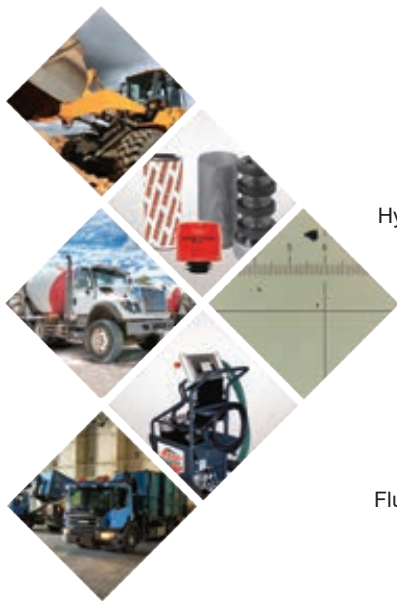




MOBILE POCKET GUIDE

Advanced Fluid Conditioning Solutions®



Hydraulic & Lube Filtration

Fuel Filtration

Filter Systems &
Diagnostic Tools

Process Filtration

Element Technology

Accessories

Fluid Engineering Services



As an ISO 9001:2015 certified company, Schroeder Industries has been designing, manufacturing, and marketing a complete range of Advanced Fluid Conditioning Solutions® for over 73 years.

With a comprehensive portfolio of filtration and diagnostic solutions, we have been recognized as *the* leader in fluid conditioning for markets that use:

Hydraulic and Lube Filtration (pg. 40)

A complete range of filter assembly types up to 6,500 psi (448 bar)

Fuel Filtration (pg. 43)

Elements, housings, and systems for challenging fuel cleanliness requirements

Filter Systems & Diagnostic Tools (pg. 48)

Mechanical and electronic fluid conditioning and diagnostic monitoring tools

Element Technology (pg. 53)

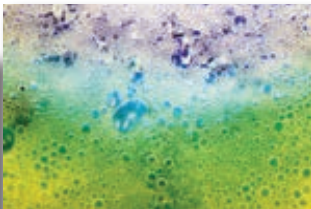
High-efficiency elements for lubrication and fluid power systems

*The purpose of this guide is to serve as a useful, simple, and compact reference of fluid contamination and best proactive practices for our customers and the markets we serve.



What is Contamination?

Contamination is any foreign matter introduced into a fluid power (hydraulic) system. Fluid power system repairs represent a significant portion of annual maintenance dollars spent today. With electric controls and the tolerances becoming so tight, contamination becomes an enormous cause for system repairs.



Types of Contamination

SOLID



GAS



LIQUID



GEL-LIKE



Sources of Contamination

Built in

- During manufacturing / assembly

Ingression

- Leaking seals, breather caps, worn fittings, cylinders, etc.

Internally Generated

- Shavings created from the wearing and scoring of hydraulic components

Introduced During Repair

- Dirty parts on shelves, dust/dirt in the air, inadequate cleaning during re-assembly, etc.

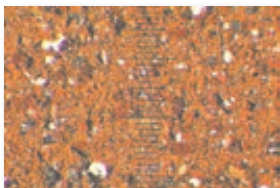
Contamination May Be...

Particles We Can See:

- Weld Spatter
- Metal Cuttings
- Rubber Dust from Making Hoses
- Sludge
- Floor Sweepings
- Metal from Damaged Components
- Paint Chips
- Rust
- Rags and Plastic Caps Left in Component when Installed



Metal Shavings



Rust

Contamination May Be...



Particles We Cannot See (less than 40 microns (μm))

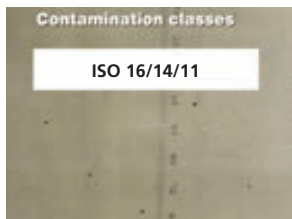
- Airborne Dust
- Metal Particles Internally Generated or Externally Induced
- Silt Particles



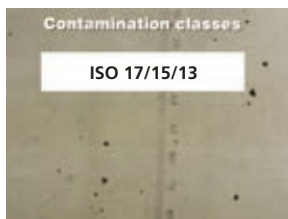
Fluids

- Water
- High Pressure Wash Down Cleaning Solutions
- Other Chemicals: Diesel Fuel, Anti-Freeze, Solvents, etc.

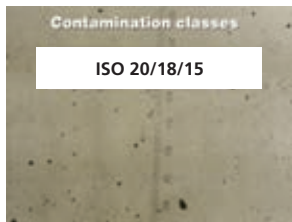
Just because it's "new" oil, doesn't mean it's "clean" oil!



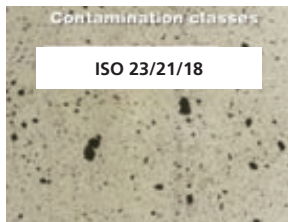
Demanded by Modern Hydraulic Systems



New Oil as Delivered in Mini-container



New Oil as Delivered on Tanker



New Oil as Delivered in Barrels

Types of Contamination - Specs to keep in mind

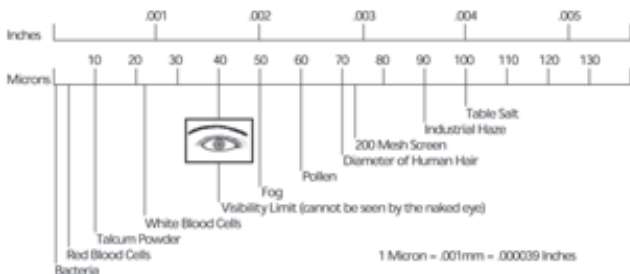
Manufacturers are keeping up with the demand by utilizing newer technology in machine parts. This technology can help reduce material waste, promote improved production times, and the overall quality of work.

With the demand for higher efficiency, tolerances have become tighter, and parts have become smaller. Tolerances as tight as .0001 of an inch are more frequently used. **With that tight of a tolerance, contamination in fluids (even 10x smaller than a grain of table salt) can negatively affect critical system components.**

Consider the diameters of the following substances:

Substance	Microns	Inches
Grain of table salt	100	.0039
Human hair	70	.0027
Talcum powder	10	.00039
Bacteria	2 (average)	.000078

A micron rating identifies the size of particles that a particular filtration media will remove. For instance, Schroeder Z10 filter media is rated at B10 ≥ 1000 , meaning that it can remove particles of 10 μm and greater than 99.9% efficiency.



