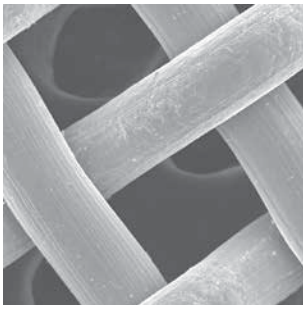
HOW IT WORKS



SEM 60X



SEM 100X

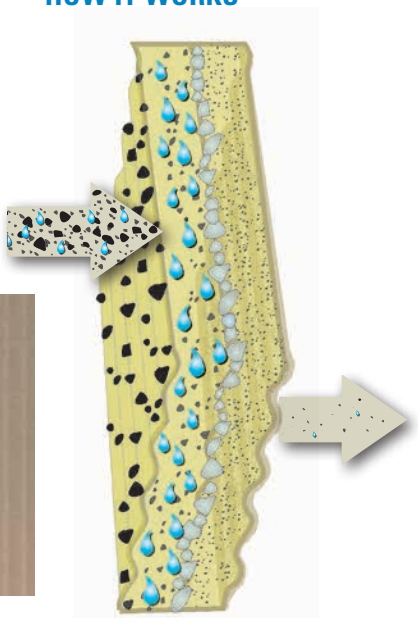


MEDIA IMAGE

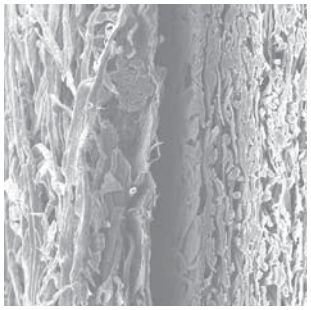
Water Absorbing Media

Water absorption media quickly and effectively removes free water from hydraulic systems. Using super-absorbent polymer technology with a high affinity for water absorption, this media alleviates many of the problems associated with water contamination found in petroleum-based fluids.

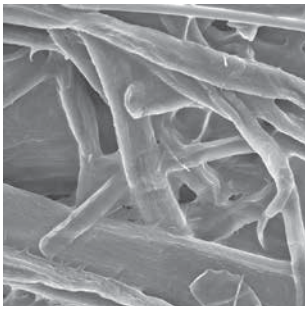
HOW IT WORKS



SEM 100X



SEM 600X



MEDIA IMAGE

Donaldson Filter Media Efficiency Ratings per ISO 16889 Test Standards

ISO 16889 is the international standard for Multi-Pass Testing to determine the efficiency (beta rating or beta ratio) and the dirt-holding capacity of the filter. It replaced the ISO 4572 test standard.

Donaldson filter media has been re-tested per the new standard and the current beta ratios are shown at right. New beta ratios are shown at 2, 200 and 1000, with a (c) to indicate test adherence to the ISO 16889 standard and traceability to NIST test dust.

Fluid to be Filtered	Recommended Media
Petroleum-based	Synteq or Cellulose
Phosphate Ester	DT Synteq
Diester	Synteq
Water Glycol	DT Synteq
Water-Oil Emulsion	Synteq
Biodegradable Fluid	Synteq
HWCF (high water content fluids)	Synteq
Coarse Filtration	Wire Mesh

Donaldson Filter Media Efficiency Ratings Per ISO 16889 Test Standards

$ß_{x(c)} = 2$	$ß_{x(c)} = 200$	$ß_{x(c)} = 1000$
Donaldson DT Synteq Synthetic Media		
<4 µm	<4 µm	<4 µm
<4 µm	4 µm	5 µm
<4 µm	6 µm	8 µm
<4 µm	9 µm	12 µm
7 µm	18 µm	23 µm
Donaldson Synteq XP™ Synthetic Media		
<4 µm	4 µm	6 µm
<4 µm	8 µm	11 µm
<4 µm	11 µm	15 µm
Donaldson Synteq™ Synthetic Media		
<4 µm	<4 µm	<4 µm
5 µm	10 µm	13 µm
6 µm	16 µm	22 µm
7 µm	18 µm	23 µm
14 µm	>42 µm	50 µm
Donaldson Cellulose Media		
5 µm	18 µm	24 µm
7 µm	19 µm	23 µm
17 µm	>40 µm	>40 µm
27 µm	>40 µm	>40 µm
Donaldson Water Absorbing Media		
10 µm		
Donaldson Wire Mesh Media		
45 µm		
60 µm		
75 µm		
90 µm		
125 µm		
150 µm		

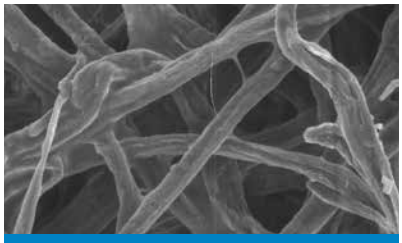
Hydraulic Filtration Pressure Drop

The difference between the inlet pressure and the outlet pressure is called pressure drop or differential pressure. It's symbolized by ΔP. ΔP is an irrecoverable loss of total pressure caused by the filter, and is mostly due to frictional drag on the fibers in the media.

Differential drop may increase as the particulate rating or efficiency of the filter (as expressed by its beta ratio) gets better. ΔP also increases as the filter is being loaded with contaminant.

Four Major Factors Contribute to Pressure Drop

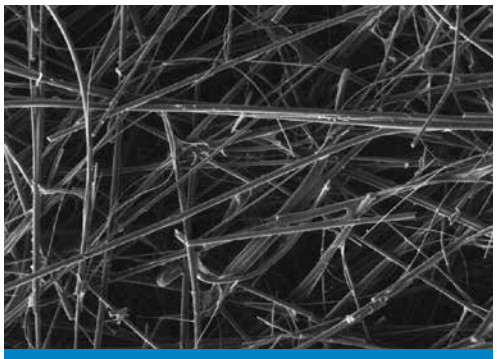
1. Filter Media



Natural Fiber Cellulose media, as seen under the scanning electron microscope.

Media is, of course, the main factor influencing pressure drop; indeed, it causes pressure drop. That's why having a low-friction, high-flowing media is so important. The natural cellulose or paper fibers (shown at left) typically used in filtration are large, rough, and as irregular as nature made them.

Donaldson developed a synthetic media with smooth, rounded fibers, consistently shaped so that we can control the fiber size and distribution pattern throughout the media mat, and still allow the smoothest, least inhibited fluid flow. Our synthetic media is named Synteq™.

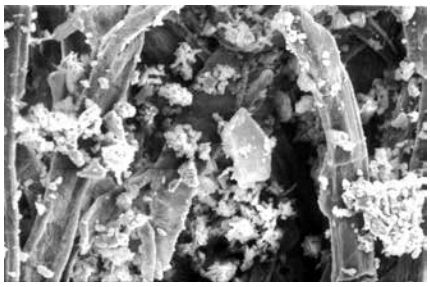


Donaldson's synthetic Synteq filter media — photo from scanning electron microscope — magnified hundreds of times.

