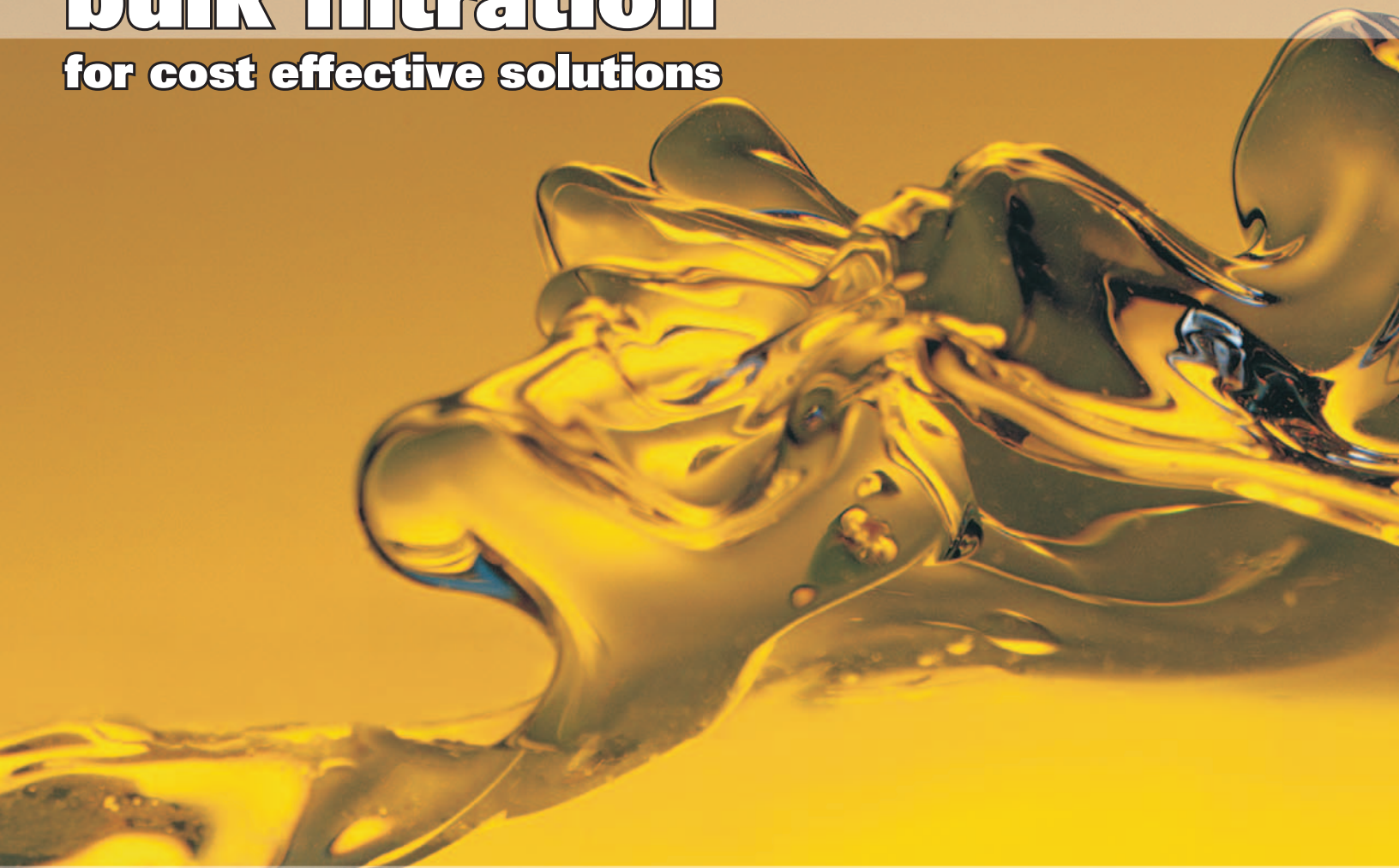


Guide to

Fuel and lube bulk filtration

for cost effective solutions



Why Filter Bulk Oils & Fuels?

Filtration of bulk oil and diesel fuel controls the ingress of dirt and water into equipment when filling up oil or fuel tanks.

