



Filtration Division

Products and market overview

We make delivering your best work.*

ELECTRICAL



Power distribution
and circuit protection



Power quality, backup
power and energy
storage



Life safety and
security



Structural solutions



Control and automation



Harsh
and hazardous
environments solutions

INDUSTRIAL



Aerospace



Filtration



Vehicle



eMobility



2022 Financials (USD)

Electrical Sector

- Electrical Americas: \$8.5 Billion
- Electrical Global: \$5.8 Billion

Industrial Sector

- Aerospace: \$3.0 Billion
 - Filtration Division included
- Vehicle: \$2.8 Billion
- eMobility: \$538 Million

A leader in liquid filtration

- Eaton helps companies improve product quality, increase manufacturing efficiency, protect employees and equipment, and help achieve sustainability goals.
- Eaton employees around the world make a difference for their customers by creating an exceptional customer experience, solving problems with application expertise and developing innovative filtration solutions.

Filtration sites worldwide



Filtration sites worldwide

- **Manufacturing plants:**

- Europe:

- Nettersheim (bag filter housings)
 - Langenlonsheim (depth filter systems)
 - Altlusheim (hydraulic and lubrication filter systems)
 - Sint-Niklaas (filter bags)

- Americas:

- Reynosa (engineer to order filter systems, filter bags, and hydraulic filters)

- Asia:

- Jining (filter bags, bag filter housings, strainers, hydraulic filters & elements)

- **Warehouse, distribution center or assembly:**

- Americas:

- Fitzgerald and Williamsport

- India:

- Pune



Altlusheim, Germany



Langenlonsheim, Germany



Nettersheim, Germany



Sint-Niklaas, Belgium



Fitzgerald, United States



Williamsport, United States



Reynosa, Mexico



Jining, China



Pune, India

Eaton's growth through acquisition

LOEFLER FILTRATION (1998)

- Acquired by Hayward in 1998
- Strength in vessels manufacturing



GAF Filter (1999)

- Acquired by Hayward in 1999
- Developed the concept of bag filtration 35 years ago



Hayward Filtration (2005)

- Strong presence in the filtration process water and chemical markets
- Market leading position in bag filtration and straining products

HAYWARD FILTRATION™



WRIGHT-AUSTIN™

Ronningen-Petter (2006)

- Application focused engineering in a range of industrial markets
- Range of unique solid-liquid separation and self-cleaning products

Ronningen-Petter®

Eaton's growth through acquisition

INTERNORMEN Technology GmbH (May 2011)

- Proven leader in hydraulic and lubrication filtration technologies
- More than 4,000 different hydraulic & lubrication oil and process filters, as well as condition monitoring equipment



E. Begerow GmbH & Co. (August 2011)

- Leading system provider for advanced liquid filtration solutions
- Develops and produces technologically innovative depth filter media and filtration systems for food and beverage, chemical, pharmaceutical and industrial applications