Synteq fibers offer the least amount of resistance to fluid passing through the media. Consistency of fiber shape allows the maximum amount of contaminant-catching surface area and specific pore size control. The result is media with predictable filtration efficiencies at removing specified contaminants (e.g., 4 µm) and maximum dirt holding capacity. Natural cellulose fibers are larger than synthetic fibers and jagged in shape, so controlling size of the pores in the media mat is difficult and there is less open volume. In most applications this results in higher ΔP as compared to synthetic filters. Higher beta ratings mean there are smaller pores in the media; smaller media pores cause more flow resistance, in turn causing higher pressure drop.

2. Dirt, Contaminant

As dirt gets caught in the media, it eventually begins to build up and fill the pore openings. As the pore openings shrink, the differential pressure (pressure drop) increases. This is called restriction. This photo from our scanning electron microscope shows actual dirt particles building up in the media pores.



Excessive dirt in the media can cause dirt migration or even filter failure. Dirt migration occurs when the restriction is so great that the differential pressure pushes dirt deeper into the media and, eventually, through the media and back into the system. Filter failure occurs when the restriction becomes so high that the filter cartridge collapses (outside-in flow) or bursts (inside-out flow) to relieve the upstream pressure.

To avoid such catastrophe, use of a filter service indicator is recommended. It measures the pressure drop across the filter, then signals when the filter is 'full' and needs to be changed.

3. Flow

Higher flows create higher pressure drop. With fast moving fluid, there will be more friction causing higher pressure drop across the media.

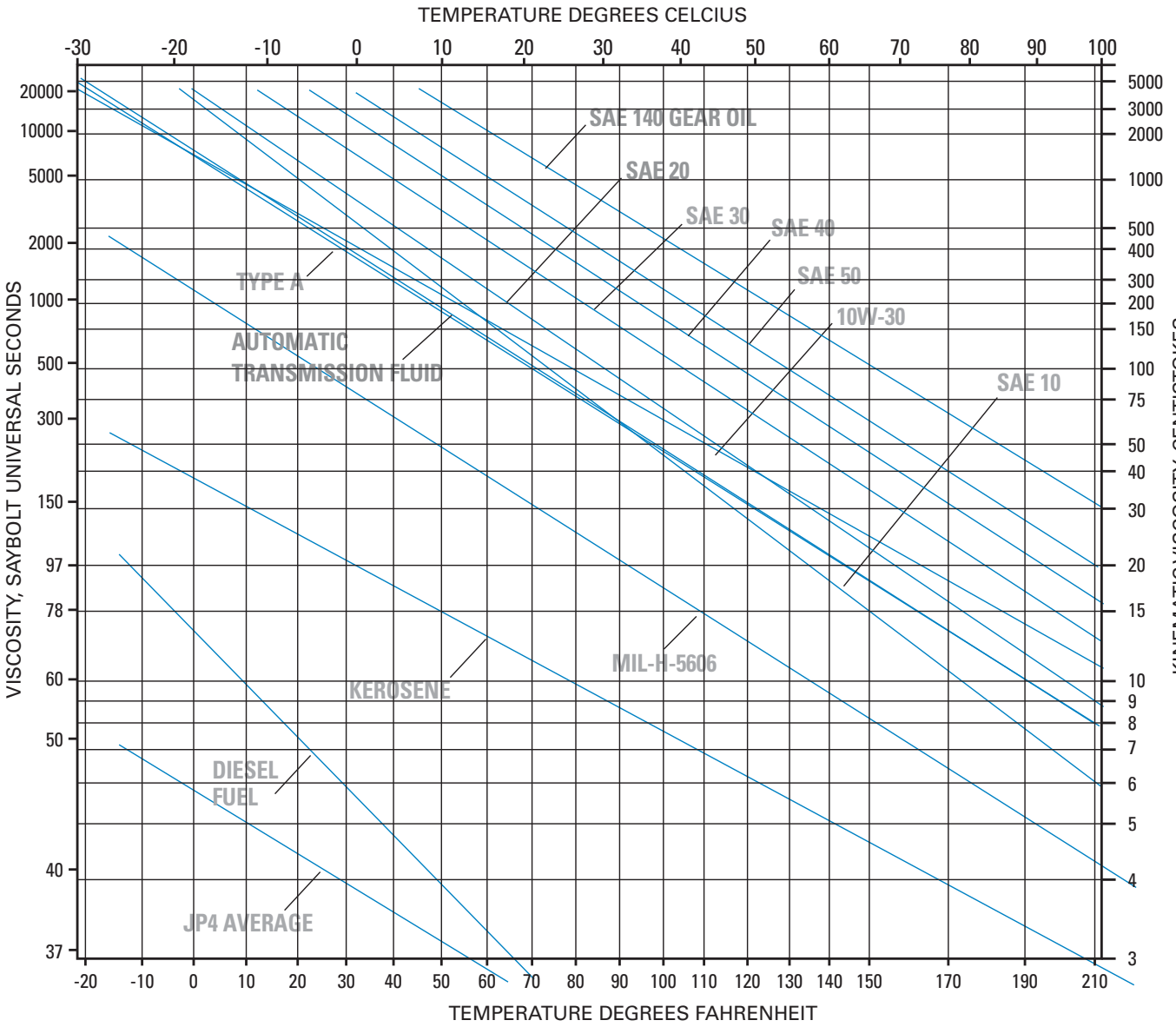
4. Fluid Viscosity

Measured in centistokes (cSt) or Saybolt Seconds Universal (SSU or SUS), fluid viscosity is the resistance of a fluid to flow. As fluid viscosity increases, the cSt rating increases. Higher fluid viscosities also mean higher pressure drop because the thicker oil has a tougher time passing through the layer of media fibers. Cold start fluid is a good example of highly viscous fluid. See chart below.

Filter media, amount of contamination, the flow rate, and fluid viscosity are all factors in the importance of sizing the filter for the system requirements. Filters that are too small won't be able to handle the system flow rate and will create excessive pressure drop from the start. The results could be filter operation in the bypass mode, filter failure, component malfunction, or catastrophic system failures. Filters that are too large for the system can be too costly. Oversized filters require more system oil and higher cost replacement filters. Optimal sizing is best.

Viscosity/Temperature Chart

A.S.T.M. Standard Viscosity-Temperature Chart for Liquid Petroleum Products (D 341-43) Saybolt Universal Viscosity



Filter Design and Construction

There are two main differences in a filter. The first is the design of the filter itself, and the second is the type of media that is used in the filter.

Filter

Filters have some attributes that are immediately obvious to the casual observer, such as height, inside diameter, outside diameter, media concentration, type of liner, seal design, and the way the media and components are glued or potted together.

Liners

Liners must be structurally sturdy to withstand pressure variance, yet open enough to allow good flow.