ISO Cleanliness Levels - Explained

ISO 4406:1999 provides guidelines for defining the level of contamination present in a fluid sample in terms of an ISO rating.

To structure an ISO Code, the amount of dirt particles measured in a 1 mL sample must be larger than these three specified sizes: **4 $\mu\text{m(c)}$ / 6 $\mu\text{m(c)}$ / 14 $\mu\text{m(c)}$** .

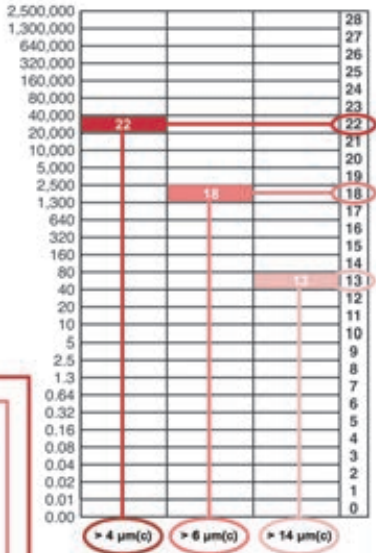
Example

larger than 4 $\mu\text{m(c)}$ = 22,340

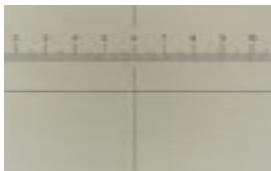
larger than 6 $\mu\text{m(c)}$ = 1,950

larger than 14 $\mu\text{m(c)}$ = 43

ISO Code = 22/18/13



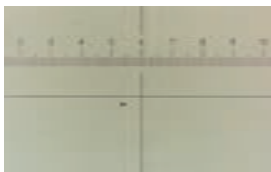
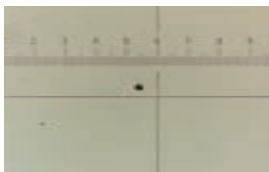
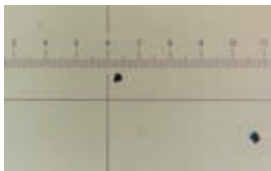
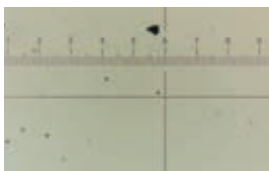
Comparison Photos of Fluid Contamination Classes (1 Scale Mark = 40 μm)

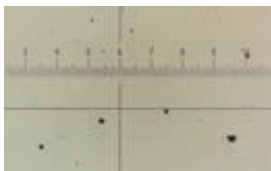


ISO 12/9/6

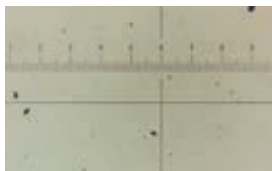


ISO 13/10/7

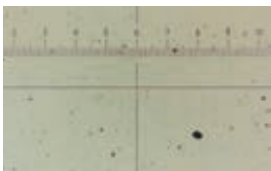
ISO 14/12/9
NAS 1638: Class 3
SAE AS 4059(D): Class 4ISO 15/13/10
NAS 1638: Class 4
SAE AS 4059(D): Class 5ISO 16/14/11
NAS 1638: Class 5
SAE AS 4059(D): Class 6ISO 17/15/12
NAS 1638: Class 6
SAE AS 4059(D): Class 7



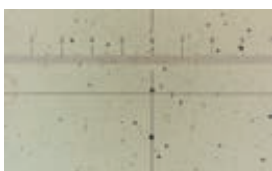
ISO 18/16/13
NAS 1638: Class 7
SAE AS 4059(D): Class 8



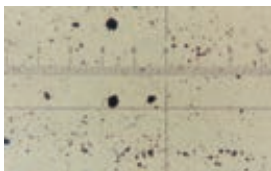
ISO 19/17/14
NAS 1638: Class 8
SAE AS 4059(D): Class 9



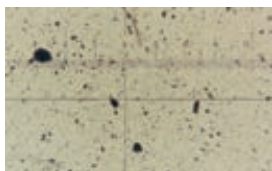
ISO 20/18/15
NAS 1638: Class 9
SAE AS 4059(D): Class 10



ISO 21/19/16
NAS 1638: Class 10
SAE AS 4059(D): Class 11



ISO 22/20/17
NAS 1638: Class 11
SAE AS 4059(D): Class 12



ISO 23/21/18
NAS 1638: Class 12
SAE AS 4059(D): Class 13

It is important to note that the ISO 4406:1999 coding system is set up so that, for each number, the code increases the contamination level exponentially. For example: The particle count for ISO level 10 is 5–10 particles per mL; ISO level 11 is 10–20 particles per mL.

Types of Contamination

All photos are magnified 48x. Each line is a measurement of 45 μm .



Rust and Additives

The photo to the left shows rust and other particles that are white. There are also additives in this photo. These particles result in premature aging of the oil, damage to pumps, seals, and valves, as well as other wear and tear.



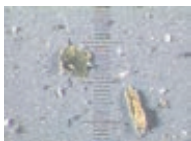
Oil Aging Products

These particles block the filter element and cause silting within the system.



Metal

These particles cause wear on pumps, seals, and other components, as well as increase the aging rate of oil.



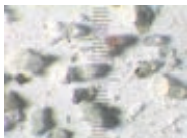
Bronze, Copper, and Brass

These particles cause wear on pumps, seals, and other components, as well as increase the aging rate of oil.



Gel-type Residue from Filter Element

These block the filter by silting up the element causing the filter to go into bypass or collapse.



Silicates

They are caused by lack of/or an inadequate air breather filter. This produces heavy component wear, pump, and valve breakdowns, as well as wearing of seals.



Colored/Synthetic Particles

They cause breakdowns in pumps, and valves, as well as wearing of the seals.



Fibers

They enter through open tanks, cleaning clothes, etc. Fibers block nozzles and cause leaking from valve seats.

As seen in the pictures above, contamination takes many different shapes, consistencies and sizes. It is obvious that some of these contaminants cause more damage than others; however, all cause damage and need to be removed from circulating flow as quickly as possible.