Focus market segments

Industrial Processing & Oil and Gas



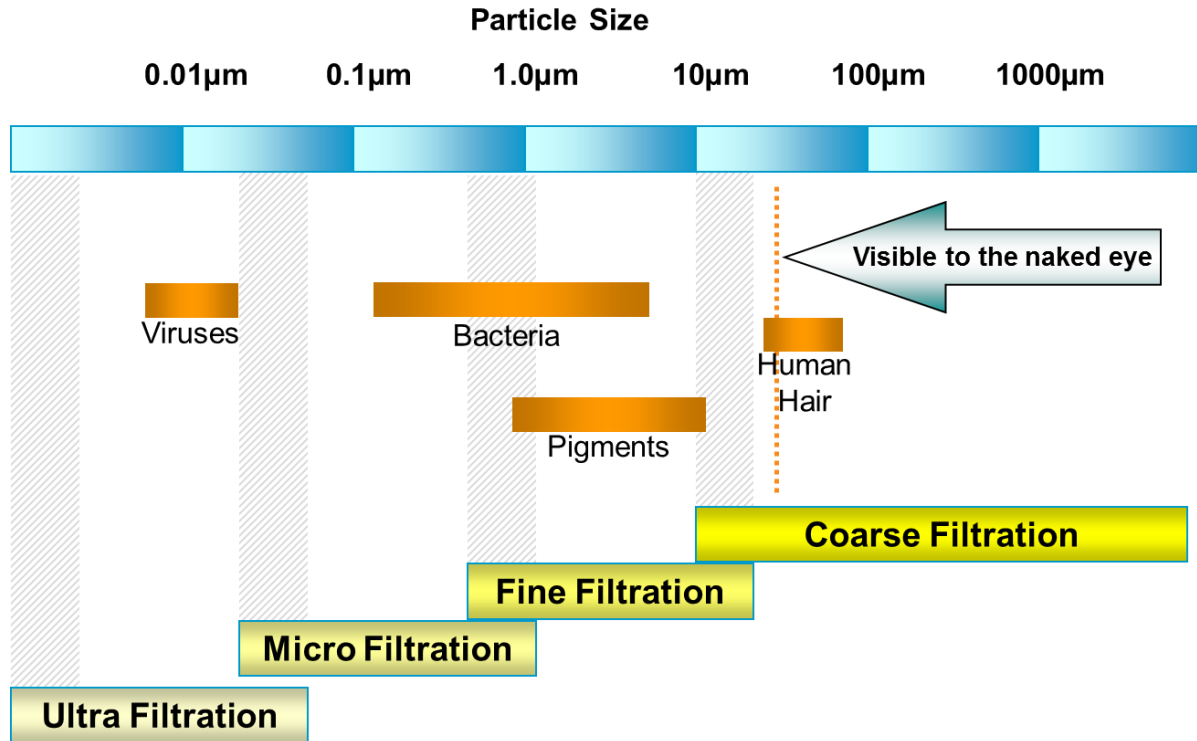
Hydraulic Filtration



Life Sciences



The spectrum of filtration



Industrial process products



Bag and cartridge
filter housings



Filter bags and
elements



Filter cartridges



Tubular
backwashing filters



Manual strainers



Automatic self-
cleaning filters



Gas liquid
separators

Industrial process products

Bag and cartridge filter housings

Eaton is the leading manufacturer of bag and cartridge filter housings. Creative innovations have been the logic for a highly diversified range of vessels to meet the most demanding as well as standard applications. From single- to multi-media housings, from stainless steel to engineered plastic vessels.



Industrial process products

Filter bags and elements

From economical sewn filter bags for standard applications to welded, multi-layered bags for demanding applications.

Eaton's range of filter bags and elements is extensive. Over 1,500 choices in all.



Industrial process products

Filter cartridges

Eaton's broad range of filter cartridges gives customers wide flexibility in choosing filtration solutions.

Available are nominal and absolute rated melt blown, string wound, resin bonded and activated carbon cartridges as well as filter elements.



Industrial process products

Tubular backwashing filters

Matching media configuration, retention, and materials is easy with a tubular backwashing filter.

The product range offers media choices from compact configurations that pack a large amount of surface area into a small amount of space, to simple strainer-type systems for removing larger contaminants.



Industrial process products

Manual strainers

Especially for industrial and commercial customers to protect their process piping equipment by removing debris from the liquid that flows through pipelines. Products include manual, duplex, simplex, and Y strainers.

For specialized applications, a pipeline strainer can be designed and manufactured.



Industrial process products

Automatic self-cleaning filters

Solutions can be offered from internal or external backwashing systems for the filtration of water and aqueous media to mechanically cleaned filters systems for high viscous liquids.

The filters are always sized to the customer's individual applications and needs.

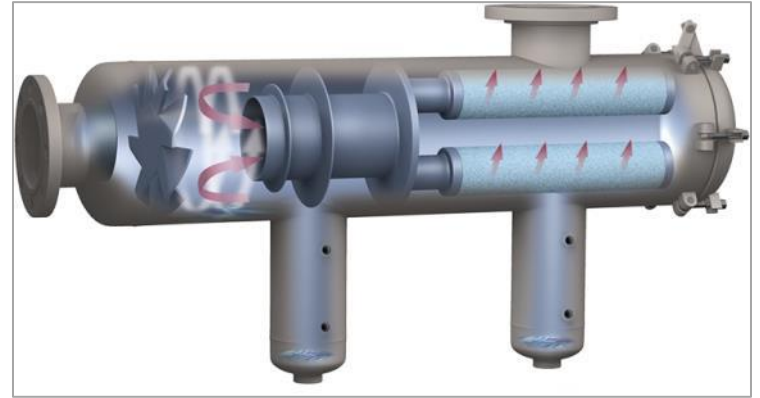


Industrial process products

Gas liquid separators

Gas liquid separators remove +99% of all damage causing moisture and solid particles 10 microns and larger.