Seals

The top seal design must be leak-free, with a gasket or sealing device that ensures a good seal throughout the life of the filter. Standard seals are made of Buna-N® material, which is fine for most applications. However, if the filtered fluid is diester or phosphate ester fluid, you'll need a seal made of a fluoroelastomer such as Viton®.

Buna-N® and Viton® are registered trademarks of E. I. DuPont de Nemours and Company.

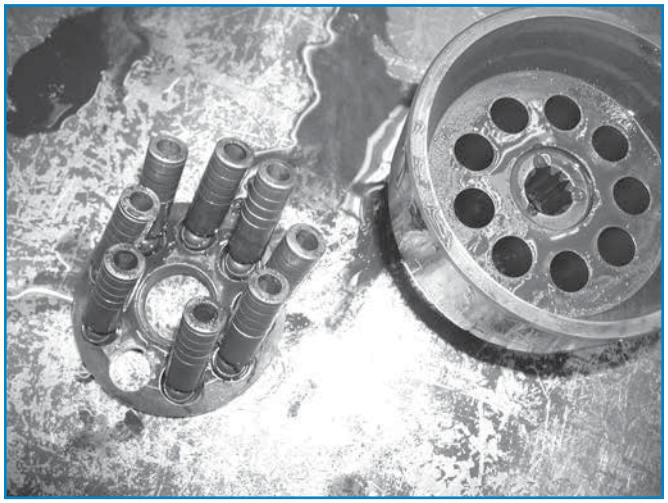
Media Potting

Media potting is key since it holds the media in place in between the end caps (not visiable). Not only should the potting be fully around the ends of the media to prevent leaks, it should also be of a material that can withstand the application. For instance, epoxy potting should be used in filters that must perform in higher temperature environments, phosphate ester fluids and some high water based fluids.

Inside the filter, the media can vary in thickness, pleat depth and pleat concentration.

For example, Donaldson hydraulic filters are generally equipped with either white ("Synteq™" our synthetic material) or natural brown (paper or cellulose material) media. *It is important to note that media colors vary according to each manufacturer—it should not be assumed that any white-colored media is made of synthetic material.*

Some of the most important characteristics of filter media (structure, fiber diameter, volume solidity, basis weight, thickness, layering) can only be detected under a microscope.



Damaged Equipment

Damage happens when key filtration points are ignored! The pistons in this pump are severely damaged from contamination in the oil.

Combining the ISO Rating and Filter Performance Ratings

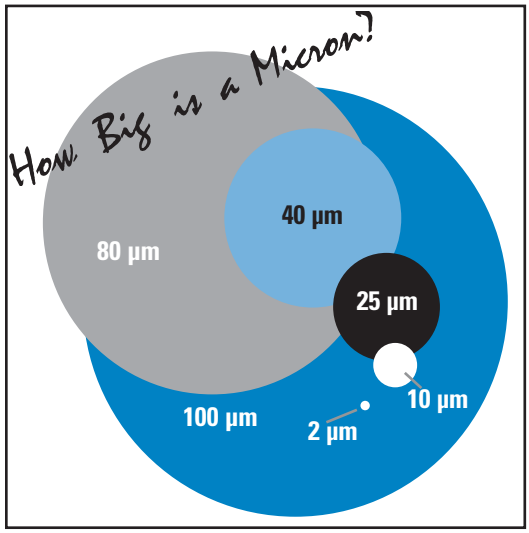
While filter manufacturers publish beta ratings for filter media to describe efficiency performance levels, a direct connection between the beta rating scale and the ISO rating scale cannot be made.

The solution is monitoring filter media performance at removing particles in the 4 µm, 6 µm, and 14 µm ranges. Fluid analysis and field monitoring are the only ways to get these measurements. Combine data from several tests to form a range of performance. Remember, actual filter performance will vary between applications.

Here's how to determine which filter media will best protect your hydraulic components: plot any media performance range on the Application Guide to Donaldson Filter Media, then connect the dots to make a line. On the same graph, plot your component requirement. (Reference chart below for some popular components, or ask your supplier for the recommended ISO rating.) If the line of the media falls below the ISO line, or if the bottom line of the filtration range does not intersect the ISO line, the component will be protected.

Micron Sizes of Familiar Particles

Grain of table salt	100 µm
Human hair	80 µm
Lower limit of visibility	40 µm
White blood cell	25 µm
Talcum powder	10 µm
Red blood cell	8 µm
Bacteria	2 µm
Silt	<5 µm



Typical ISO Cleanliness

Here are some typical ISO cleanliness recommendations from component manufacturers. (These are guidelines; always check the ratings specified by the manufacturer of your specific components.)

Pressure	<3000 PSI ≤210 Bar	>3000 PSI >210 Bar
Pumps	--- ISO RATINGS ---	
Fixed Gear Pump	19/17/15	18/16/13
Fixed Vane Pump	19/17/14	18/16/13
Fixed Piston Pump	18/16/14	17/15/13
Variable Vane Pump	18/16/14	17/15/13
Variable Piston Pump	17/15/13	16/14/12
Valves		
Directional (solenoid)	20/18/15	19/17/14
Pressure (modulating)	19/17/14	19/17/14
Flow Controls (standard)	19/17/14	19/17/14
Check Valves	20/18/15	20/18/15
Cartridge Valves	20/18/15	19/17/14
Load-sensing Directional Valves	18/16/14	17/15/13
Proportional Pressure Controls	18/16/13	17/15/12*
Proportional Cartridge Valves	18/16/13	17/15/12*
Servo Valves	16/14/11*	15/13/10*
Actuators		
Cylinders	20/18/15	20/18/15
Vane Motors	19/17/14	18/16/13
Axial Piston Motors	18/16/13	17/15/12
Gear Motors	20/18/15	19/17/14
Radial Piston Motors	19/17/15	18/16/13

* Requires precise sampling practices to verify cleanliness levels.
Source: Vickers

Media Application Guide and ISO Rating System

The Application Guide for Donaldson Filter Media on the next page provides a data format for rating fluid contamination level and plotting filter media performance.

The vertical numbers on the left side of the chart represent particle counts in a logarithmic progression of ten: .01, .1, 1,10, 102, 103, 104, 105 and 106. (This represents the number of particle in the oil sample at the given size.) The numbers across the bottom of the chart represent particle size in microns.

Donaldson media efficiency performance levels are derived from the ISO 16889 test standard with NIST-certified on-line automatic particle counters and ISO medium test dust. The Donaldson media efficiency performance levels shown are based on test averages under steady flow conditions. Actual performance levels may vary by application, viscosity, flow variance and contamination differences. Contact Donaldson or your Donaldson distributor for specific application calculations. The international rating system for fluid contamination levels is called the ISO contamination code and it is detailed in the ISO 4406 document. Most component manufacturers publish filtration level recommendations using the ISO code. The ISO code, located on the right side of the media application guide on the next page, is easy to use if you remember the 4 µm, 6 µm and 14 µm numbers along the bottom of the chart.

