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ENHANCED CLEANLINESS - OPTIMUM PERFORMANCE





In 2011, we started as Smart Filtration Solutions, providing Bulk Fuel and Oil Filtration Solutions for increased uptime and, ultimately, greater profitability. Ultra High Efficiency Filters designed to capture 99.98% of particulate matter in a **Single Pass**. It was the result of a strategic partnership with Donaldson Company, Inc. a leading worldwide provider of filtration systems.

Today we bring two world class brands together under Smart Fuel Solutions: Smart Filtration Solutions & Smart Fuel Storage Solutions. A merge of innovative fuel storage solutions and an impressive range of **Ultra High Efficiency Filters**.

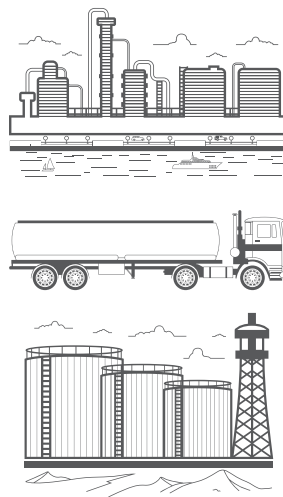
Smart Fuel Storage offers specialization in manufacturing of engineered self-bunded tanks, remote refueling systems, bulk fuel farms and plug & play dispensing solutions. From diesel, petrol, lubricants, HFO, Jet A1 and Avgas storage, we design and manufacture a unique, robust, turnkey, plug & play solution to meet your site requirements.

A handwritten signature in black ink that reads "Mohammad Atif".

Mohammad Atif Manzoor
Managing Partner

Donaldson Company, Inc. is a leading worldwide provider of filtration systems and replacement parts. Since 1915, Donaldson has perfected and leveraged their innovative technology, strong customer relationships and broad geographic presence to meet the diverse and changing needs of their customers. Donaldson holds over 1800 active patents worldwide and spends substantial amounts every year in R&D (research and development). As one of the world's largest OEM (original equipment manufacturer) you are rest assured that you are only getting the very best possible product.

The perfect filter would have no pressure drop, hold an unlimited amount of dirt, be small enough to fit anywhere in a system, give great ISO cleanliness codes per ISO 4406:1999, have high capture efficiency and cost nothing. Obviously this combination cannot exist, and the pursuit of the perfect compromise has always been the challenge for filter manufacturers. But with Donaldson's innovative filtration technology, you do get a filter that's close to "perfect".

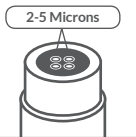


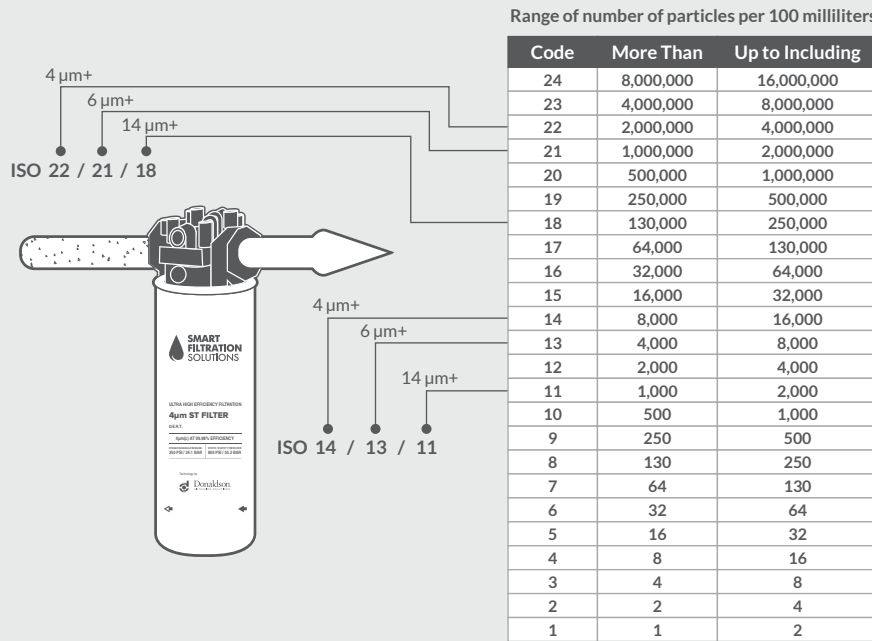
Fuels and oils are transported from the refinery to the storage depots by tanker trucks, ships or pipelines. From there it is loaded into another tanker truck and delivered to your site. Every time fuels & oils are transferred from one tank to another, it not only transfers the fuel & oil but also the contaminants present that are deadly to today's engines.

Many people assume they are buying quality fuel that meets the required specifications; diesel fuel cleanliness is rarely questioned. But higher fuel systems operating pressures, lower system tolerances and tighter filtration have pushed fuel cleanliness into the maintenance spotlight.

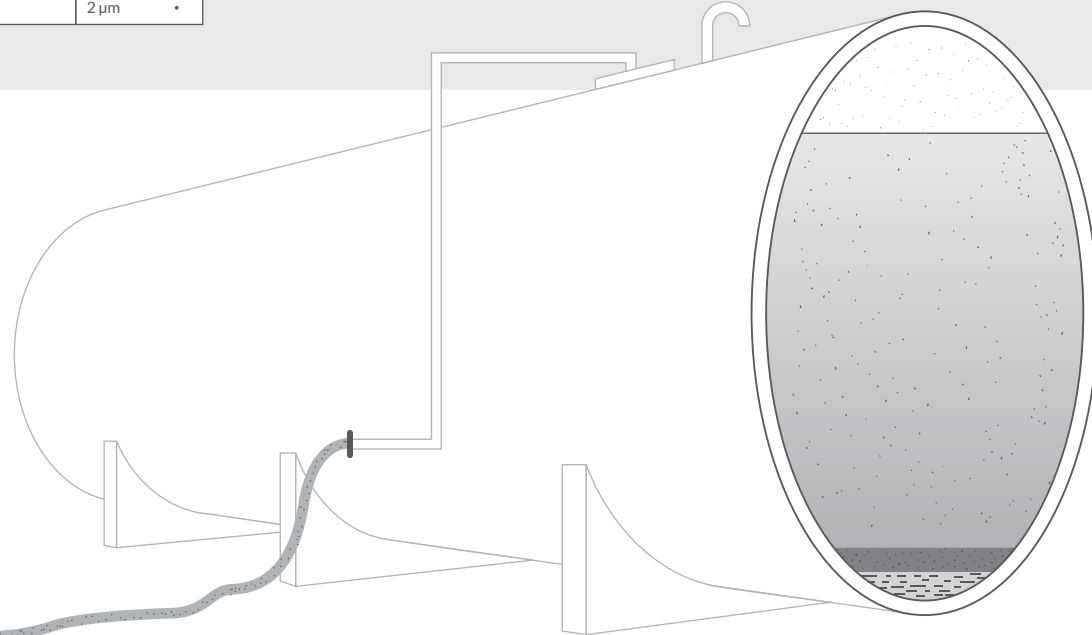
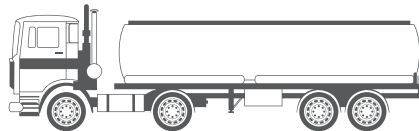
ISO 4406 contamination codes consist of three numbers corresponding to the number of particles of 4 microns and larger, 6 microns and larger, and 14 microns and larger present in the fluid. This page illustrates what it means to start with a contamination level of ISO 22/21/18 and target a cleanliness level of ISO 14/13/11.

With tight tolerances and high rates of pressure, even microscopic particles in diesel will ruin your injectors and cost you thousands of dollars in downtime and replacement parts.

Fuel Injector Clearance	Size of Familiar Particles	
 <p>The typical clearance for a high pressure common rail fuel injector is less than 5 microns, and some injectors feature a clearance of less than 2 microns, so even the tiniest particles can cause problems.</p>	Grain of table salt	100 µm ●
	Human hair	80 µm ●
	White blood cell	25 µm ●
	Talcum powder	10 µm ●
	Red blood cell	8 µm ●
	Silt	<5 µm •
	Bacteria	2 µm •



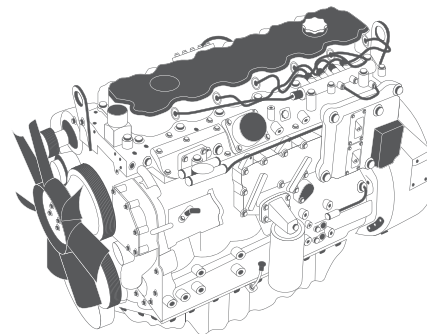
A typical 10,000-gallon bulk delivery can contain more than 700 grams of dirt and other particles (the equivalent of a 700ml soda bottle, packed with dirt), and that's before it mixes with whatever contamination is lurking in your tank, waiting to cause problems with your injectors.



