

Par-Gel



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Par-Gel filter elements are an effective tool in controlling water related problems in hydraulic power and lubrication systems.

There is more to proper fluid maintenance than just removing particulate matter. You need to remove water as well. Parker has developed Par-Gel water removal elements to be used in combination with particulate filters to provide significant benefits.

- Less component wear, consequently less component generated contaminants.
- Significant reduction of costly downtime and replacement of failed components.
- Increased efficiency of the system, thereby improving machine productivity.
- Less frequent replacement and disposal of contaminated fluid.
- Reduced chance of catastrophic failure.



Water as a contaminant.

Whether you used a mineral-base or synthetic fluid, each will have a water saturation point. Above this point, the fluid cannot dissolve or hold any more water. This excessive water is referred to as 'free' or emulsified water. As little as .03% (300 ppm) by volume can saturate an hydraulic fluid. Many mineral-base and synthetic fluids, unless specifically filtered or treated in some way, will contain levels of water above their saturation point.

Water is everywhere!

Storage and handling. Fluids are constantly exposed to water and water vapour while being handled and stored. For instance, outdoor storage of tanks and drums is common. Water settles on top of tanks and drums and infiltrates the container, or is introduced when the container is opened to add or remove fluid.

In-service. Water can get into the system via worn cylinder and actuator seals, or through reservoir openings. Water can come into contact with these entry points through water based cutting fluids or when water and/or steam are used for cleaning.

Specification



Condensation is also a prime water source. As fluid cools in a reservoir, the temperature drop condenses water vapour on interior surfaces, which in turn causes rust. Rust scale in the reservoir eventually becomes particulate contamination in the system.

Microbial growth as a contaminant.

Once water enters a system, growth of micro-organisms begins. Since water is one of the end products of the breakdown of hydrocarbon fluid, once started, the process is somewhat self-sustaining.

Slime is evidence of microbial growth, as is the apparent increase in viscosity of the fluid, obnoxious odour and discoloured fluid. The results are: short fluid life, degraded surface finish and rapid corrosion.

Water generated damage and operating problems.

- Corrosion
- Accelerated abrasive wear
- Bearing fatigue
- Additive breakdown
- Increased acid level
- Viscosity variance
- Electrical conductivity
- Forms of water in fluid
- Dissolved water – below saturation point
- Free water – emulsified or in droplets*.

Water in the system creates oxides, slimes and resins. Corrosion is an obvious by-product and creates further contaminants in the system.

The effect is compounded, as you now have both particulate contaminant and water working together.

The particulate contamination can be as simple as rust flaking from reservoir walls. Anti-wear additives break down in the presence of water and form acids. The combination of water, heat and dissimilar metals encourages galvanic action. Pitted and corroded metal surfaces and finishes result.

Further complications occur as temperature drops and the fluid has less ability to hold water. As the freeze point is reached, ice crystals form, adversely affecting total system function. Operating functions may become slowed or erratic.

Electrical conductivity becomes a problem when water contamination weakens insulating properties of fluid (decreases dielectric kV strength).

Testing your fluid for water.

A simple 'crackle test' will tell you if there is water in your fluid. Simply take a metal dish or spoon with a small amount of fluid. Apply a flame under the container with a match. If bubbles rise and 'crackle' from the point of applied heat, you have free water.



ParTest™ fluid analysis. For complete analysis, Parker offers Par-Test fluid analysis. Your Parker representative can supply you with a fluid container, mailing carton and appropriate forms to identify your fluid and its use. An independent lab performs complete spectrometric analysis, particle counts, viscosity and water content.

Results are sent directly to the requester.

* Excessive free water must be removed from the system before filtering is attempted. In systems with gross amounts of water (1% to 2% by volume), settling or vacuum dehydration should be considered before using Par-Gel filter elements.

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Features & Benefits

Removing water.

Using a Par-Gel water removal element is an effective way of removing free water contamination from your hydraulic system. It is highly effective at removing free water from mineral-base and synthetic fluids.

The Par-Gel filter media is a highly absorbent copolymer laminate with an affinity for water. However, hydraulic or lubrication fluid passes freely through it and the water is bonded to the filter media.