Manufacturer's ISO contamination levels are based on controlling the particle counts of 4 µm, 6 µm and 14 µm particles in hydraulic system oil. This level is identified by measuring the number of particles 4µm and greater, 6 µm and greater, and 14 µm and greater in one milliliter of the system hydraulic oil sample.

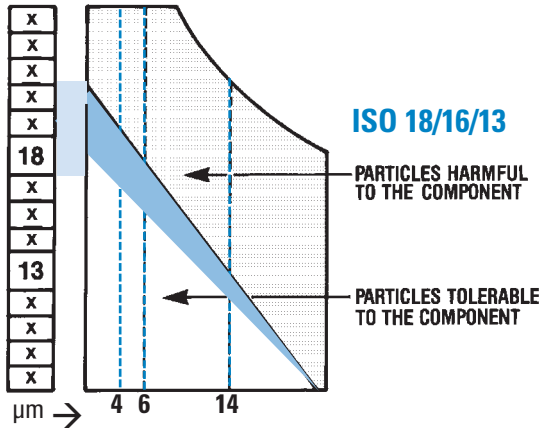
How to Use the ISO Rating

Example: A cartridge valve manufacturer recommends an ISO cleanliness level of 18/16/13.

1) On the Application Guide for Donaldson Filter Media on the next page, place a dot on the vertical 4 µm line, horizontally even with the 18 box of the ISO code.
2) Place a dot on the vertical 6 µm line horizontally even with the16 box of the ISO code.
3) Place a dot on the vertical 14 µm line horizontally even with the13 box of the ISO code.
4) Connect the dots to get the ISO cleanliness level 18/16/13.

As illustrated below, particle counts falling on and above the 18/16/13 line are damaging to the component and exceed the 18/16/13 specification set by the manufacturer.

Select a Donaldson media that falls below 18/16/13 to achieve cleanliness level tolerable to the component.



ISO 4406 Contamination Code

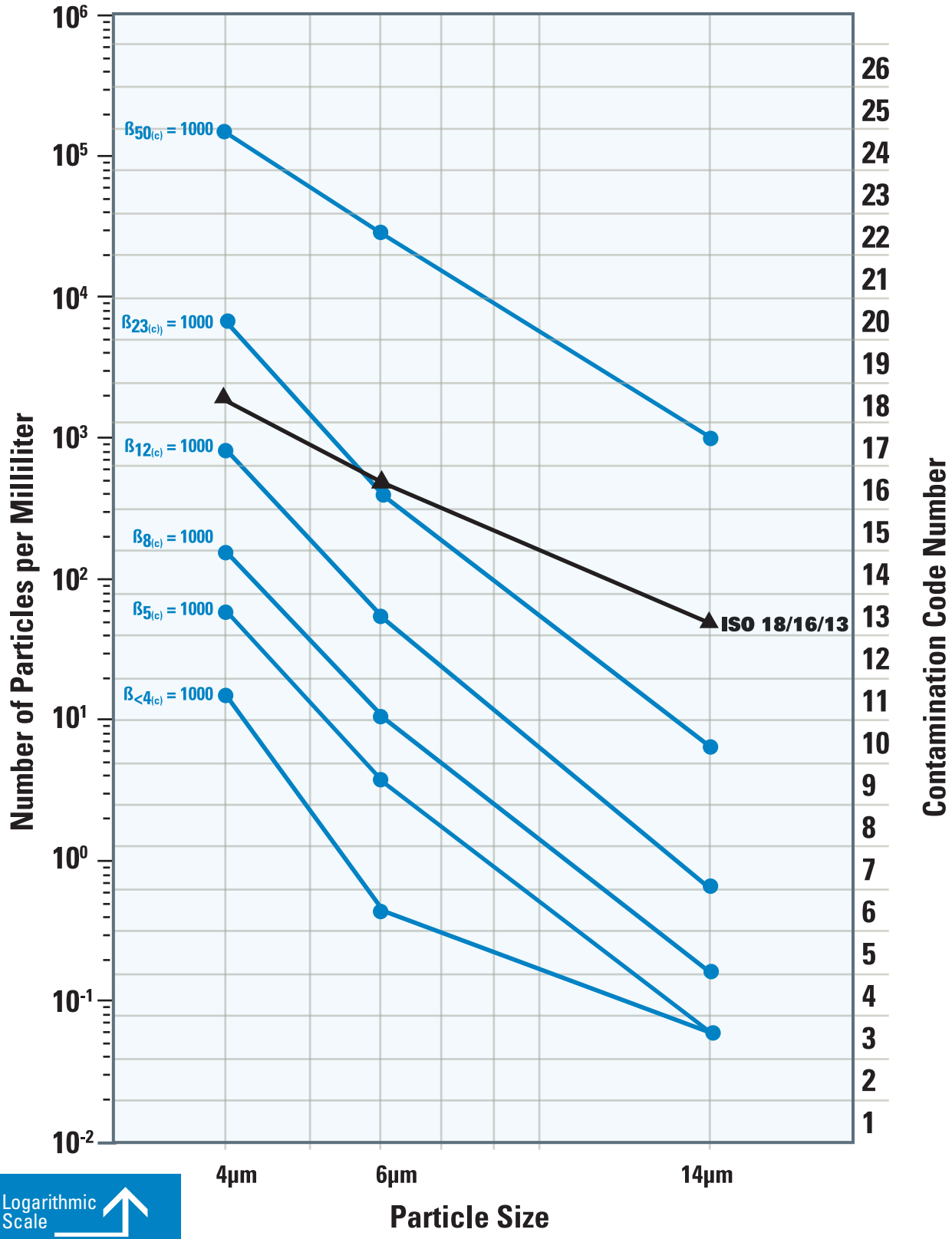
This correlates to the numbers in the boxes along the right side of the graph on the next page.

Range of number of particles per milliliter:

Code	More Than	Up to & Including
24	80,000	160,000
23	40,000	80,000
22	20,000	40,000
21	10,000	20,000
20	5,000	10,000
19	2,500	5,000
18	1,300	2,500
17	640	1,300
16	320	640
15	160	320

Code	More Than	Up to & Including
14	80	160
13	40	80
12	20	40
11	10	20
10	5	10
9	2.5	5
8	1.3	2.5
7	.64	1.3
6	.32	.64

Application Guide for Donaldson Synthetic Filter Media



Donaldson FILTRATION SOLUTIONS

Filter Efficiency Standards

Understanding the Beta Rating System

This information is provided as an aid to understanding fluid filter efficiency terminology based on current ISO, ANSI and NFPA test standards. It is not proprietary and may be reproduced or distributed in any manner for educational purposes.

What is Beta Ratio?

Beta ratio (symbolized by ß) is a formula used to calculate the filtration efficiency of a particular fluid filter using base data obtained from multi-pass testing.