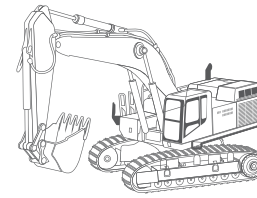
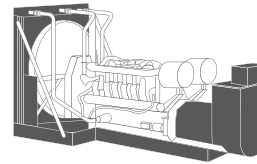
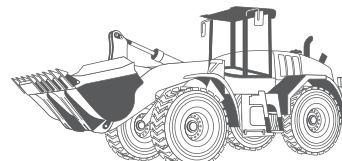
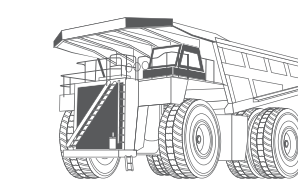
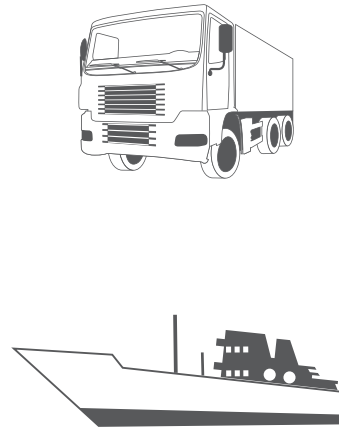
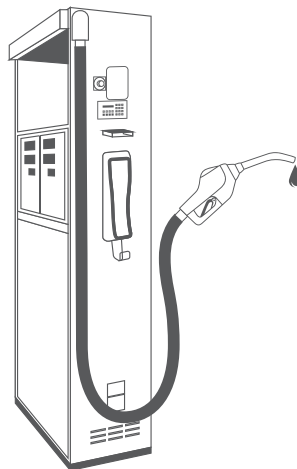
Progressive introduction of increasingly stringent emission standards have resulted in sophisticated diesel engines that require cleaner fuel than ever before to operate efficiently, due to injection pressures of more than 30,000 PSI and extremely tight tolerances.

In engines where precision is everything, you can't risk the damage done by high-velocity microscopic contaminants. At 30,000 PSI (2000 BAR), every unfiltered particle acts almost like a tiny sandblaster, **eroding the injector**, creating inefficient spray-patterns and potentially **over-fueling** the engine.

A fouled injector doesn't spray fuel efficiently and may lead to improper idle, irregular fuel distribution, unsuitable exhaust emissions and poor fuel economy.



Water gets into fuels and oils by adsorption, condensation and human negligence. Dirt and water act as catalysts for the breakdown of fuel via oxidation and by supporting bacterial growth. Although water in fuel or lubricants is often hidden from the naked eye and its inert properties supposedly render it "harmless", it can be extremely detrimental to most systems.



Onboard filters are designed to provide final filtration for moderately clean fuel. Engine filtration is not intended to clean fuel that contains large amounts of dirt and water. If contaminated fuel is used, the capability of the onboard filtration is overwhelmed and injectors either wear out prematurely or seize.

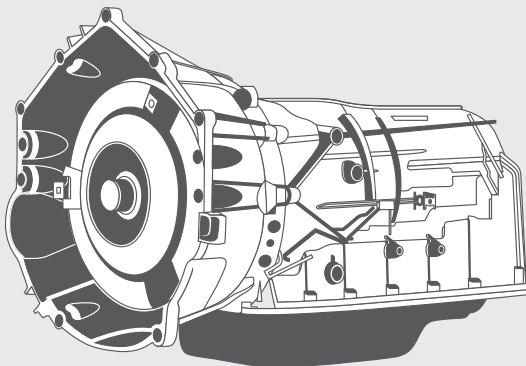
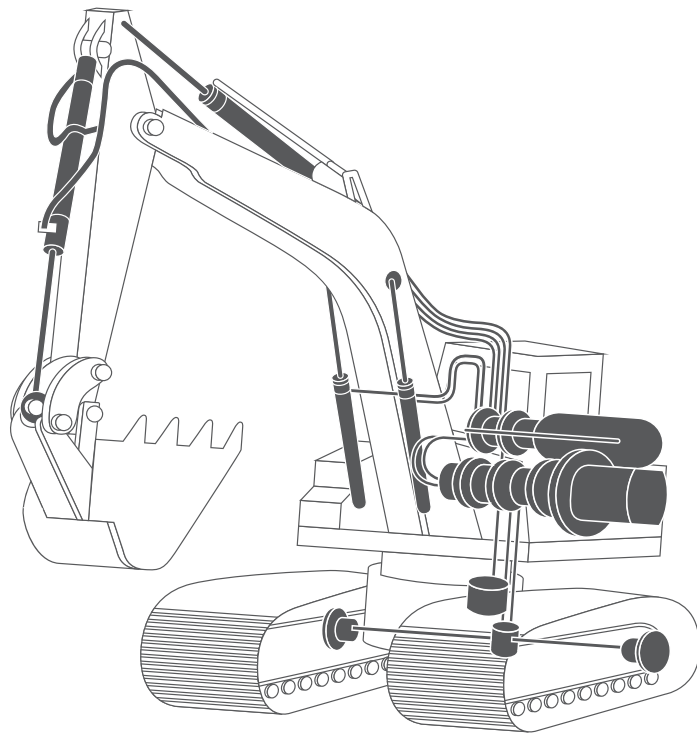
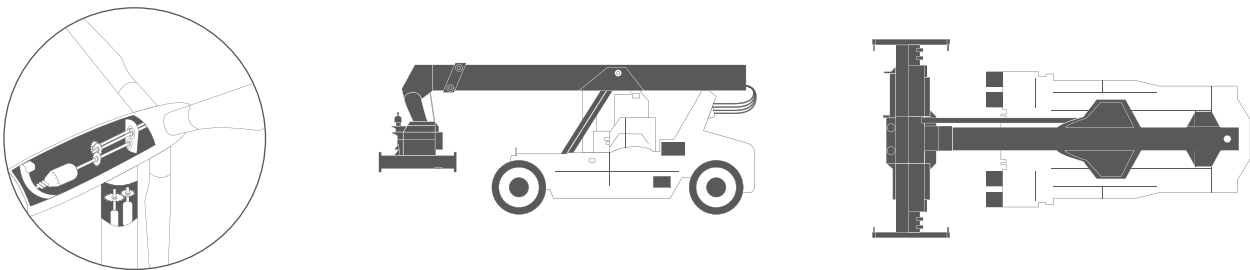
This means more maintenance, more downtime and more money out of your pocket.

Every hydraulic system has suspended particles in the fluid. Whether introduced from outside the system or resulting from the movement of metal parts within, these particles reduce the effectiveness of lubricant and hydraulic fluid. Contaminants grind and wear at the surfaces of moving parts, introducing even more particles into the system.

In fact, these contaminants cause more than 70% of all hydraulic system downtime.

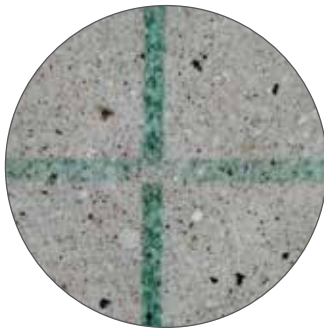
Contamination in lubricating oil can rapidly wear away at components ultimately causing higher oil consumption, or worse still catastrophic failure; leading to costly down time and higher operating costs.

When oils and lubes are delivered to your site you could be forgiven for thinking that it's clean - after all, it is new, isn't it? Unfortunately this is far from the truth. Contamination of the oil starts at the refining and production process, and continues right through the distribution and transportation of the oil until it reaches your bulk storage tank.



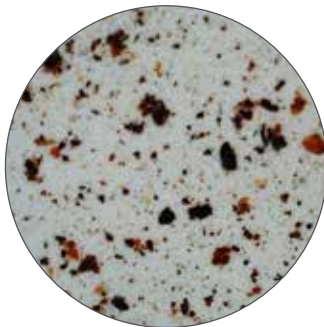
Pre-filtration of transmission oils before dispensing is the most cost-effective way to keep your transmission operating at peak performance. If you take care of your transmission, gears and shafts can last through multiple rebuilds and the overall transmission life increases. Faster wearing components such as friction material, seals, gaskets and bearings can also contaminate transmission oils in severe operation, harsh environments or extreme duty cycles. Flushing the entire transmission system using our Ultra High Efficiency Filters is the most effective way to maximize transmission life and its long-term performance.