Typically installed following an intercooler or aftercooler they will remove entrained solids. Steam separators are also installed in steam distribution lines to assure clean, dry steam.



Industrial process products

Certificates

- DIN EN ISO 9001
- DIN EN ISO 14001
- Energy Management System Standard: ISO 50001

- Manufacturing of pressure vessels:
 - PED 2014/68/EU
 - CE 0045
 - DIN EN ISO 3834-2
 - AD 2000 HP0



Sint-Niklaas



Group Certification



Nettersheim

Group Certification



Nettersheim



Nettersheim



Nettersheim

Industrial process markets



Pharmaceutical

- Intake water
- Bulk product load-out

Paint

- Fill lines
- Additive polishing
- Raw latex

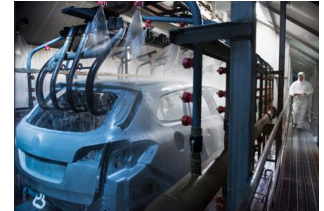


Chemical

- Solvent recovery
- Resin filtration
- Feed stock load-out
- Oil removal

Automotive coatings

- E-coat
- Machine tool coolant
- Parts washers
- Paint booth



Water

- Municipal water intake
- Waste water treatment
- Commercial water intake

Oil refinery

- Hydro-processing feed stock
- Amine loop conditioning
- Cooling water



Life science products



Depth filter sheets



Stacked disc cartridges



Filter cartridges and housings



Filter bags and elements



Filtration systems



Measuring and testing devices



Filter capsules and laboratory filters



Beverage treatment products

Life science products

Depth filter sheets

Conventional depth filter sheets with different clarifying sharpness and unfiltrate volume offer specifically tailored filtrate quality in all filtration ranges.

BECOPAD, a premium depth filtration product. The filter media made of pure cellulose covers all requirements from coarse to sterile filtration.



Life science products

Stacked disc cartridges

Precise sealing with polypropylene or polyamide edge molding of two depth filter sheets, whose outlet side is in contact with a drainage plate forms one filter cells.

Depending on the stacked disc cartridge type, a different number of filter cells forms a cartridge unit, which is safely held together by the three-part segmented sleeve made from stainless steel.



Life science products

Filter cartridges

A wide range of filter cartridges offer complete filtration solutions for diverse applications from clarifying and fine filtration with depth filter cartridges to the reduction of microorganisms and microbiological stabilization with membrane filter cartridges.

Filter cartridges feature a variety of retention ratings, between 0.2 and 150 μm , suitable for an array of liquid filtration applications. In addition to sizes ranging from 10" (25 cm) to 40" (100 cm) and various adapter codes, filter cartridges are available with different filter material.



Life science products

Filtration systems

The implementation of process engineering concepts and client-specific filtration tasks for clarification, fine and sterile filtration applications.

The design of the filtration systems follows current domestic and international standards and special guidelines, e.g., cGMP or FDA.



Life science products

Filter capsules and laboratory filters

Filter capsules are ready-to-use units for the filtration of media containing particles, or for removing biologicals in pharmaceutical and biotechnology applications.

They are used for scale-up trials, e.g., for selection of suitable filter media and determination of the required filter area, easy sample preparation, separation of cell debris, filtration of serum and cell culture media.



Life science products

Beverage treatment

Dried pure yeasts, lactic acid bacteria (*Oenococcus oeni*), and enzymes (bio-catalysts).

Fining generally refers to products and process used to increase the shelf life of beverages.

Stabilization products for beverages.

GMO confirmed for **oenological products**.



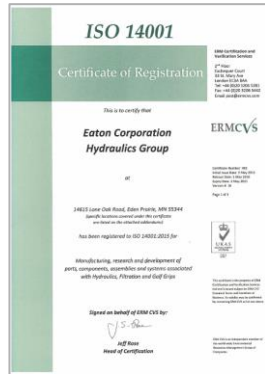
Life science products

Certificates

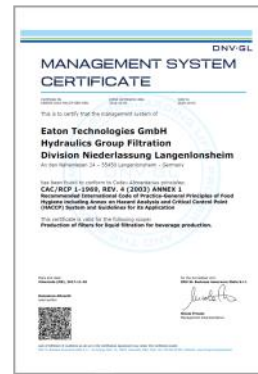
- DIN EN ISO 9001
- DIN EN ISO 14001
- Energy Management System Standard: ISO 50001
- HACCP
- Additional product compliance according FDA, USP, LFGB, cGMP
- Kosher Lemehadrin for Passover