In a multi-pass test, fluid is continuously injected with a uniform amount of contaminant (i.e., ISO medium test dust), then pumped through the filter unit being tested. Filter efficiency is determined by monitoring oil contamination levels upstream and downstream of the test filter at specific times. An automatic particle counter is used to determine the contamination level. Through this process an upstream to downstream particle count ratio is developed, known as the beta ratio. The formula used to calculate the beta ratio is:

$$\text{Beta ratio}_{(x)} = \frac{\text{particle count in upstream oil}}{\text{particle count in downstream oil}}$$

where (x) is a given particle size

Indicates that testing was done with APC's calibrated with NIST fluid

$$ß_{10(c)} = 1000$$

1000 times more particles upstream than downstream that are 10 µm and larger

Why the Efficiency Rating Test Standard was Updated

The International Industry Standard (ISO) for multi-pass testing provides a common testing format for filter manufacturers to rate filter performance. This standardization gives you the ability to reliably compare published filter ratings among different brands of filters.

ISO test standards were updated in 1999 to reflect the improved technology available in particle counters and other test equipment. The newer particle counters provide more precise counting and greater detail—reflecting a truer indication of filter performance.

The National Fluid Power Association (NFPA), the National Institute of Standards & Technology (NIST), and industry volunteers, including several engineers from Donaldson, helped revise the ISO standard. ISO 16889 has been in force since late 1999 and ISO 4572 is officially discontinued.

Better Test Dust

The old test dust (AC fine test dust or ACFTD) was "ball milled," which produced dust particles of varying size and shape. Particle distribution was often different from batch to batch. The accuracy of ACFTD distribution and previous APC calibration procedure was questioned by industry, due to lack of traceability and certification. ACFTD hasn't been produced since 1992.

Now, the new test dust (ISO medium test dust) is "jet milled" to produce consistent particle size, shape, and distribution from batch to batch. See dust size comparison chart on the next page.

Liquid Automatic Particle Counters (APC's)

In the old test standard (ISO 4572), fluid samples obtained in bottles and off-line particle counting were allowed. Now, in the updated standard ISO 16889), on-line, laser-based automatic particle counters, especially made for measuring liquids, are required and bottle counting methods are disallowed, as illustrated on next page.

Find further information on ISO 16889 at www.NFPA.com or your ISO document source. Ask for ISO/TR16386: 1999 "The Impact of Changes in ISO Fluid Power Particle Counting—Contamination Control and Filter Test Standards."

The old particle counter calibration was based on only one dimension of an irregularly-shaped particle (the longest cord). Today, the particle counter calibration is based on equivalent spherical area of an irregularly-shaped particle.

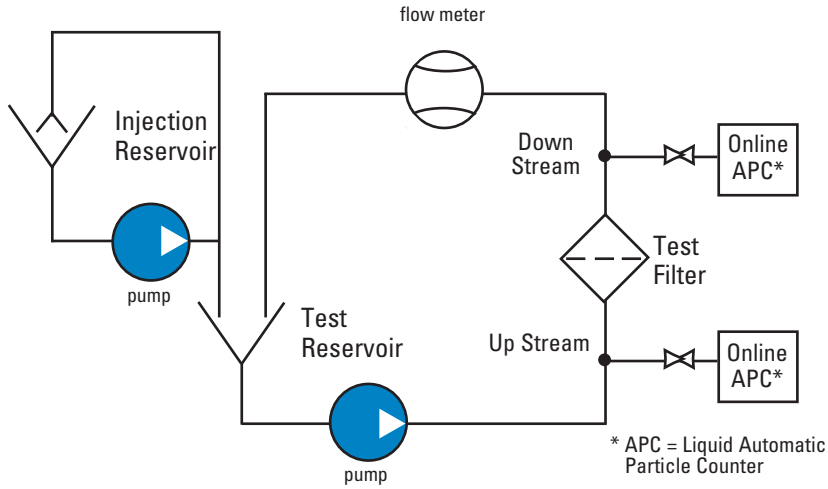
NIST provides calibration suspension, which is certified with X number of particles at a certain size. This is verified by NIST. The new way to list beta ratios includes a subscript (c) to indicate NIST certified test suspension and assures you of traceability and repeatability.

Overall, you can have strong confidence in filter ratings resulting from tests per ISO 16889, as they are highly accurate. As always, keep in mind that beta ratings are laboratory measurements under steady flow conditions with artificial contaminants — the real proof of the performance is how clean the filter keeps the fluids in the application. A good oil analysis program that checks the cleanliness of the oil periodically will verify that the proper filters are being used.

Test Dust Size Comparisons

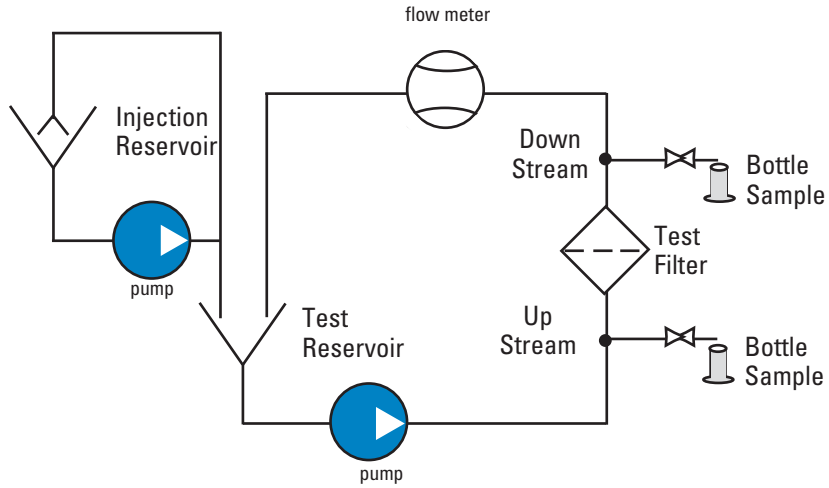
ACFTD calibrated size (µm) per ISO 4402 corresponds to a NIST-calibrated size [$\mu m_{(c)}$] per ISO 11171

ACFTD	0.8	1	2	2.7	3	4.3	5	7	10	12	15	15.5	20	25	30	40	50
NIST	4	4.2	4.6	5	5.1	6	6.4	7.7	9.8	11.3	13.6	14	17.5	21.2	24.9	31.7	38.2



ISO 16889

- In-Line Liquid Automatic Particle Counters (APC) are now required for proper testing.
- APC calibration follows ISO 11171 procedures
- ISO 11171 uses NIST (National Institute of Standards & Technology) certified calibration fluid



ISO 4572
(Discontinued)

- Either bottle samples or APC's were allowed.
- APC calibration followed ISO4402 ACFTD (Discontinued)

Highlights of ISO 16889

- ISO 4572 is now replaced by ISO 16889 as the international standard for Multi-Pass Tests to determine the efficiency (beta rating or beta ratio) and the dirt-holding capacity of the filter.
- The test bench for ISO 16889 must have On-Line Liquid Automatic Optical Particle Counters (APC) calibrated using NIST (National Institute of Standards & Technology)-certified calibration fluid. This includes added enhancements to APC's, to allow for better resolution, accuracy, repeatability and reproducibility.
- ISO 12103-1,A3 (ISO Medium, 5µm-80µm
- Test Dust was selected as replacement dust for calibration and testing procedures.
- APC's are calibrated by passing a sample of calibration fluid with a known particle size distribution and producing a calibration curve to match the known count distribution.
- NIST used the Scanning Electron Microscope analysis and statistical analysis techniques to certify the particle size distribution.
- Particle counts, upstream and downstream, are taken every minute of the test.
- Beta ratios are reported with (c) to designate NIST traceability.