There are many different types of contaminants that could adversely effect, damage or even destroy a fuel injection or a hydraulic system. Bacteria, fungus, water, suspended microscopic particles, additives, wax are some of the main contaminants. Below are some examples of suspended microscopic particles and how they appear under a microscope. The size varies from 4-120 micron.



Typical View

This is what a typical fuel sample patch looks like under a microscope. Careful observation reveals various different types of microscopic particles such as silica, bright metal particles and asphaltenes.



Rust

Presence of water in the transfer chain speeds the oxidation and chemical breakdown of metal parts (pipes, valves, etc) and is considered very dangerous. Particle size vary from 10 - 120 micron range.



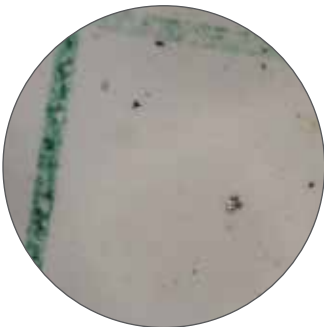
Fibers

They are introduced into the fuel tankers and into the fuel storage tanks by improper cleaning and maintenance practices.



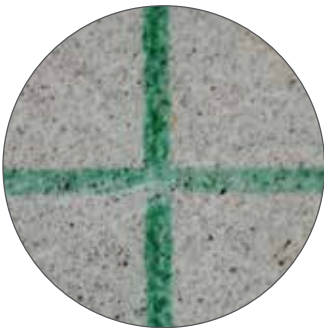
Asphaltenes

Unwatned by-product from the process of producing diesel from crude oil. Asphaltene particles are generally thought to be in the 0.5 - 2.0 micron range and they agglomerate into an oily sludge. This problem is made worse when free water is present.



Bright Metal Particles

Typically originate from component wear such as fuel pumps and valves. These particles are abrasive and, as a result, can lead to wear and tear of the engine parts and ruin fuel injectors.



Silica And Dust Particles

This is typically airborne contamination. U shaped open vents/pipes on top of storage tanks increase its number significantly. Particle size varies from 4 - 40 microns and is extremely abrasive against delicate engine components.

ENHANCED CLEANLINESS



Smart Filtration Solutions is all about taking your preventive maintenance practices to the next level. Our goal is to help you protect your bulk fuel storage tanks, your fuel, and your expensive equipment by refusing entry of harmful contaminants. We offer **Ultra High Efficiency Filters** that fit on our innovative square tube manifolds & filter heads to accept high flow rates and extend service life.

Our solutions help you deliver clean fluids into your equipment and maximize your uptime. Require a fraction of the capital expense compared to traditional filter housings and cartridge elements.

Minimize downtime & resulting loss of production

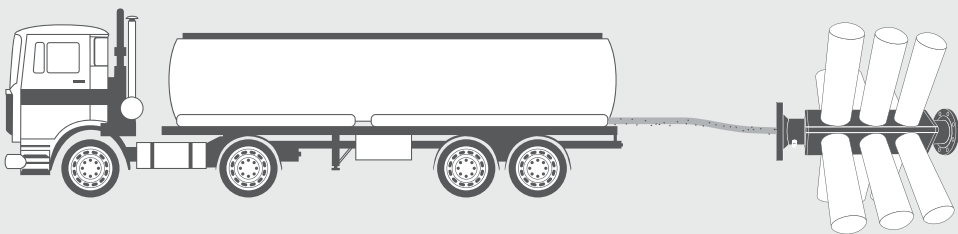
Minimize component repair & replacement

Minimize total cost of ownership

Your storage tanks probably have been exposed to years of dirty fuel, atmospheric dirt and water ingress.

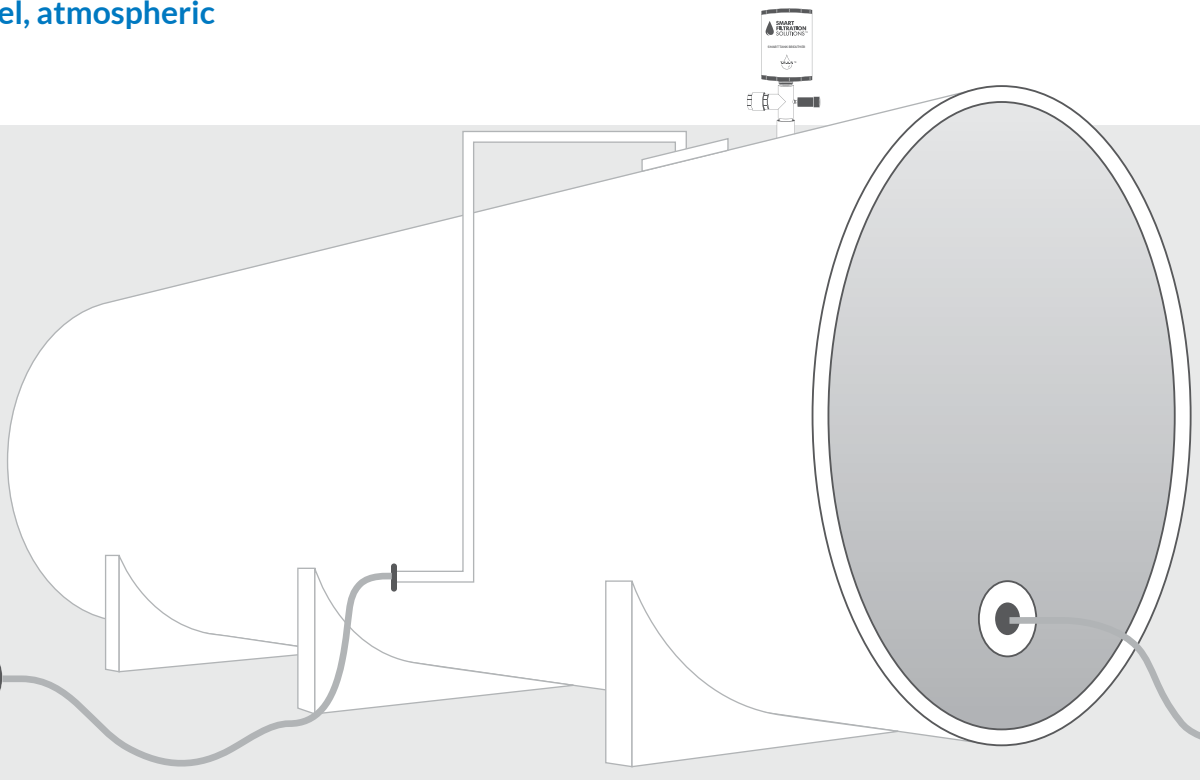
Inlet Filtration

We highly recommend filtration to be focused at the delivery of fluids. At this point, flow is steady with minimal disruptions and vibrations. This scenario results in the highest filtration efficiency and reduces the risk of contamination built up in storage tanks. Designed for high flow rates and minimum pressure drop, our **Ultra High Efficiency Filters** form a strong line of defense in ensuring enhanced cleanliness of fluids.



Smart Tank Breather

It is very likely that your fuel/oil storage tank has a U shaped open vent at the top. What your storage tank really needs is a Smart Tank Breather. The T.R.A.P. (Thermally Reactive Advanced Protection) Breather is a self- regenerating moisture removal system with integrated dust removal. Its dual function is to capture the moisture on the inhalation phase and release it with each exhalation so that water contamination is prevented continuously.



OPTIMUM PERFORMANCE

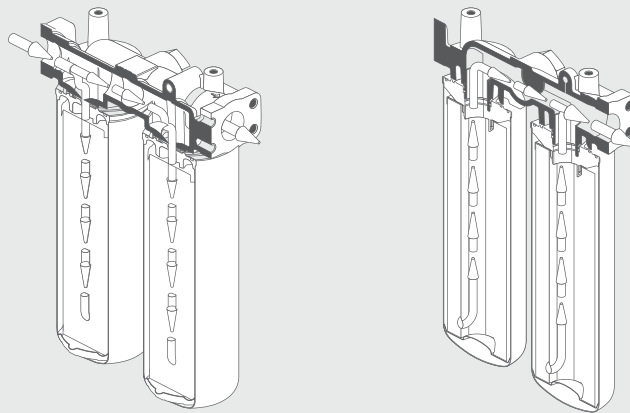


Ultra High Efficiency Single Pass Filtration

Our next generation manifolds are designed to take parallel flow for lowest pressure drop while providing Ultra High Efficiency Single Pass Filtration.