For this reason, Schroeder Industries recommends multiple filtration locations in a circuit so that all components are protected. **[Continued on Next Page]**

Components, ISO Codes, and Filter Media

Recommended Cleanliness Levels (ISO Codes) for Fluid Power Components

Components	Cleanliness Level
Hydraulic Fixed Gear Pump	18/16/13
Hydraulic Fixed Piston Pump	17/15/12
Hydraulic Variable Vane Pump	17/15/12
Hydraulic Fixed Vane Pump	18/16/13
Hydraulic Proportional Valves	16/14/12
Hydraulic Servo Valves	15/13/11

Schroeder Element Media Recommendations

Desired Cleanliness Levels (ISO Code)	Schroeder Media
20/18/15-19/17/14	Z25
19/17/14-18/16/13	Z10
18/16/13-15/13/10	Z5
15/13/10-14/12/9	Z3
14/12/9-13/11/8	Z1

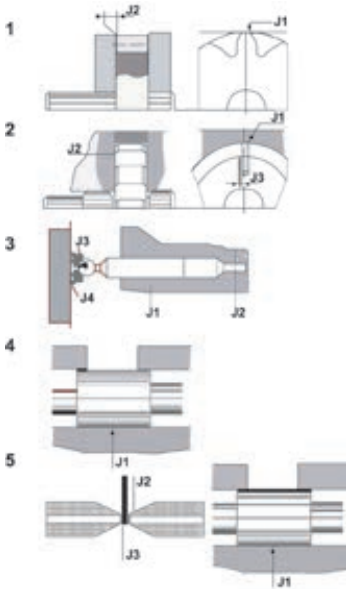
Recommended Schroeder Media to Achieve Desired Cleanliness Level*

Desired Cleanliness Levels (ISO Code)	Ingression Rate	Schroeder Media
20/18/15	High	Z25
19/17/14	Low	Z25
19/17/14	High	Z10
18/16/13	Low	Z10
18/16/13	High	Z5
15/13/10	Low	Z5
15/13/10	High	Z3
14/12/9	Low	Z3
14/12/9	High	Z1
13/11/8	Low	Z1

*Based on Ingression Rate

Types of Contamination - Specs to be aware of

Component	Typical Critical Clearance (μ)
1. Gear Pump (J1, J2)	0.5-5
2. Vane-cell Pump (J1)	0.5-5
3. Piston Pump (J2)	0.5-1
4. Control Valve (J1)	1-25
5. Servo Valve (J1)	1-4



Damage Caused By Contamination



Surface Scoring & Wear



Fluid Degradation



Gel-Like / Varnish



Metal Shaving / Solid



Internally Generated

Ingression Contamination - Cause & Effect

Cause

- Improper Filtration
- Low Oil Level - Concentration of Contaminant
- Loose or Lost Breather Cap
- Leaking Fittings, Seals, Wipers, etc.
- Missing or Collapsed Inlet Strainer
- Poor Transferring, Delivering, and Dispensing Practices
- Clogged Filter - Filter in Bypass



Effect

- Accelerated Wear of Bearings, Thrust Plates, Filter Housing, etc.
- Bearing / Bushing Failure
- Reduced Pump Efficiency
- Reduced System Life
- Heat
- Internal Leaks
- Failed Pump



Note From the Expert:

Change element when bypass is indicated. If no indicator is installed on the filter, consider installing one to remain on top of your fluid cleanliness.

Cavitation Damage - Cause & Effect

Cause

- Inlet Restriction
- Clogged Inlet Strainer / Breather
- Inlet Strainer Too Small
- Inlet Line Too Long
- Inlet Line Bore Too Small
- Excessive Engine Speed
- Collapsed Inlet Hose
- Suction Head Too Great
- Oil Too Viscous (Cold Weather)

Effect

- Noise
- Heat
- Accelerated Wear Thrust Plates / Housing
- Internal Leaks
- Reduced Pump Efficiency
- Erratic Actuator Performance
- Failed Pump



Note From the Expert:

Blocked suction strainers and air breathers are two leading causes of pump cavitation.

Aeration Damage - Cause & Effect

Cause

- Air Enters Oil
- Low Oil Level
- Whirlpool of Oil Above Strainer
- Loose Inlet Fittings
- Worn Pump Shaft Seal
- Worn Cylinder Rod Seal
- Foam Suspended in Oil due to Sloshing in the Reservoir

Effect

- Noise
- Heat
- Accelerated Wear Thrust Plates / Housing
- Internal Leaks
- Reduced Pump Efficiency
- Erratic Actuator Performance
- Failed Pump



TNK25

Note From the Expert:

A simple redesign of your system tank can give you increased de-aeration, and volume reduction.

Pressure Damage - Cause & Effect

Cause

- Improper Relief Valve Setting
- Relief Valve Malfunctioned
- Slow Acting Relief Valve
- Absence of a Relief Valve
- Improper Size Elbow or Fitting Downstream of the Valve Affecting the Performance

Effect

- Accelerated Wear
- Cracked Housing
- Excessive Housing Cut-Out
- Reduced Efficiency
- Internal Leakage
- Bearing / Bushing Failure
- Thrust Plated Coined, Warped, or Cracked
- Broken Drive / Connecting Shaft



Note From the Expert:

Continuously check pressure and flow to ensure proper system functioning.

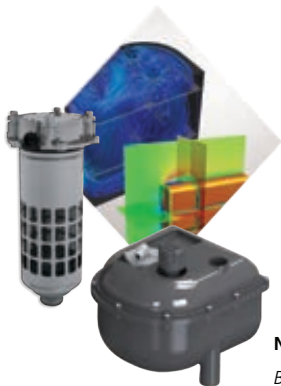
Heat Damage - Cause & Effect

Cause

- Low Oil Level
- Cavitation / Aeration / Water
- Contamination
- Inlet Restriction
- Relief Valve
- Incorrect Fluid
- Poor Size & Build of Reservoir
- Undersized Fittings, Hoses, Components, etc.

Effect

- Breakdown of Oil
- Loss of Lubricity
- Accelerated Wear
- Reduced Efficiency
- Leakage
- Varnish / Sludge
- Internal Seal Destruction
- Seizure



Note From the Expert:

By optimizing your systems tank, this allows for better temperature control.