ISO 16889 recommends reporting beta ratings at:

Rating	Efficiency
2	50%
10	90%
75	98.7%
100	99%
200	99.5%
1000	99.9%

Example: $ß_{4(c)}$ **=200** signifies that there are 200 times as many particles that are 4 µm and larger upstream as downstream. This is **99.5% efficiency**.

Example: $ß_{5(c)}$ **=1000** indicates that there are 1000 times as many particles that are 5 µm and larger upstream as downstream. This is **99.9% efficiency**.

Donaldson Hydraulic Filter Media Beta Ratings

Donaldson hydraulic filter media beta ratings are average ratings obtained from multi-pass tests performed per the new ISO 16889 standard.

According to the ISO standard, each filter manufacturer can test a given filter at a variety of flow rates and terminal pressure drop ratings that fit the application, system configuration and filter size. Your actual performance may vary depending on the configuration of the filter tested and test conditions.

Donaldson Filter Media Efficiency Ratings Per ISO 16889 Test Standards

$ß_{x(c)} = 2$	$ß_{x(c)} = 200$	$ß_{x(c)} = 1000$
Donaldson DT Synteq Synthetic Media		
<4 µm	<4 µm	<4 µm
<4 µm	4 µm	5 µm
<4 µm	6 µm	8 µm
<4 µm	9 µm	12 µm
7 µm	18 µm	23 µm
Donaldson Synteq XP™ Synthetic Media		
<4 µm	4 µm	6 µm
<4 µm	8 µm	11 µm
<4 µm	11 µm	15 µm
Donaldson Synteq™ Synthetic Media		
<4 µm	<4 µm	<4 µm
5 µm	10 µm	13 µm
6 µm	16 µm	22 µm
7 µm	18 µm	23 µm
14 µm	>42 µm	50 µm
Donaldson Cellulose Media		
5 µm	18 µm	24 µm
7 µm	19 µm	23 µm
17 µm	>40 µm	>40 µm
27 µm	>40 µm	>40 µm
Donaldson Water Absorbing Media		
10 µm		
Donaldson Wire Mesh Media		
45 µm		
60 µm		
75 µm		
90 µm		
125 µm		
150 µm		

Cleanliness Level Correlation Table

Conversion of cleanliness specifications to filter performance is not an exact science because the contamination level in a hydraulic system is a function of the ingression and generation rate as well as the filter performance.

Factors That Affect Cleanliness Levels in a Hydraulic System

- Abrasive wear in space between adjacent moving surfaces of components.
- Erosive wear at component edges or direction changes where there is high fluid velocity.
- Fatigue wear by particles trapped between moving surfaces.

Identification of the Most Sensitive Component

- Required cleanliness level is dominated by the component with smallest clearances and/or highest loading on the lubricating film.
- Best source for determining this level is the specification published by the component manufacturer.
- Higher pressures reduce component life, unless contamination level is decreased accordingly.
- Operating at half the rated pressure of component will increase its life by more than four times.
- Percent of operating time at maximum pressure depends on individual machines and application.

ISO Code	Particles Per Milliliter >10 microns	ISO FTD* Gravimetric Level (mg/l)	Mil Std 1236A (1967)	NAS 1638 (1964)	SAE Level (1963)
30/26/23	140,000	1000			
29/25/23	85,000		1000		
26/25/20	14,000	100	700		
23/21/18	4,500			12	
2220/18	2,400		500		
22/20/17	2,300			11	
21/20/17	1,400	10			
21/19/16	1,200		10		
20/18/15	580			9	6
19/17/14	280		300	8	5
18/16/13	140	1		7	4
17/15/12	70			6	3
16/14/12	40		200		
16/14/10	35			5	2
15/13/10	14	0.1		4	1
14/12/9	9			3	0
13/11/8	5			2	
12/10/8	3		100		
12/10/7	2.3			1	
11/10/6	1.4	0.01			
11/9/6	1.2			0	
10/8/5	0.6			0	
9/7/5	0.3		50		
8/6/3	0.14	0.001			
7/5/2	0.04		25		
6/2/.8	0.01		10		

* SAE Fine Test Dust — ISO approved test and calibration contaminant.
Source: Milwaukee School of Engineering Seminar, Contamination & Filtration of Hydraulic Systems

Compatibility of Donaldson Filter Media with Hydraulic Fluids

While Donaldson has developed many formulations of media, they can be divided into two broad categories: natural fibers, usually cellulose, and synthetic or man-made fibers.

	Recommended Filter Media		
Petroleum-Based (Hydrocarbon) Fluids	Cellulose	Synteq	DT Synteq
Straight oils	Yes	Yes	Yes
ATFs	Yes	Yes	Yes
Military hydraulic fluids	Yes	Yes	Yes
#2 Diesel fuel	Yes	Yes	Yes
Gasoline	Yes	Yes	Yes
E85 (85/15 Ethanol/Gasoline)	No	No	Yes
Fire Resistant Fluids	**Cellulose**	**Synteq**	**DT Synteq**
HFA - Oil-in-water emulsion	No	<150°F	Yes
HFB - Water-in-oil emulsion	No	<150°F	Yes
HFC - Water glycol	No	<150°F	Yes
HFD Synthetics - Polyol esters, Esters, Diesters, & blends	No	Yes	Yes
HFD Synthetics - Phosphate esters	No	No	Yes
HFD Synthetics - Polyalkylene glycols (PAG), Polyalphaolefins (PAO), & blends	No	Yes	Yes
HFD Synthetics - Silicone (siloxane) oil	No	Yes	Yes
Biodegradable Fluids	**Cellulose**	**Synteq**	**DT Synteq**
Vegetable-based oils - sunflower, rapeseed oils	No	Yes	Yes
Synthetic oils - PAG / PAO	No	Yes	Yes
Synthetic oils - Esters, Diesters	No	Yes	Yes

Piston Pump Damage

The severe score marks on the piston slippers leave no question about why good hydraulic filtration is important.

A Note on Seals

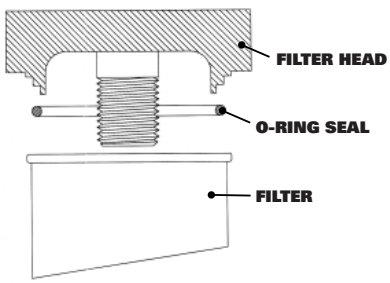
- Filters with seals made of Buna-N® are appropriate for most applications involving petroleum oil and some high water content fluids. Filters with seals made of Viton® or Fluorel® (both fluoroelastomers) are required when using diesters, phosphate ester fluids. Donaldson offers both types. EPR (ethylene propylene rubber) seals are required for use with Skydrol® and Skydrol 500 fluids.