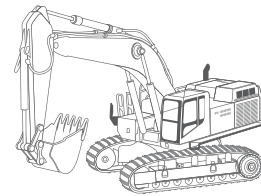
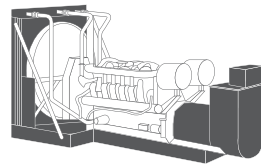
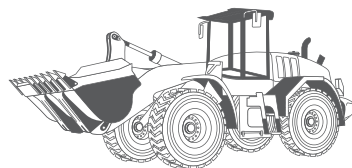
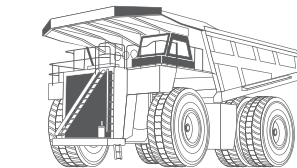
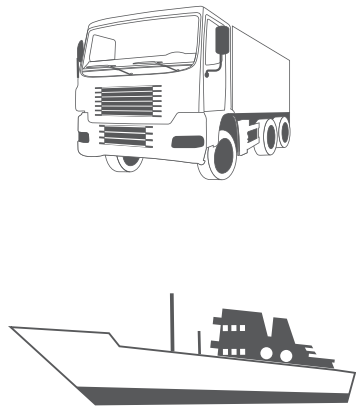
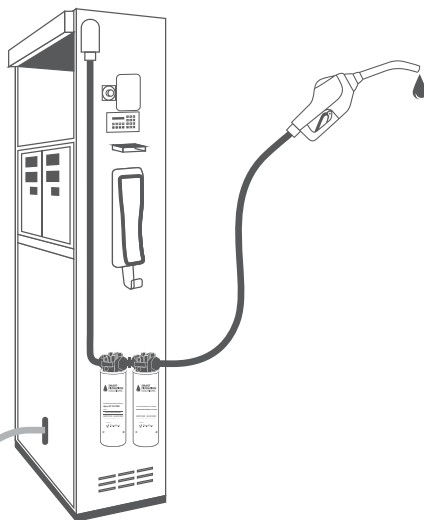
Half of the flow travels through the first filter and the rest of flow travels through the second filter. The flow is divided equally on the two filters, resulting in a parallel filtration rather than in series.

Inside our filters, Donaldson's innovative filtration technology allows high dirt holding capacity, low initial differential pressure, and high single-pass efficiency.



Outlet Filtration

If you stop introducing contaminants into the tank and stop them from coming in with a Smart Tank Breather, contaminants will stop coming out. Over time, the outlet filtration will rarely need service and the inlet filtration will be the primary service item on the system. But outlet filtration is still highly recommended to maintain cleanliness achieved at inlet filtration, as this is the last and most critical point to capture microscopic dirt particles & water before they make their way to the expensive and delicate components of fuel injection systems.




ULTRA HIGH EFFICIENCY FILTERS



Smart Filtration Solutions Ultra High Efficiency Filters are designed with Donaldson’s proprietary synthetic media to remove 99.98% of abrasive particulates in a single pass. All our filters are equipped with Viton® seals to have optimum compatibility with various fuels & oils.


Max Working Pressure: 350PSI / 24.1bar (per NFPA/t3.10.17)
Rated Static Burst: 800PSI / 55.2bar (per NFPA/t3.10.17)
Max Flow Range: 65 gpm / 246 lpm
Operating Temperature: -40°F-190°F / -40°C-88°C

ISO=International Standards Organization
NFPA = National Fluid Power Association




4µm ST FILTER

4µm(c) B5000 99.98% Efficiency (per ISO 16889)
D.E.R.T
Target Cleanliness: 14/13/11 (per ISO 4406:99)




7µm ST FILTER

7µm(c) B2000 99.95% Efficiency (per ISO 16889)
D.E.R.T
Target Cleanliness: 16/14/11 (per ISO 4406:99)



25µm ST FILTER

25µm(c) B5000 99.98% Efficiency (per ISO 16889)
Target Cleanliness: 18/16/13 (per ISO 4406:99)



WATER ABSORBING ST FILTER

Contains expanding media for water detection

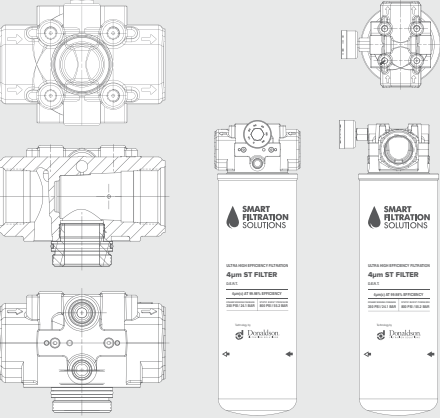
Smart Filter Heads

Smart Filtration cast aluminum Filter Heads with steel inserts prevent excessive metal-to-metal friction and adhesion between the head and the filter. Our Dual Filter Heads are designed for parallel flow for the lowest pressure drop while providing Ultra High Efficiency Single Pass Filtration.

Single Filter ST Head

Specifications:

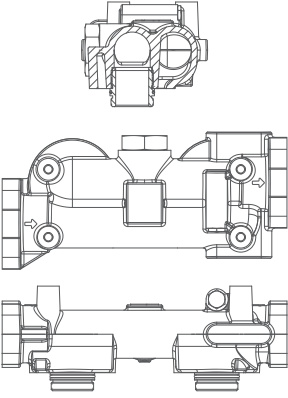
Max Flow Rate: 65 gpm / 246 lpm
Working Pressure: 350 psi / 24 bar
Rated Static Burst: 800 psi / 55 bar
Mounting Connection: SAE-20 O-Ring
Filter Quantity: 1



Dual Filter ST Head

Specifications:

Max Flow Rate: 125 gpm / 473 lpm
Working Pressure: 350 psi / 24 bar
Rated Static Burst: 800 psi / 55 bar
Mounting Connection: Code 61 Flange
Filter Quantity: 2



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UNDERSTANDING LIQUID FILTER EFFICIENCY



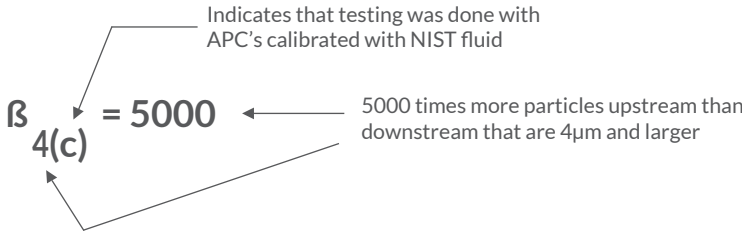
What is a Beta Ratio?

Beta ratio (symbolized by β) 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 fluid 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:

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

where $_{(x)}$ is a given particle size



What is Efficiency?

The beta ratio is commonly used to calculate the filtration efficiency of a filter and can be converted into a percentage of efficiency at a given particle size.


The formula used to calculate efficiency is:

$$\text{Efficiency}_{(x)} = \frac{\beta - 1}{\beta}$$

where $_{(x)}$ is a given particle size

$$\beta_{4(c)} = 5000 \text{ is same as } 99.98\% @ 4\mu\text{m}$$

$\beta 5000$ is 99.98% for particles 4µm and greater

Fuel Injector Clearance	Size of Familiar Particles				
	Grain of table salt	100 µm	●		
	Human hair	80 µm	●		
	White blood cell	25 µm	●		
	Talcum powder	10 µm	●		
	Red blood cell	8 µm	●		
	Silt	<5 µm	●		
The typical clearance for a high pressure common rail fuel injector is less than 5 microns, and some injectors feature a clearance of less than 2 microns, so even the tiniest particles can cause problems.			Bacteria	2 µm	•

Beta Ratio (at given particle size)	Efficiency (at the same particle size)
1.01	1.00%
1.1	9.10%
1.5	33.30%
2 (Nominal)	50.00%
5	80.00%
10	90.00%
20	95.00%
75 (Absolute)	98.70%
100	99.00%
200	99.50%
1000	99.90%
2000	99.95%
5000	99.98%

- Without Beta Ratio / Efficiency information, micron rating alone is meaningless.
- Focus must be on Beta Ratio, rather than just Efficiency %, as we can see above, the difference between 99.50% & 99.98% looks negligible but in filtration, that means Smart Filtration 4µm with a beta 5000 rating, will have on average 5000 particles larger than 4 microns upstream of the filter for every one particle 4 microns or greater downstream.