Contamination in lubricating oil or a fuel can rapidly wear away at expensive components ultimately causing catastrophic failure, higher fuel or oil consumption, greater emissions, leading to down time and higher operating costs.

The Donaldson Solution

- ✓ Donaldson has developed a range of custom filtration products and services specifically targeted to resolve bulk oil and fuel filtration problems.
- ✓ A full range of purpose built assemblies
- ✓ Onsite surveys to determine the best solution for your facility
- ✓ Facility upgrade options
- ✓ Condition monitoring and analysis
- ✓ Replacement elements and spare filter parts via Donaldson approved distribution
- ✓ Contamination control training/audit
- ✓ Installations, commissioning and fluid management systems



Donaldson[®]
FILTRATION SOLUTIONS

Why install filtration on bulk oil and diesel systems?

Proper filtration ...

- ☑ Reduces downtime and resultant loss of production
- ☑ Reduces component repair and replacement
- ☑ Reduces fluid replacement and disposal costs
- ☑ Reduces total cost of ownership

Filtration on bulk oil and diesel fuel systems prevents the ingress of solid particulate (dirt) into equipment when filling or topping up oil or fuel tanks. According to one major equipment manufacture more than 90% of fuel injection problems are due to unfiltered dirt or water in the fuel.

New emission regulations are driving up diesel injection pressures, and ever increasing sophistication of plant and machinery are requiring much improved cleanliness levels compared to the past.

Customers who are using Donaldson's fuel filtration solutions have seen that, in addition to prolonged component life, there are other unexpected benefits to clean diesel. These include improved fuel consumption as well as reduced emissions and service costs.

Understanding contaminants

An essential step to maintaining and cleaning bulk oils and fuels is to first understand contamination control.

Contamination control includes:

- ☑ Prevention
- ☑ Removal
- ☑ Detection
- ☑ Minimization of contaminants' effects

The classes of contaminants include:

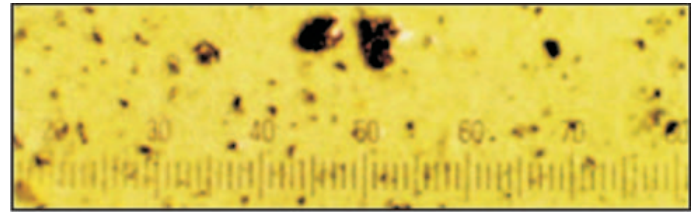
- ☑ Particulate
- ☑ Air
- ☑ Chemical
- ☑ Water
- ☑ Heat

Common contaminants in bulk systems include:

airborne dust
condensation
rain or wash water
rust bacteria
various types of sludge

Because of the ongoing contamination during the transportation cycle, we emphasize the most effective place to install bulk filtration is **as close as possible to the final point of decanting.**

Below is a sample of a patch magnified to 100X showing oil at a cleanliness of approximately ISO 22/20/18, fairly typical of 'new' oil.



Single and multi-pass filtration

Filtration is commonly set up for either a single pass through the filter or multiple passes through the filter. As you will see below, multi-pass systems are highly preferred for most applications.



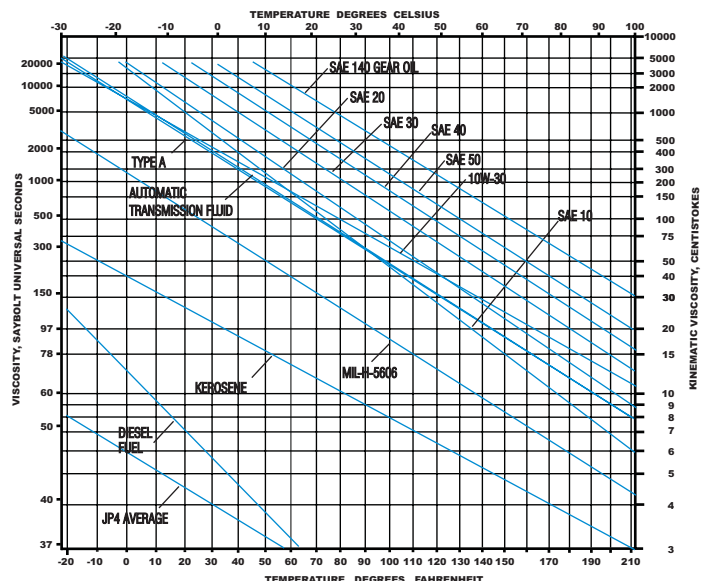
Reasons to choose a multi-pass system:

- ▶ In practice it is expensive and difficult to effectively clean product in a single pass.
- ▶ Required cleanliness levels can be achieved using lower micron efficiency filters.
- ▶ Smaller systems can be designed to accommodate high viscosity fluids and/or high flow rates.