Group Certification



Group Certification



Life science markets



Food

- Gelatin
- Sugar
- Food ingredients



Beverages

- Wine
- Beer
- Fruit juice
- Spirits



Chemical

- Silicones
- Paints, lacquers
- Synthetic resins
- Pesticides

Pharmaceutical

- Dialysis concentrates
- Human serum albumin
- Plant extracts
- Fermenter broth
- Vitamin suspensions
- Enzyme solutions
- Cell culture media



Fine Chemical

- Flavors and fragrances
- Resins
- Terpenes
- Creams, shampoos
- Lotions
- Skin, bath and essential oils



Hydraulic and lubrication oil products



Return line filters



Hydraulic and lubrication filter systems



Hydraulic and lubrication filter elements



Fluid purifiers



Condition monitoring



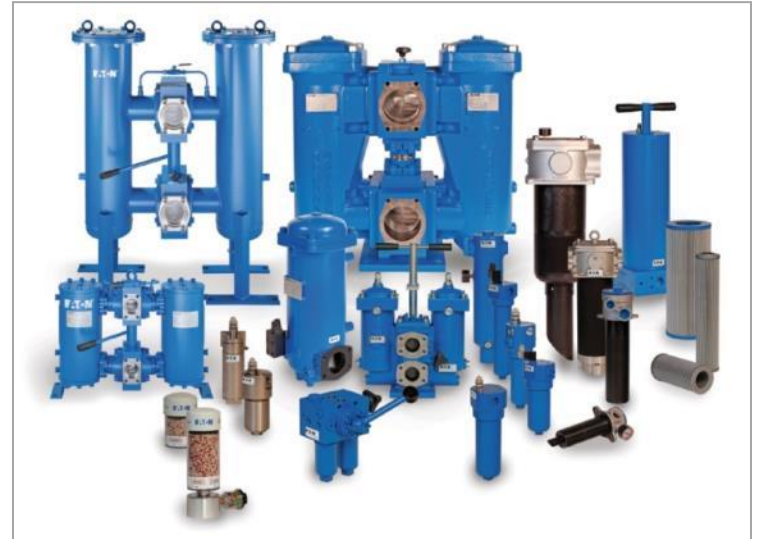
Hydraulic filter accessories

Hydraulic and lubrication oil products

Filters and systems

Eaton's full line of hydraulic and lubrication filters set standards in removing particulate and water contamination from hydraulic and lubrication fluids.

Eaton currently offers a selection of more than 4,000 different filter elements - from tank-mounted return line filters, to in-line or flange mounted high pressure filters, to manifold side mounted or manifold bottom mounted pressure filters, to air breathers and suction strainers.



Hydraulic and lubrication oil products

Filter elements and EasyFit exchange filter elements

Our advantages:

- Superior dirt-holding capacity
- Highest Δp capability
- Best filtration efficiency

EasyFit exchange filter elements

Brands we interchange with:

- Hydac
- EPE
- Mahle
- Pall



Hydraulic and lubrication oil products

Fluid purifiers

Eaton's mobile fluid purifier systems are highly versatile and designed to facilitate fluid purification where and when needed.

The IFPM fluid purifier systems are fully automated, PLC controlled units compact enough for use in confined areas.



Hydraulic and lubrication oil products

Condition monitoring systems

A condition monitoring system's performance is vital to protecting hydraulic components, such as pumps, bearings, and seals.

Eaton's monitoring systems provide mobile and stationary fluid monitoring and particle counting as well as an immediate and precise diagnosis of a system's condition. The systems easily connect to an external computer to control operations and manage them.



Hydraulic and lubrication oil products

Hydraulic filter accessories

Eaton offers a complete line of hydraulic filter accessories for hydraulic and lubrication filters, systems, and condition monitoring equipment.

Eaton's portfolio includes clogging indicators, heating and cooling systems, breathers, adaptors, evacuation and bleeder connections, hose lines, and suction strainers.