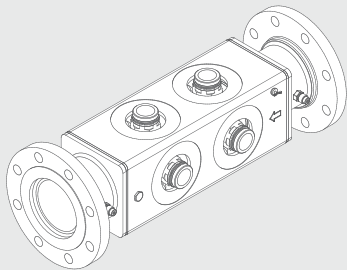
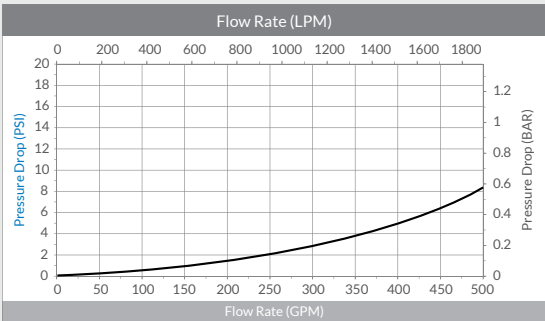
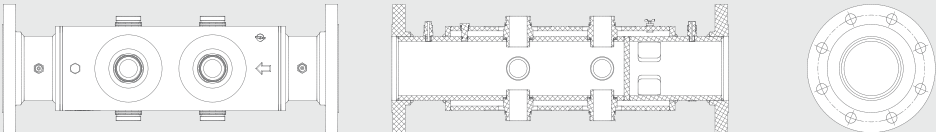
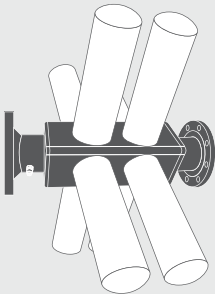
While a competitor’s 4µm with a beta 200 or 99.50% efficiency rating, will have on average 200 particles larger than 4 microns upstream of the filter for every one particle 4 microns or greater downstream.

Our innovative Smart Manifolds are designed for industry leading high flow & dirt holding capacity configurations. Lower internal flow resistance for minimal pressure drop and compact size with 4” flanges on both ends for uncomplicated installation in existing pipe infrastructure.

Donaldson’s proven spin-on technology also makes our manifolds extremely easy to service without the need of specialized tools and personnel.

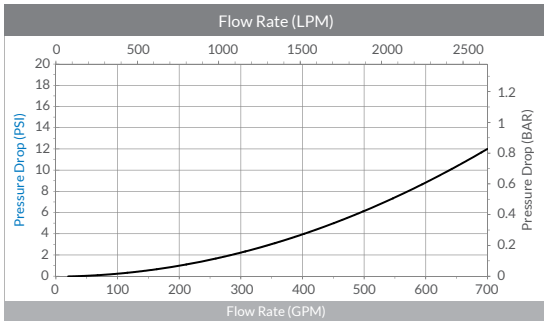
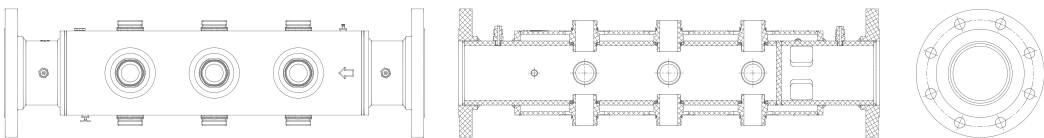
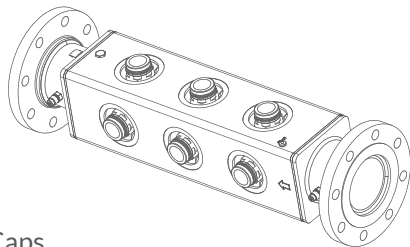
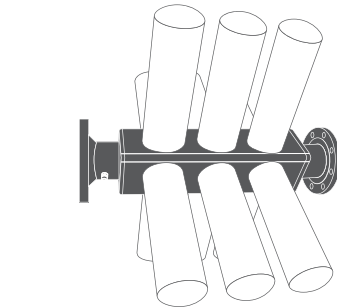
8 Filter Smart ST Manifold

- Specifications:
- Max Flow Rate: 450 gpm / 1700 lpm (Diesel Fuel)
 - Working Pressure: 150 psi / 10 bar
 - Mounting: ASA 150 4” Flanges
 - Configuration: Mounts in any direction
 - Filter Quantity: Up to 8
 - Accessories: Mechanical Pressure Gauges, Blanking Caps



12 Filter Smart ST Manifold

- Specifications:
- Max Flow Rate: 700 gpm / 2650 lpm (Diesel Fuel)
 - Working Pressure: 150 psi / 10 bar
 - Mounting: ASA 150 4” Flanges
 - Configuration: Mounts in any direction
 - Filter Quantity: Up to 12
 - Accessories: Mechanical Pressure Gauges, Blanking Caps



- 1) Mini test points (2)
 - 2) Threaded insert assembly
 - 3) Plug assembly (1)
 - 4) 1/4” NPT bleeder
 - 5) 400mm installation clearance to face for filters
- No exposed aluminum reduces impact sparking

Weight: 8 Filter STManifold: 50 KG
12 Filter ST Manifold: 58 KG

Smart Filtration Bulk Assemblies are designed to remove water and particulate matter from Bulk Fuel Applications.

For best results, we recommend using Fuel Water Separator Bulk Assembly & Pre-Filter Particulate Bulk Assembly in conjunction with Smart Filtration ST Manifolds fitted with our Ultra High Efficiency Spin-On Elements.

Pre-Filter Particulate Bulk Assembly

- Specifications:
- Max Flow Rate: 317 gpm / 1200 lpm (Diesel Fuel)
 - Max Pressure: 58 psi / 4 bar
 - Pressure Testing: Assembly Undergoes Pressure Test of 600kPa / 6 Bar Max at Factory
 - Flow Direction: Inside Out Flow
 - Flanges: 100NB ASA 150
 - Accessories: Pressure Gauge & Adapter (Included)
 - Service Element: 23µm(c) B1000 Bulk Assembly Element
14µm(c) B1000 Bulk Assembly Element



Fuel Water Separator Bulk Assembly

- Specifications:
- Max Flow Rate: 158.50 gpm / 600 lpm (Diesel Fuel)
 - Max Pressure: 58 psi / 4 bar
 - Pressure Testing: Assembly Undergoes Pressure Test of 600kPa / 6 Bar Max at Factory
 - Flow Direction: Outside In Flow
 - Flanges: 100NB ASA 150
 - Accessories: Pressure Gauge & Adapter, Drain Kit (Included)
 - Service Element: Water Separator Element (via Coalescence)

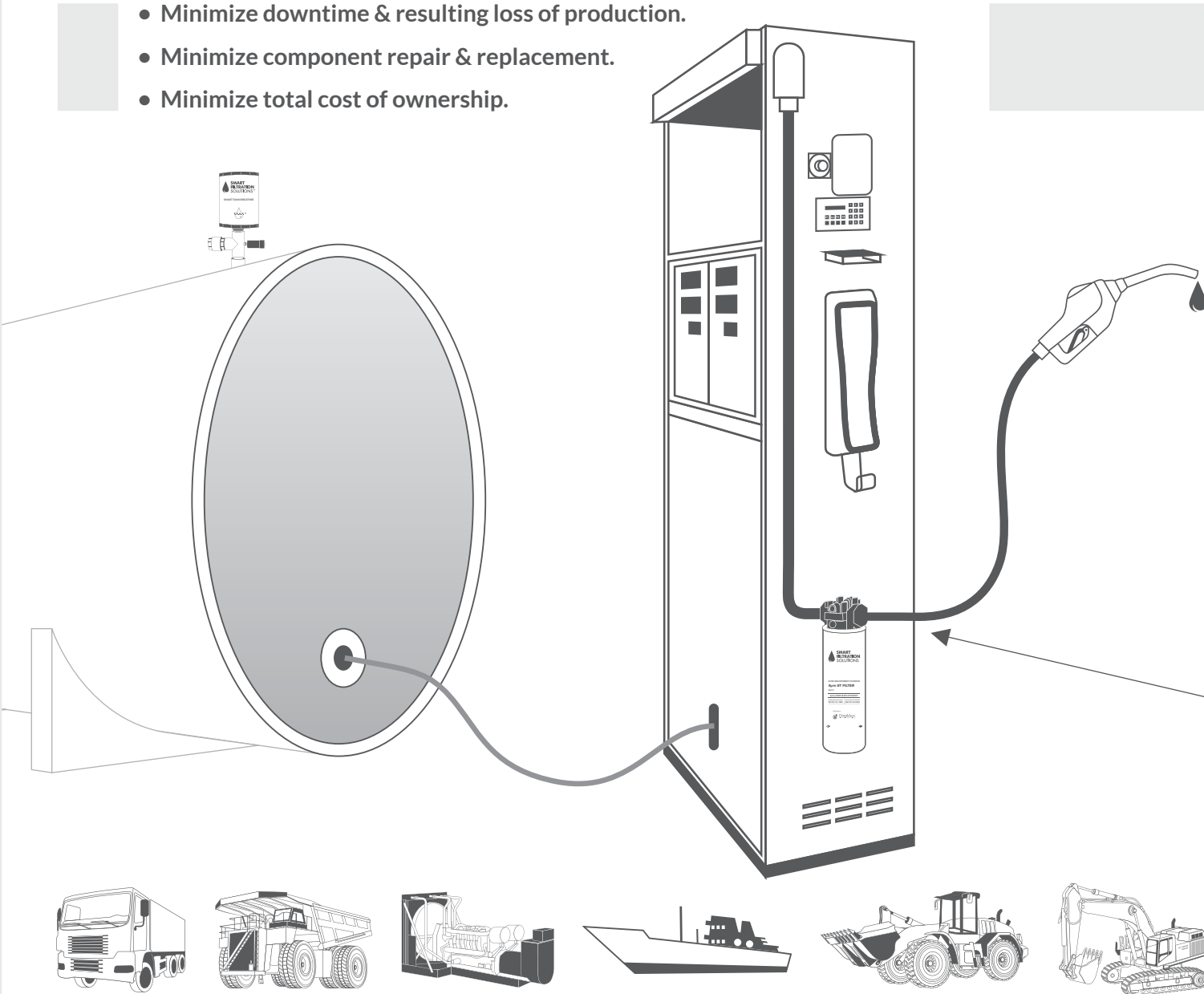


Smart Filtration Kits are designed for ease of installation & service and come with our Ultra High Efficiency Filters that fit on our cast aluminum filter heads to accept high flow rates and extend service life.