How to Control Contamination

Maintain and Monitor Filtration

1. Check the condition of filter caps/breathers
2. Monitor dirt alarm and replace filter element as necessary
3. Take oil samples frequently and check for particulate or water contamination
4. Compare results with corporate guidelines for contamination levels (*reference pg. 14*)

Fluid Storage & Handling

1. Store fluid in clean, dry container
2. Do not mix old and new fluid
3. Pre-filter fluid before filling reservoir
4. Fill through fill cap strainer on reservoir

Parts Storage & Handling

1. Store parts in a clean area
2. Plug all port openings in components, manifolds, hose, and tube assemblies
3. Keep all hydraulic components plugged until flushed or installed in vehicle

How to Control Contamination - Continued

Parts Installation

1. Keep work area clean
2. Inspect parts for contamination before installing in a system
3. Make sure cylinder rods are not painted or have overspray

Flush Hydraulic System

1. Thoroughly clean all hydraulic components before assembly
2. Flush all hydraulic plumbing before final installation
3. After final assembly, flush total hydraulic system thoroughly before rolling out (*roll-off cleanliness*)

"...as much as 70% of all premature machine failures can be attributed to contamination"

-NORIA Corp.

Contamination Costs

- Downtime
- Additional Maintenance
- Replacement of Parts
- Environmental Fines and Cleanup
- Missed Pickup Hours
- Unhappy Customers



Recommended Practices for Taking Oil Samples

Sampling Procedure:

1. Find a convenient opening above the fluid level in the reservoir through which the sampling tube can enter.
2. Determine the approximate distance (half the depth of the reservoir).
3. Place a reference mark on the sampling tube at a point corresponding to the length of the tubing needed to reach the halfway point from the opening through which the sampling tube will enter.
4. Use a lint-free cloth to clean all surfaces which could contribute contaminant to the fluid sample.
5. Operate the hydraulic circuits to help diffuse particulate contaminant as evenly as possible throughout the reservoir.
6. Insert the sampling tube into the reservoir to the reference mark immediately after the contaminant in the reservoir has been diffused.

NOTE: It may be necessary to weigh the end of the tubing to help it to be positioned at the desired level.

7. Flush sampling tube with reservoir fluid equal to approximately five (5) times the internal volume of the sampling line. **Do not use flushing fluid or flushing bottle to obtain fluid sampling.**
8. Withdraw a fluid sample from the reservoir into a clean sample bottle.* Fill sample bottle to no more than 75% of the sample bottle volume.
9. Remove sample bottle and recap immediately.

****NOTE: Sample bottles are available for FREE from Schroeder Industries (PLEASE NO WATER BOTTLES)!***

NOTE: For accurate results, take sample immediately after vehicle or system has run for a fair amount of time.

Contamination Control in Hydraulic Hose Making

Making

Cutting hoses introduces contamination to the hydraulic system in the form of:

- Metal Particles From the Hose's Wire Reinforcement
- Cutting Blade Itself
- Polymer Dust From the Hose's Outer Cover and Inner Tube if Not Addressed Before Crimping and Installation

How to Clean a Hose

The most efficient and popular way to clean a hose prior to installing crimped ends is by blowing a foam cleaning projectile through the hose using a special attachment connected to compressed air.

Clamping

Hydraulic hose manufacturers estimate that 80% of hose failures are attributed to external, physical damage through pulling, kinking, crushing, or abrasion of the hose. **Abrasion caused by hoses rubbing against each other or surrounding surfaces is the most common type of damage.**



Note From the Expert:

A proper clamping solution can eliminate unnecessary damage to your hoses.

Common Poor Practices - Maintenance

Unprotected Parts Storage

- Caps
- Cylinders
- *Unprotected Hoses*

Dirty Parts

- Metal Contamination
- Dirty Cylinders

Open Containers

- *Open Fluid Containers*
- *Open Part Containers*



Open Fluid Containers



Common Poor Practices - Maintenance - Continued



Unprotected Hoses



Open Part Containers



Things to Consider - Fluid Handling

1. Condition-based hydraulic servicing. In order to maximize element and oil life, while saving money and reducing downtime, service your hydraulics when needed. Without using visual indicators, or oil analysis kits, how can you be sure your hydraulic system is performing as designed?
2. If you keep your hydraulic oil clean, cool, and dry, the need to change oil during a hydraulic service can be greatly reduced. In order to accomplish this, a comprehensive contamination control program must be implemented along with oil analysis.
3. Just because you bought "new" oil, it doesn't mean it's "clean" oil. Consider placing bulk filtration between your storage tank and fluid dispenser. Doing this provides protection for the entire fleet and ensures clean oil is being put into your vehicles.
4. Use a filter cart whenever a major hydraulic repair is completed. Not doing so will cause more damage in the future, guaranteed. Don't dump the oil just because you changed a pump. A Schroeder filter cart can clean any contamination ingress during the pump change-out.



Contamination Control Tiers (1 of 3)

Tier 1 (Basic)



Tier 1 (Basic)

Basic contamination control begins with filtering contaminants while fluid is dispensed. The bulk filter assembly is plumbed between the storage tank and the dispensing nozzle. Dispensed fluid is filtered or it is returned to the storage tank, preventing contaminated oil from reaching the equipment.

Recommended Components

- Bulk Filtration
- Desiccant Breather
- Quality Suction Strainer
- Quality Return Filter
- On-board Air Breather

Contamination Control Tiers (2 of 3)

Tier 2 (Intermediate)



Tier 2 (Intermediate)

In addition to the components in the basic solution, Tier 2 incorporates portable on-board cleaning that can extend the service life of the hydraulic fluid. The technician now has the ability to clean the hydraulic system after making any hydraulic repairs. As in the basic solution, proper maintenance practices, as well as a sampling program must be followed to ensure oil serviceability.

Recommended Components

- Bulk Filtration
- Desiccant Breather
- Quality Suction Strainer
- Quality Return Filter
- On-board Air Breather
- Portable Filtration

Contamination Control Tiers (3 of 3)

Tier 3 (Advanced)



Tier 3 (Advanced)

The advanced solution uses all components in the lower tiers and incorporates a bulk storage pre-filter that prevents dirty oil from entering your tanks.