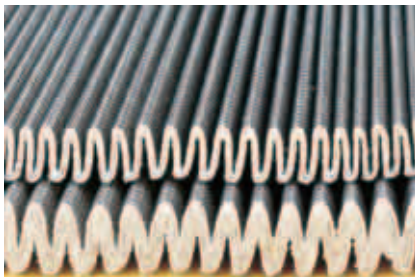
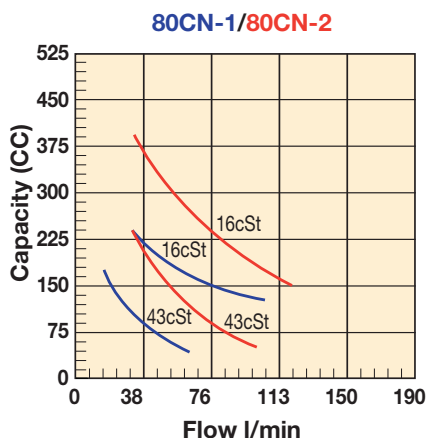


Photo above shows 'dry' Par-Gel filter media and the same media swollen with absorbed water.

Parker technology and expertise at your disposal.

Choosing the correct filters can save money and minimise problems caused by particulate and water contaminants in hydraulic and lubricating fluids. Parker provides hard data and advice on choosing from a wide range of filter configurations, flow patterns and flow pressure capabilities.



How many filter elements will I need?

Suppose you would like to remove water from contaminated oil stored in a 750 litre tank. The tank is found to have 1000 ppm of water (very contaminated). The circulation rate will be 40 lpm for the 40cSt fluid.

Example: How many single length Modulflow™ elements will be needed to reduce the water to normal saturation levels. To find the answer, use the conversion charts and capacity curves for the Modulflow element.

- 1000 ppm start – 300 ppm finish = 700 ppm removed
- 700 ppm water x 0.001 = .07%
.07% x 750 litres = 0.53 litres water total
- Use the capacity curve for Modulflow element P/N 927584.
Capacity = 80cc at 40cSt & 40 lpm to pressure drop of 1.7 bar.
(See graph below)
 $80\text{cc} \times 0.0001 \frac{\text{lpm}}{\text{CC}} = 0.076 \text{ lpm/element}$
- $\frac{0.53 \text{ litres total water}}{0.076 \text{ lpm/element}} = 7 \text{ elements}^*$

* The replacement value of this fluid may range from €1500.00 to €4500.00 (€0.50 to €1.25 litre). An estimated element cost of €150.00 each, the saving could be as much as €3000.00!

Using Par-Gel filter elements saves money in fluid and replacement component costs. Also, the frequency of fluid disposal and the problems associated with it are greatly reduced.

Filter capacity. There are no accepted and approved water capacity testing or reporting standards. Consequently, there is virtually no way to compare one element capacity with another. It is also difficult to simulate a specific application in testing...making it hard to predict field performance.

Why the discrepancies? Water removal media capacity is the result of the interplay of four variables: flow rate, viscosity, bypass setting and the media itself.

Here's an example: two identical elements, testing the same fluid, varying only the flow rate.

	Element A	Element A'
Flow rate:	11 lpm	38 lpm
Viscosity:	15 cSt	15 cSt
Test capacity:	425 ml	360 ml

This is a 15% reduction in capacity, due to changing only the flow rate! Now, look at what happens when the test flow rate is the same and the viscosity is changed.

	Element B	Element B'
Flow rate:	76 lpm	76 lpm
Viscosity:	40 cSt	15 cSt
Test capacity:	250 ml	550 ml

Twice the capacity can be achieved just by manipulating the test viscosity!

Naturally, having a lower bypass valve setting limits the capacity. Since the life of the element is measured in pressure drop, using higher bypass valve settings will increase apparent life (all other conditions equal).

We recommend 1.7 bar bypass valves to get adequate life from Par-Gel filter elements.

Capacity also depends on the media itself. That's why Parker spent two years researching the media used in Par-Gel filter elements. We tested all known media, and worked closely with our suppliers to achieve maximum water absorbency.

Specification

How we report:

Our goal is to give our customers usable data. Why show test results at a lower viscosity (13cSt for example), if the typical application uses 41cSt fluid? So, we report at 41cSt to give typical field application capacity, and 15cSt for competitive comparisons. But keep in mind when comparing, you still have to consider flow rate.

What it all means:

You deserve to know how an element will work for you in your applications. So, we test and report our data in such a way that it helps you predict element performance and life.

Be wary of claims that say... "this element holds one litre (or 5 litres) of water". What was the test flow rate? fluid viscosity? bypass valve setting? Was it run as a 'single pass' or 'multipass' test?

Rely on Parker to give you the facts and data you need. Our goal is to better protect your systems and components...and we start up-front by telling you what you need to know.

Is there any other way to do business?

Add it all up.