As a general rule, it is necessary to circulate all the oil or fuel in a storage vessel 6 to 7 times to ensure all product has been filtered at least once. Take this into account when designing a new storage system on mobile or industrial equipment.

Viscosity/Temperature Chart

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



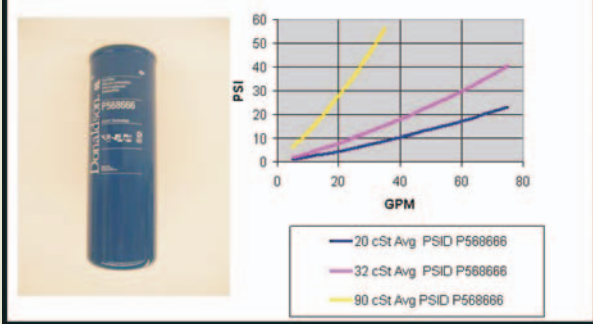
Filter selection

Filter performance is primarily a function of system design. Filter selection should be done carefully when a system is designed. However, here is a general guide to consider.

- ▶ Step 1: Ensure system is sealed and not exposed to elements. Define target cleanliness levels and filtration objectives.
- ▶ Step 2: Chose and size appropriate filtration giving careful consideration to factors such as fluid viscosity, operating temperatures and flow rates.

Donaldson bulk filter elements

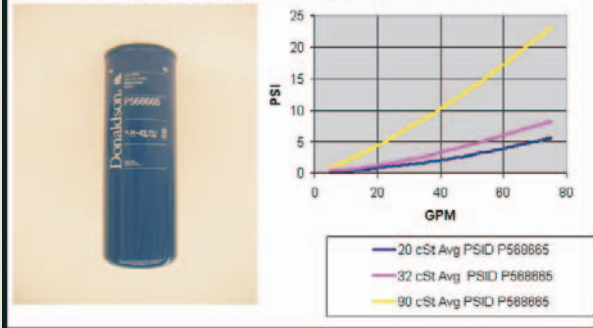
4um BLF P568666 flow versus pressure drop at 20, 32 and 90 cST



4 micron: Incorporates Donaldson's new DERT media (Donaldson Electrostatic Reduction Technology).

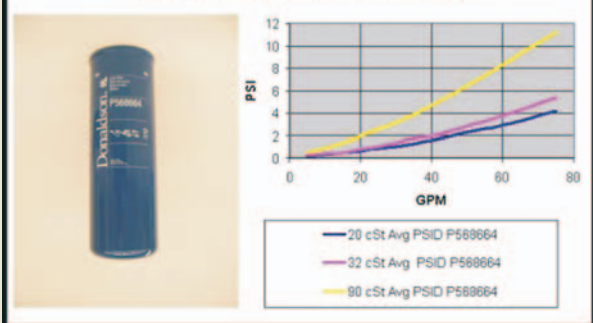
Provides high efficiency useful for diesel fuel and servo valves, targets ISO cleanliness levels of 14/13/11 or better.

7um BLF P568665 flow versus pressure drop at 20, 32 and 90 cST



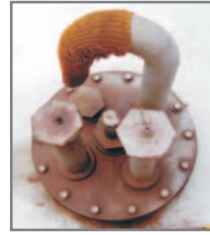
7 micron: provides high dirt holding capacity (useful for general hydraulic and transmission applications, targets ISO cleanliness levels of 16/14/11 or better)

25um BLF P568664 flow versus pressure drop at 20, 32 and 90 cST



25 micron: provides high dirt holding capacity at a low pressure drop, for use with high viscosity oils (engine lube and gear oils, targets ISO cleanliness levels of ISO 18/16/13 or better)

- ▶ Step 3: To ensure no further dirt ingress, install a proper breather system.