Recommended Components

- Bulk Filtration
- Desiccant Breather
- Quality Suction Strainer
- Quality Return Filter
- On-board Air Breather
- Advanced Portable Filtration
- Bulk Pre-Filter

Products

We will now dive in deeper to some of the products and solutions we offer here at Schroeder Industries.

All Schroeder products are tested and held to these standards:

ISO 2941	Element Collapse (Burst)
ISO 2942	Fabrication Integrity
ISO 2943	Material Compatibility
ISO 3723	End Load
ISO 3724	Element Flow Fatigue
ISO 3968	Pressure Drop / Flow
ISO 4402: 1991	Calibration of automatic particle counters
ISO 4405: 1991	Determining particulate contamination of fluid by Gravimetric Method
ISO 4406: 1987	Methods of coding level of fluid contamination by solid particles
ISO 4406: 1999	Code for defining level of contamination of solid particles
ISO 4407: 1991	Determining fluid contamination by counting method using a microscope
ISO 11171: 1999	Calibration of liquid automatic particle counters
ISO 16889	Multi Pass Test
NAS 1638	Cleanliness requirements of parts used in hydraulic systems
NFPA/T-2.6.1	Burst Pressure Test
NFPA/T-2.6.1	Fatigue Testing
NFPA/T-3.10.17	Pressure / Life Rating of a Spin-On Filter

Bulk Filtration

3K9 Single-Pass Filter Kit -

- Provides entire shop single-pass filtration at the dispensing nozzle
- Mounted between bulk storage tank and fluid dispenser
- Used for hydraulic fluids
- Field proven to deliver fluid at 18/15/13 or better in a single-pass



3K9

* Available in Hydraulic & Lube*

MCO Clean Oil Dispenser -

- Provides guaranteed clean fluid at the dispensing nozzle
- Uses a bypass valve to divert fluid once the filter goes into bypass
- Prevents unfiltered fluid from reaching the fleet
- Used for hydraulic fluid
- Field proven to deliver fluid at 18/15/13 or better in a single-pass



MCO

* Available in Filter Systems*

Bulk Filtration - Continued

K9 Medium Pressure Filter -

- Provides filtered fluid to dispensing applications
- Primarily used for engine oil and/or small bulk hydraulic fluid systems (*less than 250 gallon*)
- Comes with a 3 μ m element

NOTE: If using for engine oil, order and use the 27KZ25 (25 μ m) element



* Available in Hydraulic & Lube*

K9

KL3 Return Line Filter -

- Used as the bulk delivery pre-filter (3 μ m)
- Prevents contamination from entering bulk storage from fluid vendor

Replacement element part number is G3228

NOTE: Customer needs to source vendor delivery connection adapter



* Available in Hydraulic & Lube*

KL3

Product Line Overview

Bulk Filtration - Continued

DBE-4 Desiccant Air Breather -

- Used on bulk storage tank
- Pleated air filter with 2 μm filtration rating
- Reusable base with check (intake) and bypass (outflow) valves
- Check valves prevent absorbents from being re-introduced into the system during downtime

Replacement cartridge: RDBE4 Replacement base: 1304256



DBE-4

* Available in Accessories*

ABF 3/10 Air Breather -

- Large surface areas offer high dirt holding capacity
- 3 μm / 40 SCFM
- Available with filter strainer, dipstick, indicator, and check/relief valve options



ABF 3/10

* Available in Accessories*

A-ABC-1 Air Breather Check Kit -

- The Air Breather Check (ABC) takes the guesswork out of when to change your air breather. The A-ABC-1 doesn't care how dirty the air breather looks or how long it's been installed, it only cares how well the breather is working.

NOTE: See Catalog (L-4329) for optional mounting kit



A-ABC-1

* Available in Accessories*

PABR7 Air Breather -

- 3 μm / 35 SCFM
- Durable synthetic Nylon 6 housing
- Replacement Phenolic resin impregnated filter element
- Integrated anti-splash insert

Replacement element: R-PAB7-3



PABR7

* Available in Accessories*

Bulk Filtration - Continued

Y2, D5 Visual Indicator -

- Visual indicators provide an economical way to know, at a glance, when a filter element needs to be replaced. With the dial indicator, the pointer will reach the red section just before bypassing occurs.

NOTE: The Y2 is a variable, tri-color gauge, whereas the D5 is a visual pop-up.



Y2



D5

* Available in Accessories*

SKB-1 Suction Strainer -

- Unique protection, for pumps of all sizes, from ferrous particles. Some of which have the potential of destroying pumps in a single-pass.



SKB-1

* Available in Accessories*

GS-5U Gauge Kit -

- Protects vehicles against over pressurization. The 150 psi gauge can not be damaged when a 2500 psi system is being checked. This design feature eliminates the need to know the pressure before testing.
- Compact and portable; The GS-5U is 6½" in diameter. The GS-5U fits easily into the average tool box for instant availability.



GS-5U

* Available in Accessories*

Product Line Overview

Bulk Filtration - Continued

MFD Mobile Filtration System -

- Dual filter cart with 5 μm or 3 μm elements
- 7 gpm pump

Suggested part numbers:

MFD127Z05Z01B07 (PIN 7616339)

27KZ5 (5 μm element)

27KZ1 (1 μm element)



* Available in Filter Systems*

MFD

MFS Mobile Filtration System -

- Single filter cart with 1 μm element
- 7 gpm pump

Suggested part numbers:

MFS127Z05Z01B07 (PIN 7616445)

27KZ1 (1 μm element)



* Available in Filter Systems*

MFS

How to Clean Hydraulic Systems using a Filter Cart

1. Place wands into hydraulic reservoir. Ensure the suction wand is lower than the return or on the opposite side of the return wand.
2. Run cart for 10-12 minutes to clean the reservoir.
3. Turn on hydraulic pump and starting with the largest bore cylinder, cycle the function three (3) times.
4. Turn off pump and clean reservoir following procedure in Step 2.
5. Repeat Step 3 for the remaining hydraulic functions. Turn off pump between each function in order to clean the reservoir.
6. After all functions have been run, top off reservoir and clean the tank one last time. (Skip cleaning reservoir if bulk filtration unit is installed on the hydraulic dispenser).