Hydraulic and lubrication filtration markets



Mobile hydraulics

- Agricultural
- Construction
- Mining equipment



Heavy industries

- Steelworks
- Metallurgical plants



Plastic machine/tools

- Plastic injection machines



Lubrication systems

- Machine building
- Plant engineering
- Oil circulation systems

Power generation

- Gas turbines
- Compressor industry



Hydro-electric power plants

- Turbines
- Compressors



Water hydraulics

- Hydraulic power packs



Hydraulic and lubrication filtration markets



Wind power

- Wind turbines
- Gearbox manufacturers

Refrigeration machines

- Compressors for industrial refrigeration



Oil and gas

- Oil platforms
- Oil tankers
- Refineries

Molding and forging presses

- Metal working
- Machine building



Oil and gas products



Tubular
backwashing filters



ReactoGard



ClearAmine



Manual strainers



Automatic self-
cleaning filters



Gas liquid
separators

Oil and gas products

ReactoGard

ReactoGard systems are recognized leaders in the protection of fixed bed catalytic reactors and related refinery operations.

They consist of multiple banks of filter elements with valves at the inlet and outlet of each bank to produce cleaner, more efficient low flux operation.



Oil and gas products

ClearAmine

Pipe scale, rust, iron sulfide, sand and other solids build-up in closed-loop amine systems fouling flash drums, heat exchangers, strippers, re-boilers, and carbon filters.

ClearAmine filtration systems remove harmful solids to protect and extend equipment life, and maximize amine systems' effectiveness.



Oil and gas filtration markets



Power generation

- Make-up water
- Water treatment



Natural gas processing plants

- Gas/Liquid separation
- Gas well extraction

Petrochemical

- Diesel
- Catalyst protection
- Rich/Lean side amines



Oil refineries

- Enhanced oil recovery
- Chemical flooding



Customer success stories in diverse markets

Customer Success Story:
Manufacturer of silicone products

Market segment:
Chemical industry



One-stage filtration is the charm

Solids, gels and particles separation in silicone production

Location:
Europe

Challenge:
Removing solids, traces of water and gel particles from inorganic silicone using a single-stage filtration process.

Solution:
Replace an existing two-stage process with a BECO COMPACT PLANT 4000™ plus and remove filter using BECO KD 7™ spun fiber chaus

Result:
A fast and feasible solution that reduces costs, water residues and gel removed out of liquid into a single operation, therefore significantly reducing the time it takes to perform the process during silicone production.

"It is a truly unique product solution. The ability to remove water quickly and reliably from another liquid is a highly desirable characteristic."

Fabrice Dugues,
Regional Sales Manager - EMA, line chemical and pharmaceutical sales unit of Eaton Filtration Division

Background:
Specialist silicones are used in a remarkably broad range of industries, from adhesives to emulsions, through to medical and temperature, different types of silicone are crucial to numerous production processes, and they are combined in a wide variety of end-user products such as cosmetics, lubricants, lubricants, adhesives and protective coatings.

To meet such widespread application, silicone products come in many different grades. They are produced at highly integrated manufacturing sites, which use multiple processes to deliver consistency and repeatability. The manufacturing process is complex and carefully refined: silicones in sand or rock are first processed to clean silicon. Chemical reactions then produce silanes and, in further steps, polydimethyl siloxanes, which are used as different grades of silicone products.

These precursors contain a silicon-oxygen backbone along with processed end-products such as silicones, silicones, silicones and elastomers. The composition of silicone affects several desired performance characteristics such as thermal and oxidative stability, chemical inertness and excellent chemical strength. This makes them suitable for a range of industries and applications.

Challenge:
During the production process which involves hydrolysis of organosilicones and condensation of chemical compounds forming salts, among other things, silicone manufacturers have to ensure that any unwanted residues and particles are removed to protect the quality of the finished product. This requirement is met through the use of advanced filtration techniques, which have to be performed without leaving any residue mixed on the liquid throughout the line. Filtration has to be carried out to cleaning standards, using equipment that is reliable and easy to maintain.

Challenge:
One of Europe's silicone manufacturers came to Eaton with a requirement for a more effective method of removing solid separation as well as liquid traces production plants. The company had produced a regular batch about 60 t a day of intermediate silicone oil at 20°C. The production process involved a chemical technique using sodium carbonate to neutralize hydrogen chloride. This process resulted in the generation of water residue and solids, which needs to be removed in an effective way. Failure to do so can increase the viscosity of the final product through the creation of gel in the silicone - classified as a high undesirable outcome.



Powering Business Worldwide

Customer Success Story:
ESB Bocholt (Waste disposal and services company in Bocholt)

Market segment:
Water and wastewater



A filter to make things clear

Self-cleaning filter reduces maintenance costs and increases efficiency in wastewater treatment

Location:
Bocholt, Germany

Challenge:
Filter came online from the wastewater flow in the mechanical cleaning plant to ensure trouble-free operation of hydrocyclones and to enable automated operation of the entire system.