Our **Ultra High Efficiency Filters** are designed with Donaldson's proprietary synthetic media to remove 99.98% of abrasive particulates in a **Single Pass**. Inside our filters, Donaldson's innovative filtration technology allows high dirt holding capacity, low initial differential pressure, and Ultra High Efficiency Single Pass Filtration. All our filters are equipped with Viton seals to have optimum compatibility with various fuels and oils.

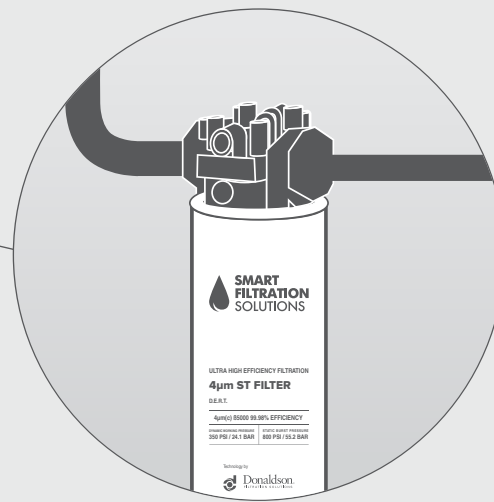
Smart Filtration cast aluminum Filter Heads with steel inserts prevent excessive metal-to-metal friction and adhesion between the head and the filter. Our Dual Filter Heads are designed for parallel flow for the lowest pressure drop while providing Ultra High Efficiency Single Pass Filtration.

- Minimize downtime & resulting loss of production.
- Minimize component repair & replacement.
- Minimize total cost of ownership.

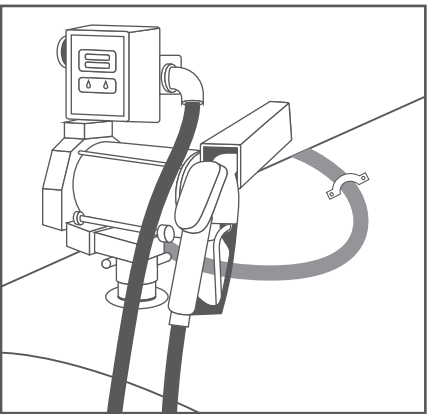


Your storage tanks probably have been exposed to years of dirty fuel, atmospheric dirt and water ingress. While you can't always control the condition of the fuel you receive, you can indeed have an impact on how clean it is before it enters your machine.

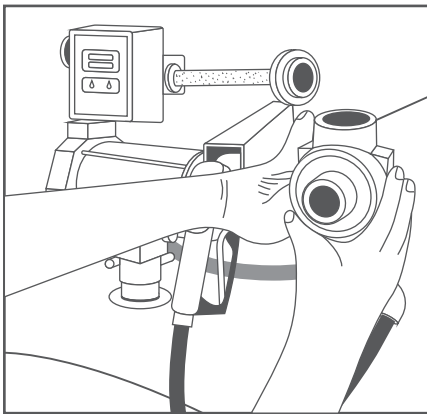
Fuel dispensers are the last and most critical point to capture microscopic dirt particles & water before they make their way to the expensive and delicate components of fuel injection systems to wreak havoc.



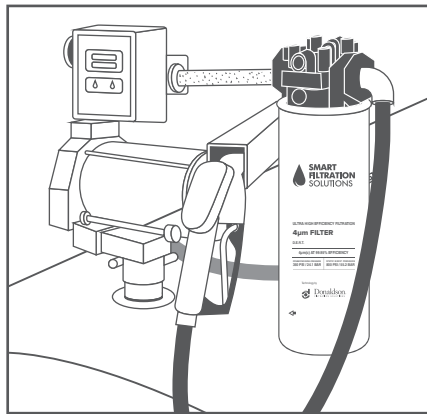
Smart Filtration Kit Installation in Minutes



A pump without a Smart Filtration Kit installed.

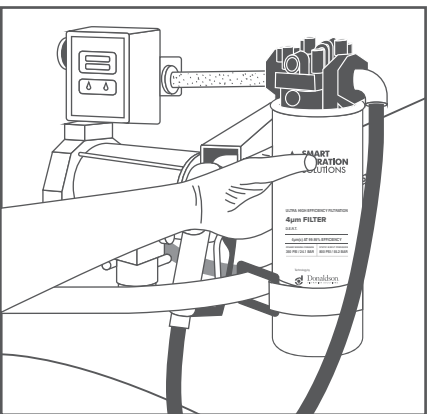


Minimal tools or expertise required.

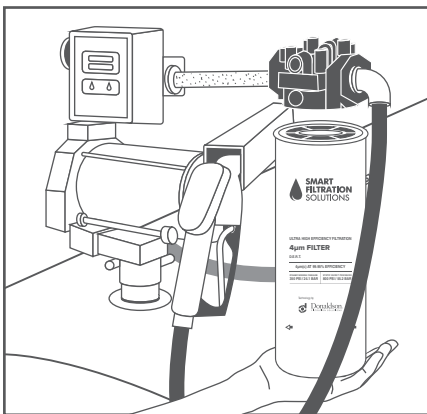


It only takes minutes to start pumping ultra clean diesel!

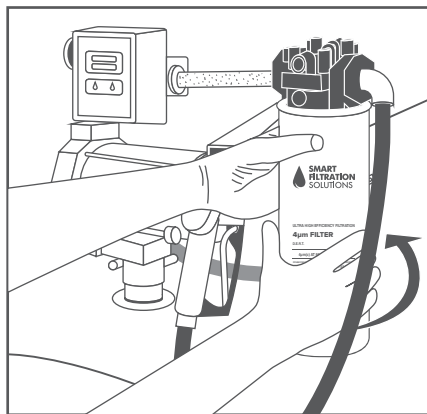
Filter Service in Seconds



Loosen used or clogged filter.



Line up threads.



Hand-tighten.



Standard Smart Filtration Kit

For flow rates up to 65 GPM / 246 LPM

The Standard Smart Filtration Kit is perfect for smaller operations that need clean fuel delivered efficiently in any environment.

Kit contents:

- Single Filter ST Head
- 4µm ST FILTER
4µm(c) B5000 99.98% Efficiency (per ISO 16889)
D.E.R.T.
Target Cleanliness: 14/13/11
- Pressure Gauge Adapter
- Pressure Gauge



High-Capacity Smart Filtration Kit

For flow rates up to 125 GPM / 473 LPM

The High-Capacity Smart Filtration Kit works for operations with high- flow delivery systems that regularly need large quantities of clean diesel delivered efficiently.

Kit contents:

- Dual Filter ST Head
- Two 4µm ST FILTERS
4µm(c) B5000 99.98% Efficiency (per ISO 16889)
D.E.R.T.
Target Cleanliness: 14/13/11
- Pressure Gauge Adapter
- Pressure Gauge
- Flange Adapters
- Connecting Bolts



Clean & Dry Smart Filtration Kit

For flow rates up to 50 GPM / 189 LPM

The Clean & Dry Smart Filtration Kit removes fuel contamination, stops water as it leaves the bulk tank.