NOTES:

1. As a best practice and for ease of use, install quick disconnects (QD's) on each truck being serviced by the filter cart. QD's also assist in preventing re-introduced contamination and assist in maintaining a closed hydraulic system.
2. Some tank designs prevent cycling of the hydraulic system because the wands must be inserted into the tank with the return filter removed. In this case, run the filter cart for 25 minutes to maximize cleanliness of the reservoir in a single step.
3. Know your ISO count. Consider upgrading the cart with the HY-TRAX® Retrofit System Assembly (pg. 50).

HYDRAULIC & LUBE FILTRATION

Our filter housings are continuously tested using the latest ISO and NFPA test procedures in our Fluid Care Center (FCC). Extensive testing is conducted to verify rated fatigue and burst pressures and to ensure compatibility with various mineral-based fluids.



Product offerings include:

- ◆ High Pressure Filters (1,500-6,500 psi)
- ◆ Medium Pressure Filters (500-1,500 psi)
- ◆ Stainless Steel (up to 1,500 psi)
- ◆ Low Pressure Filters (up to 500 psi)
- ◆ Suction Filters
- ◆ Manifold Cartridge Kits & Filters
- ◆ Custom Solutions

Model Code: ART85Z5SS43Y2

Flow Rating:	225 gpm (840 L/min) for 150 SUS (32 cSt) fluids
Max. Op. Pressure:	145 psi (10 bar)
Min. Yield Pressure:	353 psi (37 bar), per NFPA T2.6.1
Rated Fatigue Pressure:	145 psi (10 bar), per NFPA T2.6.1
Temperature Range:	-20°F to 225°F (-29°C to 107°C)
Porting Head & Cap:	Aluminum
Element Case:	Plastic
Element Change Clearance:	16.39" (340 mm)
ΔP:	See H&L Catalog (L-2520)
Porting:	2½" SAE 4-bolt flange Code 61, Dual 2½" SAE 4-bolt flange Code 61, SAE-32, Dual SAE-32

**Model Code: MRT18LZ10S24S24D5**

Flow Rating:	up to 150 gpm (570 L/min) for 150 SUS (32 cSt) fluids
Max. Op. Pressure:	900 psi (6 bar)
Min. Yield Pressure:	2700 psi (186 bar)
Rated Fatigue Pressure:	750 psi (52 bar), per NFPA T2.6.1-2005
Temperature Range:	-20°F to 225°F (-29°C to 107°C)
Porting Head & Cap:	Cast Aluminum (Anodized)
Element Case:	Steel
Element Change Clearance:	17.0" (432 mm)
ΔP:	See H&L Catalog (L-2520)
Porting:	1.5" - SAE straight thread



Model Code: LRT18LZ10S24S24NY2

Flow Rating:	Up to 150 gpm (570 L/min) for 150 SUS (32 cSt) fluids
Max. Op. Pressure:	100 psi (7 bar)
Min. Yield Pressure:	400 psi (28 bar)
Rated Fatigue Pressure:	90 psi (6 bar), per NFPA T2.6.1-2005
Temperature Range:	-20°F to 225°F (-29°C to 107°C)
Porting Head & Cap:	Die Cast Aluminum
Element Case:	Steel
Element Change Clearance:	17.0: (432 mm)
ΔP:	See H&L Catalog (L-2520)
Porting:	1", 1½", 1¼", 2" - NPTF, SAE-16, SAE-20, SAE-24. SAE-32,
	1¼", 1½", 2" SAE 4-bolt flange Code 61 ISO 228 G-1½"


Model Code: TNK25

Max. Return Flow:	75 gpm (284 L/min)
Tank Volume:	25 gal (100L)
Tank Materials:	High Density Polyethylene (HDPE) Polypropylene (Polypro)
Temperature Range:	High Density Polyethylene (HDPE) -20°F to 180°F (-29°C to 105°C) Polypropylene (Polypro) -32°F to 240°F (0°C to 116°C)
Return Line Filter:	TNK25: RT & GRT
Element Change Clearance:	TNK25: 12" (305 mm)
ΔP:	See H&L Catalog (L-2520)



FUEL FILTRATION

Our full range of fuel filtration products have revolutionized fuel cleanliness, and serve a diverse range of markets and industries. The designs of our products are a result of many hours of field testing, laboratory research, over 73 years of experience, and partnerships with fuel industry and filtration experts.



Product offerings include:

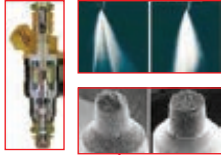
- ◆ Fuel Condition Monitoring Equipment
- ◆ On-Board, Mobile Diesel Filtration
- ◆ Diesel Particulate & Coalescing Solutions
- ◆ CNG Filtration Technology
- ◆ Biodiesel Treatment & Polishing
- ◆ ASME Filtration Vessels
- ◆ Custom Solutions

Diesel Engine Problems From Poor Quality Diesel/ Biodiesel Fuel

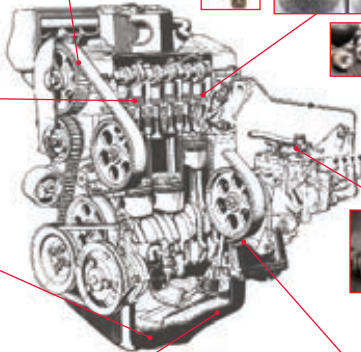
Bacterial Growth



Clogged Fuel Injections



Seal Failures



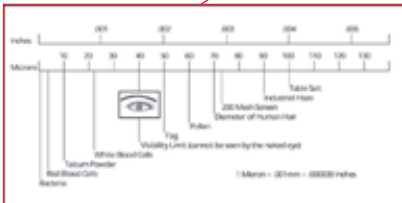
Oil Degradation/
Leakage



Damaged
Fuel Pump



Blocked
Fuel Filter



Unseen particles can still cause damage

Model Code: GHPF11GGZ3VS24D5R

Flow Rating:	Up to 100 gpm (380 L/min)
Max. Op. Pressure:	150 psi (10.3 bar)
Min. Yield Pressure:	2600 psi (179 bar)
Temperature Range:	-20°F to 225°F (-29°C to 107°C)
Bypass Setting:	Cracking: 40 psi (2.8 bar)
Porting Head:	Cast Aluminum, Anodized
Element Case:	Aluminum, Anodized
Element Change Clearance:	2.0" (51 mm)
Porting:	SAE-24