Broad selection, competitive prices, off-the-shelf availability, on-time delivery, high-efficiency filter media, reduced system contaminant and longer component life. When you add it all up, we think you'll agree...

Conversion Factors

If you have:	Multiply by:	To get:
mg/l	0.00009	%
ppm	0.0001	%
ml	1.0	cc
gallons	4.54	litres

Typical Saturation Points

Fluid type	PPM	%
Hydraulic	300	0.03
Lubrication	400	0.04
Transformer	50	0.005

Parker Par-Gel water removal filter elements are available in these standard Parker filter housings:

Fluid model series	Length	Element part number
40CN-1	Single	931412
40CN-2	Double	931414
80CN-1	Single	931416
80CN-2	Double	931418
Guardian®	Single	932019
Moduflow RF 2-1 (10MF)	Single	927584

Ideal Applications for Par-Gel filter elements



Guardian® Portable Filtration System



Filtration Trolley

Throughout the world, Parker is serving more than 400,000 customers to improve productivity and reliability in thousands of industries. Parker motion and control systems are in operation on satellites orbiting the Earth, in machine tools and mobile equipment, on oil rigs and refineries, in hospitals and laboratories, in fact, wherever there's a need for motion and control, you'll find Parker components and system solutions hard at work. For more information, visit Parker's web site at www.parker.com/eu or call freefone 00800 27 27 5374



Aerospace

Key Markets

- Commercial transports
- Military aircraft
- Regional transports
- Aircraft engines
- Business and general aviation

Key Products

- Flight control systems and components
- Hydraulic systems and components
- Fuel systems and components
- Pneumatic systems and components
- Inert oxygen generating systems
- Fluid metering, delivery and atomization devices
- Wheels and brakes
- Couplings, fittings, hoses and tubes



Automation

Key Markets

- Factory automation
- Transportation and automotive
- Life sciences and medical
- Machine tools
- Semiconductor and electronics

Key Products

- Pneumatic motion and control
- Air preparation
- Vacuum controls and sensors
- Electromechanical stepper and servo motors, drives, and controls
- Human machine interface
- Electric actuators, gantry robots, slides and linear motors
- Structural extrusion



Climate & Industrial Controls

Key Markets

- Refrigeration and air conditioning
- Transportation/mobile
- Process
- Industrial machinery
- Medical/life sciences
- Fuel cells
- Precision cooling

Key Products

- Pressure regulators
- Check, ball and service valves
- Value-added systems
- Thermostatic and expansion valves
- Electronic controllers
- Contaminant controls
- Heating/air conditioning hose
- Gerotors



Filtration

Key Markets

- Industrial machinery
- Process
- Mobile
- Marine
- Oil & gas
- Power generation and energy
- Transportation
- Food and beverage

Key Products

- Hydraulic, lubrication and coolant filters
- Process, chemical, water and microfiltration filters
- Compressed air and gas purification filters
- Condition monitoring
- Analytical gas generators
- Nitrogen, hydrogen and zero air generators
- Engine air, fuel, oil filtration and systems



Fluid Connectors

Key Markets

- Construction machinery
- Agriculture
- Transportation
- Mobile
- Industrial machinery
- Oil & gas

Key Products

- Rubber and thermoplastic hose
- Industrial hose
- Tube fittings and adaptors
- Tubing and plastic fittings
- Brass fittings and valves
- Hose couplings
- Quick disconnects



Hydraulics

Key Markets

- Construction machinery
- Agriculture
- Industrial machinery
- Oil & gas
- Truck hydraulics
- Power generation and energy

Key Products

- Hydraulic cylinders and accumulators
- Hydraulic valves and controls
- Hydraulic motors and pumps
- Power take-offs
- Hydraulic systems



Instrumentation

Key Markets

- Power generation
- Oil & gas
- Petrochemical
- Microelectronics
- Biopharmaceutical

Key Products

- Medium/high pressure fittings and valves
- Instrumentation fittings, valves, manifolds and regulators
- High purity fittings, valves and regulators
- Fluoropolymer fittings, valves, pumps and regulators
- Analytical systems



Seal

Key Markets

- Transportation
- Energy, oil & gas
- Semiconductor
- Aerospace
- Fluid power
- Life sciences
- Telecommunications

Key Products

- Elastomeric O-rings
- Homogeneous and inserted elastomeric shapes and diaphragms
- Metal and plastic retained composite seals
- Polymeric and plastic dynamic seals
- Rubber and plastic boots/bellows
- Extruded and precision-cut/fabricated elastomeric seals
- Thermoplastic engineered seals