Solution:
The filtration of wastewater by means of MCC-800 machines self-cleaning filter with magnetically coupled pneumatic actuation.

Result:
The self-cleaning filter reduces maintenance, enables automatic pre-filtration of wastewater, ensures smooth operation of the hydro-cyclonic unit and in this way, increases the efficiency and operational safety of the entire sewage treatment plant.

"After extensive testing and long periods of use in regular operation, our experience has been consistently positive. With the installation of the filter, we no longer have any failure in the hydrocyclonic system."

Andreas Pflaush,
Operations Manager at the ESB sewage treatment plant

Background:
Reducing the energy consumption of sewage treatment plants is a major challenge to achieving climate goals. It contributes to this, the waste disposal and — the operator of the central sewage treatment plant in the Museum district — decided to optimize the energy efficiency of the system in which wastewater from more 70,000 homes and several commercial operations are treated. The measures not only include the reduction of energy consumption through highly efficient pumps and low-consumption motors, but also an innovative process to improve the existing activated sludge process. Following the mechanical pre-cleaning with a silt and sand trap, the new process accelerates the sedimentation of the sludge through the use of hydrocyclones and reduces the load on secondary clarification.

Challenge:
Hydrocyclones are centrifugal separators for liquid mixtures that separate solid particles from suspensions in a process called centrifugal force. Thanks to this process, the wastewater treatment in Bocholt is more stable and efficient. However, the innovative process has a challenge: Larger contaminants, such as plastic material or leaves that happen to pass through into the mechanical pretreatment can clog the hydrocyclone. If several cyclones breakdown at the same time, a shutdown of the entire plant may occur.

To avoid unplanned downtime as much as possible from the start, the ESB previously used a manual basket strainer that was installed between mechanical pre-cleaning and hydrocyclones. The filter reliably removed contaminants with sizes of more than 0.4 to 0.9 millimeter. The disadvantage: The filter element had to be cleaned three times a day. Employees at the sewage treatment plant had to plan an hour or more a day for this process.



Powering Business Worldwide

Customer Success Story:
Hydraulic filters in underground and open pit mining

Market segment:
Mining



Return-line filters deliver reliable performance to keep mining equipment working on schedule

Location:
Europe

Challenge:
Investment equipment exposed to harsh environment and operating conditions with variable hydraulic filtration products that meet stringent certification requirements and are delivered on schedule to support 24/7 field service demands. Any unplanned equipment downtime can impact production and potentially create safety issues.

Solution:
Eaton TEF 70, 320, 400 and 602 return-line filters in combination with the corresponding 6.5 filter elements have replaced competitive filters on standard equipment on loaders, haul trucks, anchoring trucks, drill trucks and other mobile equipment produced by one of Europe's top mining machinery manufacturers.

Result:
In addition, the filters must meet stringent quality and performance standards mandated both by the manufacturer and governmental regulations covering the mining operations. Finally, the customer requires reliable maintenance services and products.

"The Eaton TEF return-line filters have reduced filter element usage by up to 40 percent compared to the filters originally used by the manufacturer."

John Smith,
Maintenance Manager at the mining site

Background:
The company is one of Europe's largest producers of mining machinery and equipment used in extracting copper, coal and other raw materials, with 2,500 employees and annual revenue of about 1.9 billion EUR. Their equipment is essential to mining operations and unscheduled downtime can impact production and potentially create safety issues. Because of the critical nature of the equipment, maintenance is performed on a fixed schedule regardless of the amount of time in service. This means the hydraulic filters are in service for a certain length of time between changes and that the filter elements must be available at the maintenance site when needed regardless of the time of day or day of the week.

The filters originally specified by the manufacturer did not perform at an acceptable rate for the typical used fluid (ISO VG 32 and 46) in an operating temperature range of 60 to 100 °C, working pressures up to 145 psi and flow rates between 20 and 100 gallons. The filters originally specified by the manufacturer did not perform at an acceptable rate for the typical used fluid (ISO VG 32 and 46) in an operating temperature range of 60 to 100 °C, working pressures up to 145 psi and flow rates between 20 and 100 gallons. Finding a more suitable replacement required extensive certification testing plus inventory and delivery arrangements for the new products.



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