**GeoSeal****Model Code: GHCFG5VS24D5R**

Flow Rating:	Up to 25 gpm (95 L/min)
Max. Op. Pressure:	150 psi (10.3 bar)
Min. Yield Pressure:	1189 psi (82 bar)
Temperature Range:	32°F to 225°F (0°C to 107°C)
Bypass Setting:	Cracking: 40 psi (2.8 bar)
Porting Head:	Cast Aluminum, Anodized
Element Case:	Aluminum, Anodized
Sump:	Cast Aluminum, Anodized
Element Change Clearance:	4.5" (114 mm)
Porting:	SAE-24

**GeoSeal**

Model Code: BDFP11GGZ3CG5VD514

Flow Rating:	Up to 14 gpm (53 L/min)
Max. Op. Pressure:	See GHPF & GHCF Specs (pg. 35)
Min. Yield Pressure:	See GHPF & GHCF Specs (pg. 35)
Operating Temp.:	32°F to 104°F (0°C to 40°C)
Bypass Setting:	Cracking: 40 psi (2.8 bar)
Porting Head:	See GHPF & GHCF Specs (pg. 35)
Element Case:	See GHPF & GHCF Specs (pg. 35)
Sump:	See GHCF Specs (pg. 35)
Element Change Clearance:	4.50" (114 mm)
Porting:	-16 SAE (J1926)


Model Code: BDFC11GGZ3CG5VD525

Flow Rating:	Up to 25 gpm (95 L/min) for ULSD15 & biodiesel blends
Operating Temp.:	32°F to 104°F (0°C to 40°C)
Bypass Setting:	40 psi (2.8 bar)
Porting Head:	See GHPF & GHCF Specs (pg. 35)
Element Case:	See GHPF & GHCF Specs (pg. 35)
Sump:	See GHCF Specs (pg. 35)
Element Change Clearance:	4.50" (114 mm) (Elements included)



Model Code: BDC39QPMLZ3VAVM

Flow Rating:	Up to 25 gpm (95 L/min) for ULSD15 & biodiesel blends
Temperature Range:	32°F to 165°F (0°C to 74°C) Standard
Bypass Setting:	Particulate: 15 psi (1.03 bar) Coalescing: 25 psi (1.7 bar)
Porting Base:	Anodized Aluminum
Cap:	Plated Steel
Bag Housing:	304 Stainless Steel
Filter Housings:	Particulate: Epoxy Paint w/ High-phos Electroless Nickel Plating (Standard) Coalescing: Epoxy Paint w/ High-phos Electroless Nickel Plating (Standard)
Element Change Clearance:	33.8" (858 mm)

**Model Code: HDP-KF1-340-BC1, 600-BC1, & 600-HT1**

Flow Rating:	Up to 160 gph (600 lph)
Max. Op. Pressure:	14.5 psia (<1 bar) suction side application
Temperature Range:	BC1: -40°F to 194°F (-40°C to 90°C) HT1: -4°F to 194°F (-20°C to 90°C)
Nominal Voltage:	24V DC (12V DC is optional for heater or water sensor)
Water Separation Eff.:	>95% to ISO CD 16332
Porting Thread:	340-BC1: M22 x 1.5 600-BC1: M27 x 2.0 600-HT1: G¾" (BSPP)
Options:	Fuel pre-heater, and water sensor



HDP-KF1-340-BC1



HDP-KF1-600-BC1



HDP-KF1-600-HT1

Fuel Filtration

FILTER SYSTEMS & DIAGNOSTIC TOOLS

Our fluid conditioning and diagnostic monitoring tools are known for their diversity, capability and precision. As applications become more sophisticated and widespread, the need for highly efficient fluid conditioning, as well as condition monitoring is increasing.



Product offerings include:

- ◆ De-Watering, De-Gassing & Dehydration Units
- ◆ HTB | Hydraulic Test Benches
- ◆ Asset Management Filtration Carts
- ◆ TestMate® & HY-TRAX® Series
- ◆ Mobile & Stationary Filtration Systems
- ◆ Custom Solutions
- ◆ EasyTest & Fluid Analysis

Model Code: MFD-BC-1-09-H10-H05

Flow Rating:	7 gpm (26.5 L/min) max
Maximum Viscosity:	1000 SUS (216 cSt)
Fluid Temperature Range:	25°F to 150°F (-4°C to 65°C)
Bypass Setting:	Cracking 25 psi (1.7 bar)
Element Technology:	Staged 10 and 5 µm elements installed

**Model Code: MFD-1-27-GXX-B-14**

Flow Rating:	14 gpm (53.0 L/min) max
Maximum Viscosity:	1000 SUS (216 cSt)
Fluid Temperature Range:	25°F to 150°F (-4°C to 65°C)
Bypass Setting:	Cracking 25 psi (1.7 bar)
Element Technology:	Element not installed. Order desired micron elements as a separate line item.

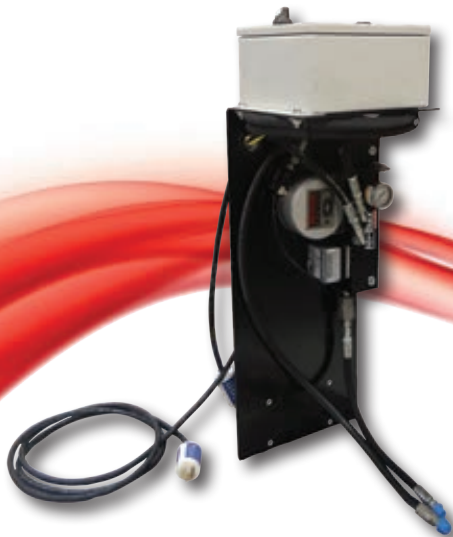
**Model Code: AMFS-1-18-G05-G03**

Flow Rating:	5 gpm (19 L/min)
Viscosity:	60-100 SUS (10-216 cSt)
Fluid Temperature Range:	25°F to 150°F (-4°C to 65°C)
Bypass Setting:	Cracking: 30 psi (2 bar) x 2