  Buna-N® and Viton® are registered trademarks of E. I. DuPont de Nemours and Company. Skydrol is a registered trademarks of Solutin, Inc.

- In Donaldson filters with fluorocarbon elastomer seals, epoxy potting is used to accommodate higher temperature environments and for compatibility with fluids such as phosphate ester, diesters, and high water based fluids. The plastisol (heat cured) and urethane (self curing) potting materials used in other filters perform well with petroleum-based fluids.

Seal Installation Instructions

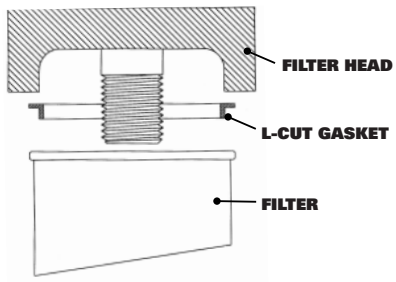
- Use only one of the following seals and the corresponding installation method. Dispose of used filter properly.
- Over-tightening filter may damage head.
- Dispose of used filter properly



O-Ring Seal

For use with filter heads with stepped profiles.

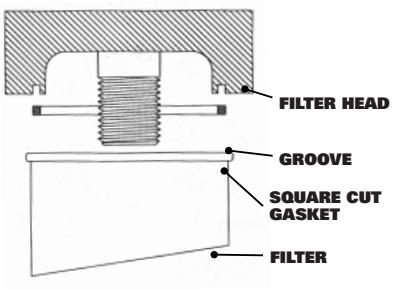
1. Remove used o-ring and clean sealing surface. Apply clean oil to new o-ring.
2. Install new o-ring on inside lip of filter.
3. Spin on new filter until o-ring makes contact. Tighten filter until top edge makes metal to metal contact with filter head – approximately 1½ additional turns.



L-Cut Gasket

For use with filter heads with no groove or wide groove.

1. Remove used gasket and clean sealing surface. Apply clean oil to new gasket surfaces.
2. Install new gasket on inside lip of filter or groove in filter head.
3. Spin on new filter until gasket makes contact. Tighten filter element an additional ¾ turn.



Square-Cut Gasket

For use with filter heads with narrow grove.

1. Remove used gasket and clean groove in filter head. Apply clean oil to new gasket surfaces.
2. Install new gasket into groove in filter head.
3. Spin on new filter until gasket makes contact. Tighten filter element an additional ¾ turn.

How to Best Position Filters in Your Hydraulic Circuit

Within every hydraulic circuit there are many possible places for filters.

The best systems are strategically engineered to ensure that oil is filtered properly at each stage of its journey through the circuit. Ideally, filtration should occur in the following places:

- In the Reservoir
- Before/After the Pump
- In the Return-line System
- Off-line

In reality, many companies have to make tough decisions about which filters they can afford and which ones they'll have to live without.

Much depends on the cleanliness level requirements of the components, environment, duty cycle of the equipment and other variables that can vary from application to application.

Portable Kidney Loop Filter Cart

Kidney Loop Filters

Benefit: High

Sometimes referred to as "off-line" filters, kidney loop filters achieve very fine filtration by maintaining steady-state flow, independent of the hydraulic circuit.

With this type of filtration, the entire hydraulic system can keep operating while the kidney loop filter is being serviced.

A kidney loop filter utilizes low-pressure housings that are easily accessible and serviceable. These filters can either be integrated into the main hydraulic reservoir, or used in mobile filter carts like the one shown at left to service many hydraulic systems.

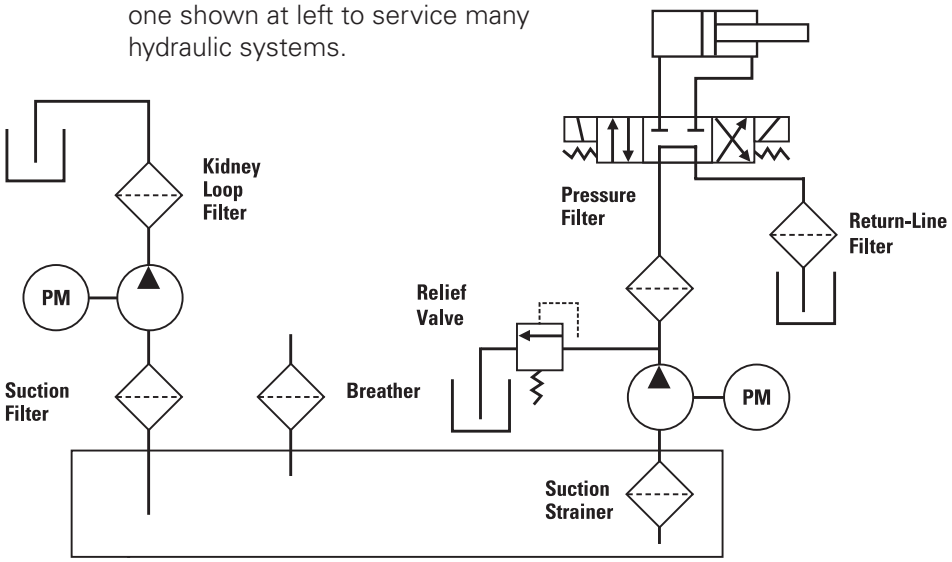
Note that kidney loop filters do not directly protect components — rather, their main function is to polish the oil to a very clean condition. It's also important to remember that an additional pump and motor will be required.

Filler / Breather

Benefit: High

Tank breathers are placed on hydraulic reservoirs to prevent atmospheric contamination from entering and to allow for sufficient air movement inside the reservoir. Breathers should prevent particles larger than 3 microns from entering the system. This is a sensible, affordable solution for any hydraulic system, but by all means cannot be the only filter on a hydraulic system.

This diagram shows how various types of filters can be used in hydraulic circuits.



Suction Filter

Benefit: Medium

Normally placed between the reservoir and the pump, suction filters are designed to remove particles in the 5 to 150 micron range. They are easier to service and less expensive than many other types of filters—but because restriction in the suction line must be kept very low, filter housing size tends to be larger than similar flow return or pressure filter housings.

The most popular application for suction filters is with variable-speed hydrostatic pumps commonly found in off-road mobile applications and industrial variable-speed drives. They are also often used in harsh environments and charge pump applications.

Suction Strainer

Benefit: Low

Suction strainers, or sump-type filters, are often used in hydraulic fluid reservoirs. Their only real use is to keep cigarette butts, moths, nuts & bolts and the like out of the pump. Instead, such contaminants can easily be eliminated by keeping the reservoir sealed and by using a Filler/Breather and Return-Line Filter.