This 'breather' is a typical example of 'make-a-plan' breather. The costs saved with a DIY approach are small compared to the costs of resultant system wear.

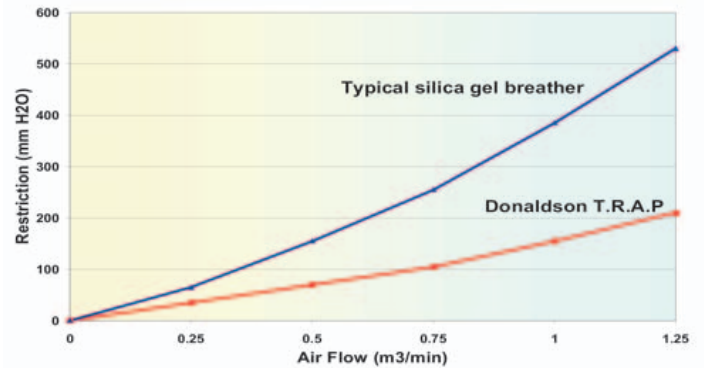
Since many contaminants are airborne, any oil or fuel exposed to the atmosphere will become contaminated unless the air is filtered or the container is completely sealed.

Use a good quality filter, like the T.R.A.P. (Thermally Reactive Advanced Protection) breather. The T.R.A.P. breather removes moisture at relative humidity levels as low as 15%. It offers superior moisture blocking and particulate filtration down to 3 microns at 97%.



KYX920006	Complete assembly
P923075	Element

Flow curve

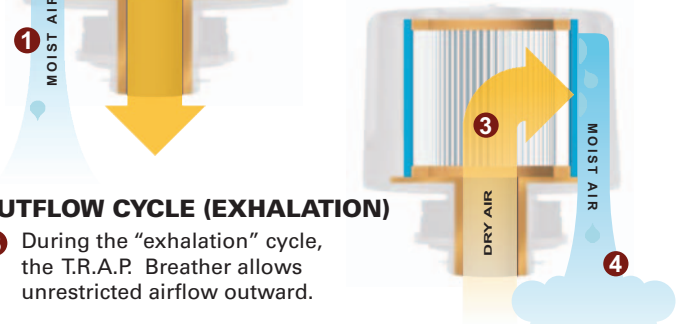


How T.R.A.P. works

Trapped moisture

INTAKE CYCLE (INHALATION)

- 1 The circuit "breathes in" air containing moisture vapor.
- 2 The T.R.A.P. Breather strips moisture from the incoming air, allowing only 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.

Filter applications



Bulk fuel and lube filtration

P568583	Single head
P568932	4 way manifold
P568933	5 way manifold
P568666	Element 4um
P568665	Element 7um
P568664	Element 25um



Snap-it Point of use filter

Designed for higher pressure delivery pump applications. High pressure spin-on (static burst 1700 p.s.i or 120 bar)

P566024	Snap-it head assembly with bypass
P566023	Snap-it head assembly
P565184	Snap-it element 4 um
P565185	Snap-it element 7 um
P565183	Snap-it element 15 um



Bulk fuel filtration, simple to service



T.R.A.P. Breather installation on a bulk tank

Diesel fuel / water separation

In addition to particulate filters in diesel systems, water removal filters can be installed in lines upstream of bulk tanks as well as downstream on the filling/recirculation lines. These filters will separate water from diesel with flow rates ranging from 0-400 L/Min. Each unit is fitted with a manual drain kit in order to remove the water collected inside the filter housing.



KYX920009	P568575	Replacement element
KYX920008	P920967	Replacement element
KYX920007	P921319	Replacement element

Rely on the world leader in heavy-duty filtration

As world leader in heavy-duty filtration, we offer a diverse range of filtration products to suit virtually every application. Our engineers are able to custom design filtration systems for your specific requirements and provide you with continued support. Contact a Donaldson representative at one of our regional offices today or visit our website for more information.

Hydraulic Filtration Solutions

Donaldson delivers quality hydraulic filters, replacement elements, test points and reservoir accessories for industrial and mobile equipment, bulk fuel and lube systems.



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FILTRATION SOLUTIONS