HY-TRAX[®]

Retrofit System Assembly



***A Retrofit Assembly enabling filtration systems
to display and transmit ISO particle
counts in real-time***



Visit our product page: <https://bit.ly/2DxVF0t>

FCU 1310: Model Code: FCU-1310-4-U-AS-1

Self- Diagnosis:	Continuously with error indication via status LED and display
Measured Value:	ISO Code/ SAE Class/ NAS Class/ Saturation level/ Temp.
Measuring Range:	Display from ISO code 25/24/23 to 9/8/7 Calibrate within the range ISO 13/11/10 to 23/21/18 Saturation level 0 to 100% Temperature -13°F to 212°F (-25°C to 100°C)
Accuracy:	± ½ ISO class in the calibrated range/ ± 2% Full scale max.
Seal Material:	Viton®
Ambient Temp. Range:	32°F to 113°F (0°C to 45°C)
Storage Temp. Range:	-40°F to 176°F (-40°C to 80°C)
IP Class:	IP50 in operation IP67 closed
Operating Pressure:	In: -7.25 to 650 psi (-0.5 to 45 bar) Out: 0 to 7.5 psi (0 to 0.5 bar)
Operating Pressure w/ Adapter for Pressure Lines	In: 217 to 5000 psi (15 to 345 bar) Out: 0 to 7.5 psi (0 to 0.5 bar)
Pressure Max.	5000 psi (345 bar)
Maximum Suction Ht.	39" (1 m)
Permissible Viscosity Range:	46 to 1622 SUS (10 to 350 cSt)
Fluid Temperature Range:	32°F to 158°F (0°C to 70°C)
Power Supply Voltage:	24 VDC ± 20%, residual ripple < 10%
Max. Power / Current Consumption:	100 Watt /4 A
Interface:	Plug connection, 5 pole, male, M12x1 USB
Weight:	Approx. 29 lbs (13 kg)





HMG4000 Diagnostic Unit: Model Code: HMG 4000-000-US

Analog Input

Input signals HSI analogue sensor

8 channels M12x1 Ultra-Lock flange sockets (5 pole) channel A to Channel H
 HSI SMART sensor
 Voltage signals: i.e. 0.5 .. 4.5 V, 0 .. etc. (input ranges for 0 .. 50 V, 0 .. 10 V, 0 .. 4.5 V, -10 .. 10 V)
 Current signals, i.e. 4 .. 20mA, 0 .. 20mA (input range 0 .. 20 mA) 1 x PT 100 / PT 1000 (on Channel H)

Accuracy dependence of the input range $\leq \pm 0.1\%$ FS at HSI, voltage, current
 $\leq \pm 1\%$ FS at PT 100 / PT 1000

Digital Inputs

Input signals Digital status (high/low)
 2 channels via M12x1 Ultra-Lock flange socket (5 pole) Channel I, J
 Frequency (0.01 to 30,000 Hz)
 PWM duty cycle
 Durations (i.e. Period length)

Level Switching threshold / switch-back threshold: 2 V/1 V Max input voltage: 50 V

Accuracy $\leq \pm 0.1\%$

CAN

Input signals HCSI sensors, CAN, J1939, CANopen PDO, CANopen SDO
 28 channels M12x1 Ultra-Lock flange socket (5 pole) channel K1 to K28

Baud rate 10 kbit/s to 1 Mbit/s

Accuracy $\leq \pm 0.1\%$

Calculated channels

Quantity 4 channels via virtual port L (channel L1 to channel L4)

ELEMENT TECHNOLOGY

Our exceptional elements are tested to ensure fabrication integrity in the manufacturing process. They are also tested for efficiency and dirt holding capacity in a multi-pass test stand, equipped with inline particle capabilities, which are calibrated to ISO standards and exceed industry requirements.



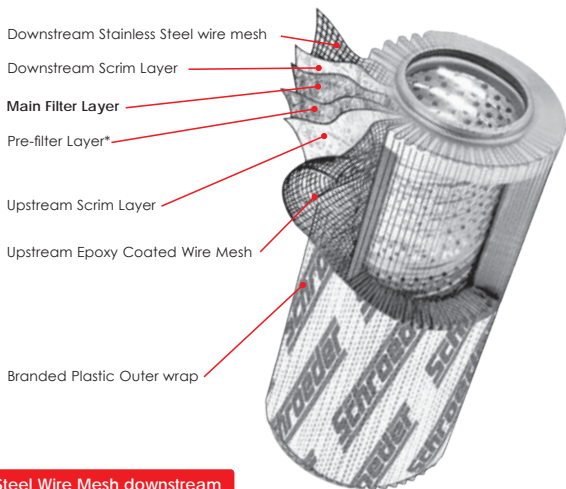
Product offerings include:

- ◆ Synthetic Media (Z-Media®)
- ◆ Patented Grommet & Bushing (GeoSeal®)
- ◆ Unique Contaminant Holding (DirtCatcher®)
- ◆ Anti-Stat Pleat Media (ASP®)
- ◆ Cellulose Media (E-Media)
- ◆ Water-Absorbent (W-Media)
- ◆ Private Label Branding
- ◆ BestFit® Online Cross-Overs

Element Technology

EXCELLEMENT Z-Media®

The special class of micro-glass and other fibers used in Z-Media® are manufactured with utmost precision, to specific thicknesses and densities, and bonded with select resins to create material with extra fine passages.



Stainless Steel Wire Mesh downstream

No threat of epoxy coating migrating downstream and contaminating the system

High cost-effective media area

Less restriction, lower pressure drop, lower hydraulic load

Multilayer media support

Provides protection and support to media layers

Multilayer filter media

Provides strength and high dirt holding capacity

Wire Mesh upstream and downstream

Better pleat stability

* Where applicable

BestFit[®]



**48,000 SKU's or 1,200 of Upgrade Replacement
Series Currently Available**



Visit our online converter: <http://schroederindustries.info/CrossReference.aspx>

Element Technology

Schroeder

INDUSTRIES

Advanced Fluid Conditioning Solutions®

PROUDLY MANUFACTURED IN THE UNITED STATES