Return-Line Filter

Benefit: High

The advantages of return-line filters are many. They are usually low-pressure housings, which are less typically expensive. Their purpose is to collect the dirt from around the circuit as the oil returns to the reservoir. Much like the kidney loop, the return-line filter provides ultimate flexibility in positioning — it can perform almost anywhere within the return line circuit, either mounted inline or built into the reservoir.

Downsides are few, but worth noting: return-line filters can be subject to flow surges (which contribute to poor filter performance) and they do not filter the drain lines.

Note regarding return-line and kidney-loop filtration:
If you're looking for a great value filter that's easy to maintain and with lots of media choices, this is a wise investment. Although these filters are very common, one downside is that there are very few standards of consistency from one manufacturer to the next, so replacement cartridges are not necessarily interchangeable.

Pressure Filter

Benefit: High

This is also known as "last-chance" filtration. High pressure filters keep clean the oil that comes directly from the pump so that the more expensive downstream components (such as valves and actuators) are protected. Pressure line filters offer protection from catastrophic pump failure. They are a worthwhile investment for high-value systems — as are found in the aircraft industry, paper and steel mills, plastic injection molding, and in die-casting machines.

One downside to high pressure filters is, ironically, the high pressure. The entire system must be stopped in order to service a high-pressure filter — unless a duplex configuration is used. When oil is shooting out of a pump at 6000+ psi, it will take out anything in its way! By nature, a high-pressure pump is a prime mover of fluids, so it will experience significant wear over time. Service can also be more difficult because of its heavy-duty construction—as anyone who's ever tried to change a slippery, 200-pound cast-iron filter can attest.

HYDRAULIC FILTRATION FOR VEHICLES/EQUIPMENT
APPLICATION DESIGN WORKSHEET

For proper development/design engineering solution, we ask you to provide details about your engine, project due dates, hydraulic or transmission system and performance (mechanical and filtration), system mounting, service, final packaging and product markings. When completed, please forward to Donaldson.
Email: engine@donaldson.com

Customer Name:		**Revision:**
Project Name:		
Contact Name:		**Title:**
Phone:	**Fax:**	**Email:**
Current Donaldson Model Used: (if applicable)		**Customer Part Number:**
Target Cost:		

Project Details

Type of Vehicle/Machine: _____
Units Per Year: _____
Key Project Dates:

Design Proposal: _____
Quote _____
Sample Delivery: _____
Design Freeze: _____
PPAP: _____
Start of Production: _____

Application Information

Components That Need Protection

☐ **Pump** (type?): _____
☐ **Circuit:** ☐ Hydraulic ☐ Pilot
☐ **Transmission**: ☐ Hydrostatic ☐ Powershift

Filter Location:

☐ Suction ☐ Pressure ☐ Return
☐ Side Loop ☐ Charge ☐ Sump
☐ Other: _____

Port Size & Type:

NPT: ☐ 1/2" ☐ 3/4" ☐ 1-1/4" ☐ 1-1/2" ☐ 2-1/2"
SAE O-ring: ☐ -8 ☐ -12 ☐ -16 ☐ -20 ☐ -24
4 Bolt Flange: ☐ 2" SAE ☐ 3" SAE ☐ 4" ANSI
☐ 2" Code 61 ☐ 2-1/2" Code 61
BSP: ☐ 1/2" ☐ 3/4" ☐ 1"
Other: _____
Mounting Requirements:

_____

Operating Conditions

Flow Rates: ☐ lpm or ☐ gpm

Minimum _____ Normal _____ Maximum _____

Oil System Pressure (psi/kPa):

Minimum _____ Normal _____ Maximum _____

Temperature: ☐ ° C or ☐ ° F

Fluid: Min _____ Normal _____ Max _____

Ambient: Min _____ Normal _____ Max _____

Fluid Type:

☐ Petroleum ☐ Water-glycol
☐ Phosphate-ester ☐ HWBF
☐ Other _____

Viscosity: (2 required)

_____ cSt or Ssu @ _____° C Temp

_____ cSt or Ssu @ _____° C Temp

Filtration Performance

ISO Contamination Level Required:

_____

$Beta_{x(c)}$ = 1000: _____ µm

Filter Media: ☐ Synthetic ☐ Cellulose ☐ Wire Mesh

Capacity:

_____ gms ISO Medium @ _____ flow to _____ psid/kPaD

More on next page

Pressure Drop Limits:

Limits	psid/kPaD		Flow (gpm/lpm)		Viscosity
1		@		@	
2		@		@	
3		@		@	

Structural Performance

Hydrostatic Pressure Resistance (Burst):

Test Method: _____

Minimum Value: _____psi / kPa

Collapse Pressure:

Test Method: _____

Minimum Value: _____psid / kPaD

Pressure Testing:

	Min. Cycles	Range (psid)	Frequency (Hz)
Hydrodynamic		to	
Flow Fatigue		to	
Vibration		to	

By-Pass Cracking Pressure

Test Method: _____

Minimum Value: _____ psid / kPa

By-pass Valve: ☐ **In Head** ☐ **In Filter**

Setting: _____ psi / kPa

Leak Testing

Test Method: _____

Minimum Value: _____ psid / kPa

Initial Product Cleanliness

Specifiction/Requirement: _____

Additional Information

Filter Service

Indicator Type: ☐ **Electric** ☐ **Visual**

Type: _____

Indicator Level: _____ psid/kPaD

Filter Change Interval:

_____ ☐ km or ☐ miles or ☐ hours

Do you require installation, service or maintenance recommendations from Donaldson? ☐ Yes ☐ No

Packaging

Do you have any special packaging requirements?

☐ Yes ☐ No If yes, please check all that apply:

Protective caps: ☐ on inlet ☐ on outlet ☐ on port

Final Assembly:

☐ Bulk / Bagged ☐ Bulk/Individual Boxes

☐ Other _____

_____

Product Markings/Identity

Do you have any product marking requirements?

Head Assembly? ☐ Yes ☐ No

Filters? ☐ Yes ☐ No

If yes, artwork it is assumed customer will provide artwork for filter markings. Donaldson can provide marking area for artwork design. Standard installation icons are available from Donaldson.

Special Requirements or Application Notes

Use this area to provide additional information that will assist Donaldson engineering.

For Donaldson Use Only

Date Received: _____ **Request From:** ☐ Catalog ☐ Web

☐ Other _____

Assigned to:

Business Unit: _____ Account Manager: _____

Product Manager: _____ Engineer: _____

Donaldson FILTRATION SOLUTIONS

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PO Box 1299
Minneapolis, MN 55440-1200

Hydraulic Applications Engineering

F115354 (06/17) Rev.3

Donaldson Company, Inc., PO Box 1299, Minneapolis, MN 55440-1299

Part Number Index

Use this section to help guide you to the proper page in this product guide to find more information and details about a individual part. The descriptions shown are, in most cases, abbreviated. Please note: a number of part numbers, such as indicators, are displayed in multiple product family pages.

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