Kit contents:

- Two Single Filter ST Heads
- 4µm ST FILTER
4µm(c) B5000 99.98% Efficiency (per ISO 16889)
D.E.R.T.
Target Cleanliness: 14/13/11
- WATER ABSORBING ST FILTER
Contains expanding media for water detection
- Two Pressure Gauge Adapters
- Two Pressure Gauges
- Connecting Nipple

Accessories

Parts

Description	Application
Manifold Flanges	ANSI 4 Inch Blank Flanges
Manifold Gaskets	Manifold Flange Gasket
Manifold Bolts Nut & Washers	Manifolds, Pre-Filter Assemblies
Blanking Cap	Blank off up to orifices on Smart ST Manifold
Connector SAE	For connecting two Smart Single ST Heads in series
Threaded Insert O-rings	Replacement O-rings for heads and manifolds, Viton
Top Mount Bolts	For Dual ST Heads & Single ST Heads
Dual Head Flange	SAE 3000 PSI 1" 1/2 BSP Flange
Dual Head Flange Screws	Hexagon Socket Head Cap Screw

Pressure Gauges & Adapters

Description	Application
Pressure Gauge Adapter	M16 x 2 to 1 / 4 " NPT Adapter
	Manifolds, Pre-Filter Assemblies
Pressure Gauge	0-160 psi / 1103 kPa / 11.0 bar
	Manifolds, Pre-Filter Assemblies
Differential Pressure Gauge	Mounting M6 x 10 Range : 0-3 bar
	Manifolds, Pre-Filter Assemblies
DP Gauge Fittings	For Manifolds, Pre-Filter Assemblies
	Inlet 1/8 NPT Outlet 9/16-18 UN
Pressure Gauge Adapter	For Dual ST Heads & Single ST Heads
	1/8 NPT BAR: 0 - 6.9 / PSI: 0 - 100
Pressure Gauge	For Dual ST Heads & Single ST Heads

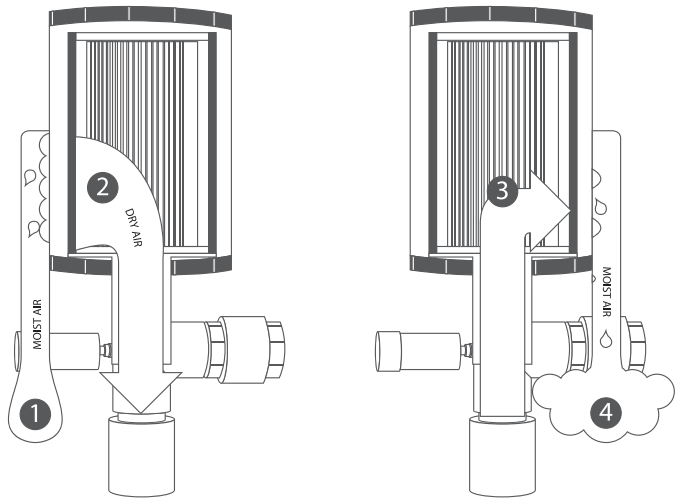
SMART TANK BREATHERS



Smart Tank Breather element contains Donaldson’s revolutionary T.R.A.P.™ (Thermally Reactive Advanced Protection) Technology that reduces the risk of dust and moisture entering storage tanks through the vent while allowing high flow rates of fluid into and out of the tank.

T.R.A.P.™ breathers contain a deliquescent drying agent that captures humidity from the air as it is drawn into the reservoir. Warm, dry air exiting the reservoir removes moisture from the deliquescent material, so T.R.A.P.™ breathers last longer than desiccant breathers.

How Smart Tank Breather 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 T.R.A.P.™ breather’s water-holding capacity.

To be used on bulk storage tanks containing diesel, lube, hydraulic, engine or transmission oil

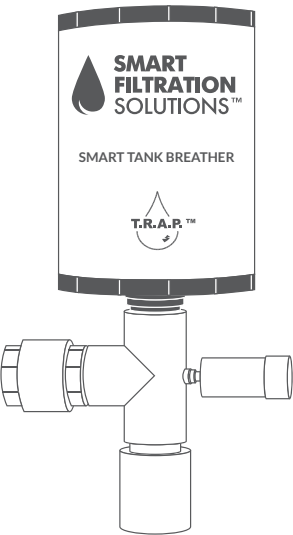
Installation instructions

One unit recommended for tanks up to 40,000 liters*
Multiple units for tanks larger than 40,000 liters*
Breather element to be changed on restriction or every 4 months.

* For information on meeting API 2000 or other tank design requirements, please contact us.

Features & Benefits

- Filter efficiency > 97% at 3µm
- Service restriction indicator
- Efficient moisture removal
- Inhibits corrosion
- Easy installation spin-on replacement element
- Airflow up to 500 gpm/1893 lpm
- Retards microbial growth
- Safety overfilling valve



SMART FILTRATION CARTS



The Smart Filtration ST & DT Carts provide a convenient portable mode of off-line filtration, flushing and fluid transfer. Use them with your in-plant machinery and mobile equipment to achieve and maintain proper ISO cleanliness levels.

In-series Ultra High Efficiency particulate filter, designed with Donaldson’s proprietary synthetic media, removes 99.95% of abrasive particulates in a Single Pass and a Water Absorbing Filter removes water. The powerful pump choices provides efficient fluid transfer and filtration.

Smart Filtration ST & DT Carts

Typical Applications:

- Filtering contaminated system
- Flushing new or repaired systems
- Pre-filtering new diesel/oil
- Transferring diesel/oils
- Topping off reservoirs
- Dispensing new diesel/oil

Materials:

- Frame: Carbon steel with drip pan; at free tires
- Motor: 220V 50 Hz (12/24 Volts Options Available)
- Filter Heads: Medium pressure, cast aluminum heads
- Pump:
 - Up to 200 cSt Fluids:
Gear pump 44 lpm for diesel & hydraulic oil applications
 - Up to 600 cSt Fluids:
Screw pump 37 lpm for heavy gear oil applications
- Hoses: 7 Meters Hydraulic Hose
- Power Switch: Sealed on/off power switch
- Cord: 10mt. electric cord

Filter Indicators:

- Individual pressure gauges. Filter change out at 2 Bar pressure.



Fuel/Oil Kinematic Viscosity Combined With Temperature
in centiStokes (cSt)

Fluid viscosity, measured in centiStokes (cSt) or Saybolt Seconds Universal (SSU or SUS), is the resistance of a fluid to flow (thickness of fluid). Low viscosity fluids pass through filters with less resistance than high viscosity fluids. Higher fluid viscosities have higher-pressure drops due to higher resistance passing through the media.

The colder the fluid, the higher the viscosity, so the lowest potential temperature of the fluid is the best measure for sizing a bulk filtration system. Due to the high specific heat capacity of fluids, the lowest ambient temperature may not be an accurate reflection of the actual fluid temperature. Avoid over sizing your system by using the stored fluid temperature and not the lowest ambient temperature, which tends to be lower than the temperature of the fluid in storage or transport.

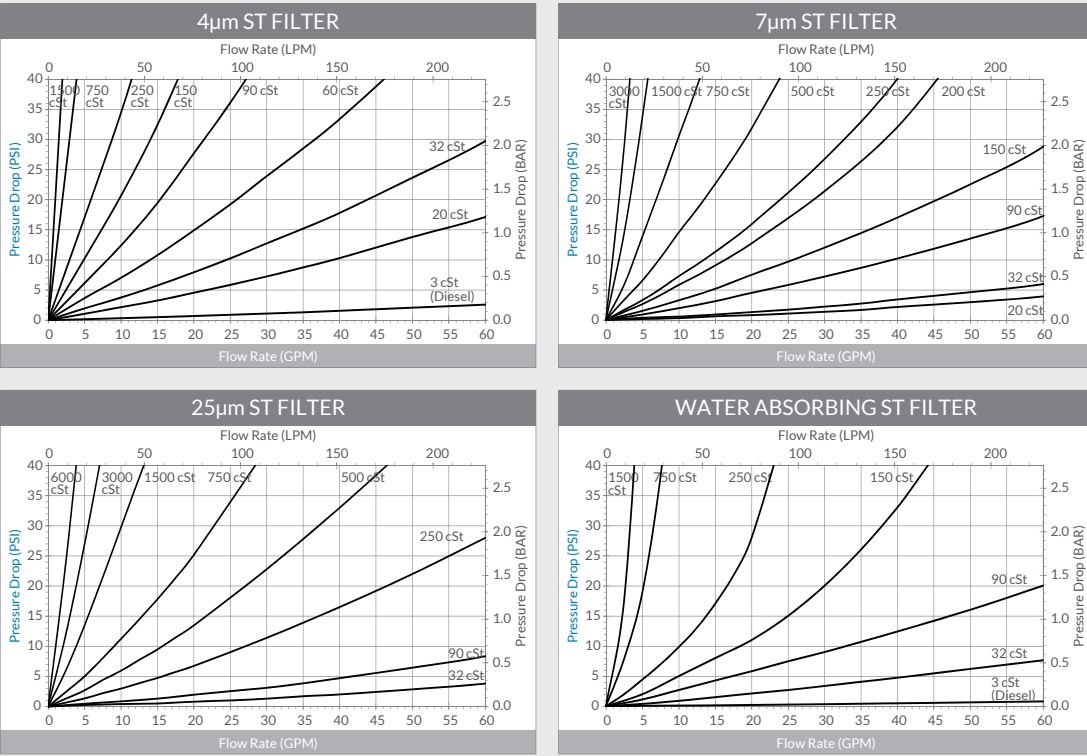
SAE Gear Oil			75W			80W		85W	90			140	
SAE Engine Oil		5W	10W	20			30	40	50				
ISO Grade		15	22	32	46	68	100	150	220	320	460	680	
°F	°C	Diesel											
248	120				3.7	3.5	5.7	7.3	9.3	11.7	14.7	18.2	22.9
230	110				4.4	5.5	7.0	9.0	11.7	14.9	18.9	23.7	30.2
212	100		1	4.5	5.4	6.8	8.8	11.4	15.0	19.4	25.0	31.8	41.1
194	90		3	5.3	6.7	8.5	11.2	14.8	19.8	26.0	34.1	44.0	57.9
176	80		5	6.5	8.5	11.0	14.8	19.9	27.1	36.2	48.2	63.3	84.8
158	70		6.2	8.5	11.1	14.8	20.2	27.7	38.5	52.4	71.1	95.2	130
140	60		8	12	15.1	20.6	28.7	40.2	57.2	79.6	110	151	211
122	50		11	15	21.5	29.9	42.9	61.5	98.7	128	181	254	365
104	40	1	15	22	32	46	68	100	150	220	320	460	680
86	30	2	21	32	50.7	75.6	116	175	271	409	613	907	1380
68	20	3	33	51	86.7	135	214	334	536	838	1290	1980	3130
50	10	4	52	87	162	264	438	711	1190	1920	3070	4870	8020
32	0	5	85	180	340	585	1020	1720	2990	5060	8400	13900	23900
14	-10	9	185	375	820	1500	2770	4880	8890	15700	27200	47000	85000
-4	-20	15	400	800	2350	4650	9120	16800	32300	60000			

Viscosity, Flow Rate & Pressure

Choosing the correct filter in a high flow filtration systems and applying the right number of filters for a specific viscosity to maintain minimal pressure drop is critical to configuring an efficient system for a given application.

Increased flow rate increases resistance as fluids pass through filters, making it harder to maintain ideal system pressure. Combined with viscosity, targeted flow rate is another critical factor in designing filtration systems.

These charts demonstrate the pressure drop experienced by fluids of various viscosities as the flow rate increases through a selected filter. The more vertical the line, the more filters need to be added to the system to distribute the volume of fluid, effectively reducing the flow rate through each filter and maintaining optimal pressure.



Fluid analysis is a snapshot of what is happening inside your equipment. It tells you the condition of the fuel or lubricant and identifies component wear and contamination in virtually any application. The Smart Analysis Kit 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



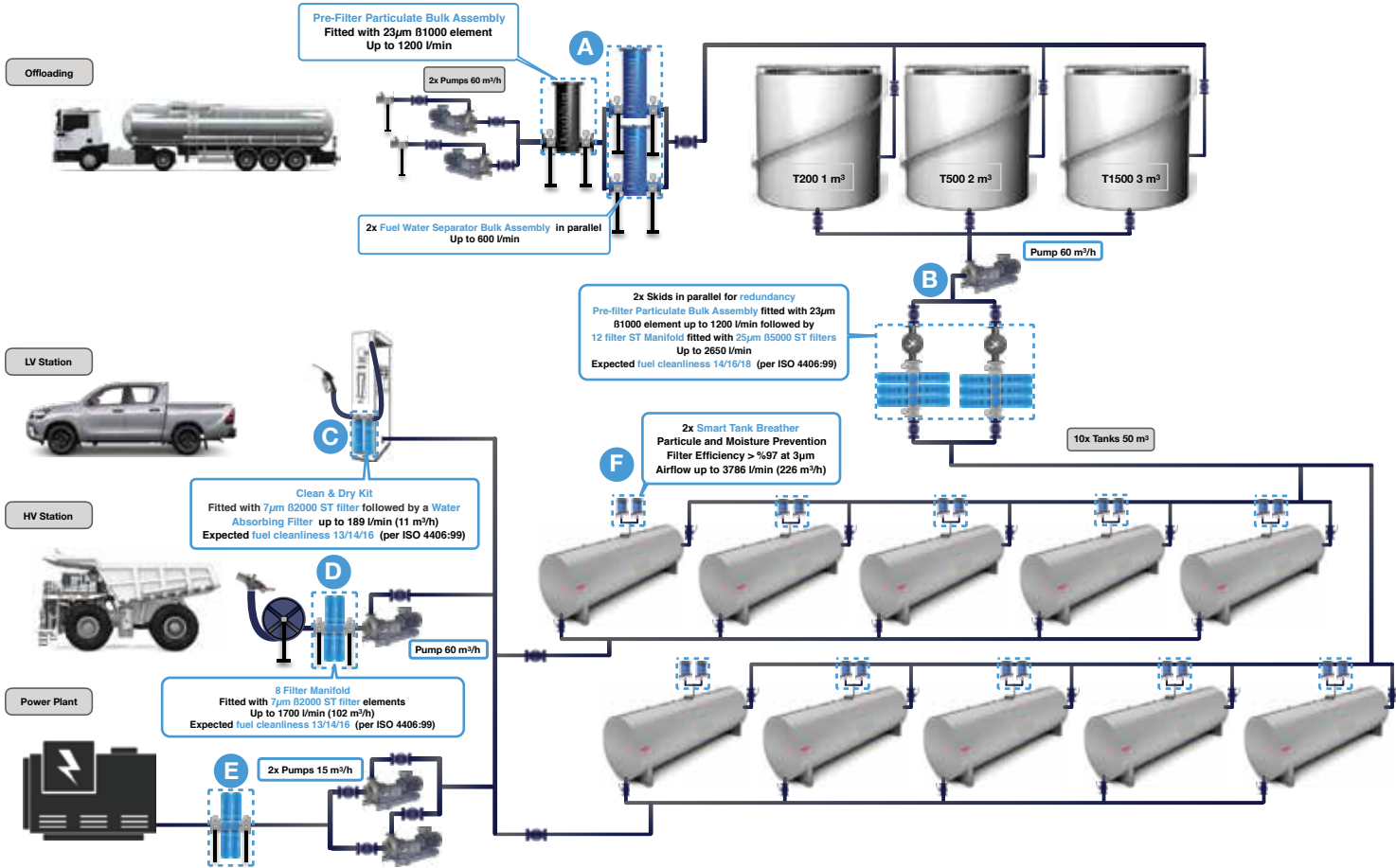
The Smart Analysis Kit includes enough supplies for 100 fluid samples. All apparatus is securely packaged and well protected with foam in a sturdy carrying case.

We provide value-added services through assistance with design, commissioning and the selection of a customized filtration solution. A comprehensive after-sales support provides advice, recommendations, condition monitoring, technical assistance and spares.

- Onsite surveys to determine the best solution for your operation.
- Value added services of condition monitoring and analysis.
- Contamination control training.

- Product availability
- Fanatical customer service
- Blazing fast deliveries

Unlike our competitors, our top priority is for our engineers to physically visit customer sites instead of designing/suggesting filtration solutions via email. Once our filtration solution is approved and shipped, we provide guidance during the installation followed by site visits for commissioning of the installation. Follow up visits are scheduled to monitor and maintain the efficiency of the filtration solution.



- Technical support (system design, sizing, etc.)
- Sales support (direct calls to end users)
- Protection of territory
- Exceptional/Premium marketing
- Training to end users (best practices, etc.)
- Training to distributor sales teams
- Stock/availability of filters/etc.
- Relationships with other suppliers (tanks, skids, pumps, etc.)
- Full knowledge of fuel and oil related problems, including water, additives, etc.
- Laboratory relationships for fluid testing/analysis
- Safety/compliance auditing
- Extensive knowledge of applied filtration

We typically require the following critical information to ensure the correct Smart Filtration Solution.

Required Information	Site Information	Example	Units of Measure
Fluid type and grade		Diesel Fuel	
Viscosity		1 cSt	cSt
Pump type		Gear Pump	
Max pump pressure		145 psi	Bar, PSI
Pump flow rate		600 lpm	l/min, g/min, m3/h
Min Temp Requirement		25 C	C / F
No. of tanks		4	
Size of tanks		10,000 Gallons	Litres / Gallons / m3
Volume of product used		50,000 L/Week	per week / month
Current cleanliness level		23/22/19	ISO 4406
Target cleanliness level		14/13/11	ISO 4406
Single pass or kidney loop		Single pass	
Inlet/Outlet filtration		Both	
Water contamination		50	PPM
Water detection required		No	Yes / No
Redundancy required		Yes	Yes / No