Components, Systems and Service.
All from one Company.

Our fluid engineering solutions are defined by the scope and complexity of our customers' requirements. Our products range from individually designed components in the fields of fluid engineering, hydraulics and electronics right up to complete systems for specific functions.

All components and systems are conceived and designed in-house. Experienced industrial and product specialists develop innovative products and efficient solutions for high-quality, cost-effective production. Throughout the globe, our production facilities share one common goal: quality. We take great pride in both our products and solutions.

Industries and Applications

Mobile Equipment  Agriculture  Power Generation  Mining  Railroad  Marine  Diesel Storage
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Overview of Fuel Filtration</td>
</tr>
<tr>
<td></td>
<td>Introduction – A1; Element Technical Data – A8; Element Selection – A10; Bulk Diesel Coalescing Filtration Fundamentals – A11; Diesel Fuel Filtration in the Engine – A14</td>
</tr>
<tr>
<td>B</td>
<td>Particulate Filtration</td>
</tr>
<tr>
<td></td>
<td>GHFP – B2; QF5 – B6; LVHF – B10</td>
</tr>
<tr>
<td>C</td>
<td>Coalescing Filtration</td>
</tr>
<tr>
<td></td>
<td>ICF – C2; GHCF – C6; QCF – C10; LVHCD – C13</td>
</tr>
<tr>
<td>D</td>
<td>Particulate &amp; Coalescing</td>
</tr>
<tr>
<td></td>
<td>BDF1 &amp; 2 – D2; BDS 1, 2, 3, 4 – D7</td>
</tr>
<tr>
<td>E</td>
<td>Particulate &amp; Absorbing</td>
</tr>
<tr>
<td></td>
<td>BDFA1 &amp; 2 – E2</td>
</tr>
<tr>
<td>F</td>
<td>Fuel Filtration Systems</td>
</tr>
<tr>
<td></td>
<td>BDFP – F3; BDFC – F7; BDC – F10</td>
</tr>
<tr>
<td>G</td>
<td>On-Board Fuel Filtration Products</td>
</tr>
<tr>
<td></td>
<td>HDP-BC – G3; HDP-HT – G8; HDPD-BC – G11; HDPD-HT – G13; HDPD Marine Series – G15</td>
</tr>
<tr>
<td>H</td>
<td>Contamination Monitors</td>
</tr>
<tr>
<td></td>
<td>FCU 1315 – H2; Analysis Kits – H4</td>
</tr>
<tr>
<td>I</td>
<td>BetterFit® Fuel Elements – I1</td>
</tr>
</tbody>
</table>

**NOTE**

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Diesel fuel injection systems are changing dramatically to provide cleaner combustion and meet Tier 4 requirements.

Diesel fuel injection systems are changing dramatically to provide cleaner combustion and meet Tier 4 requirements.

New diesel engines used in off-road equipment for construction, agriculture and power generation must be "Tier 4" compliant by 2018 to meet Environmental Protection Agency (EPA) emissions standards that reduce the allowable levels of particulate matter and nitrogen oxides (NOx). The Tier 4 standards have been in effect since 2011 for diesel trucks and buses on U.S. and European highways. (Europe's version of the standards is known as "Stage IV").

This article, along with other fuel filtration publications can be found on the HYDAC website: www.HYDAC-NA.com click on Products & Services > Products > Fuel Filtration > Tools
The New World of Advanced Diesel Filtration
OVERVIEW OF FUEL FILTRATION

Advanced Fluid Conditioning Solutions®:
When Cleanliness is Mission Critical

HYDAC, an ISO 9001:2008 certified company, is focused on developing ADVANCED FLUID CONDITIONING SYSTEMS AND PRODUCTS, and we have done so over the last sixty years. The designs in this catalog are the result of thousands of hours of laboratory research, field testing and decades of experience. HYDAC pioneered the development of micron filtration, helping to set performance standards in industrial fluid power systems. As a result, HYDAC is now a leader in almost all liquid filtration and fluid conditioning applications. Proof that our expertise lies in our broad mix of unsurpassed cleanliness products.

Our mission statement reflects our continuing commitment to excellence.

Our MISSION is to expand and retain our customer base by understanding and meeting their expectations. To achieve this MISSION we continually improve our products, business processes and work environment in order to meet our corporate goals.

Partnerships - We design solutions for industry and for the success of our customers by:

- Optimizing the use of technology with applications
- Using an efficient, timely customization process to fill specific customer needs
- Increasing manufacturing capacity and streamlining operations
- Preserving our reputation for reliability
- Expanding globally to support our customers and stay current with technologies
- Leveraging and sharing our knowledge to meet challenges openly
- Nurturing a creative, cooperative culture committed to the individual and to providing the best solutions for our customers

Our goal is to be your filtration partner. Our expertise in filtration technology, our superior filter and element manufacturing capabilities, and our dedication to customer service and product support are the reasons we are considered “The Filter Company.” We are committed to providing the best available filter products to meet necessary cleanliness levels at a competitive price. As a cost-effective quality producer, we can work with your purchasing department to supply contamination control technology or develop long-range pricing programs that can improve your company’s bottom line.

Requirements Have Changed! (The Need)

How Clean and Dry is Your Fuel?

Because many people assume they’re buying quality fuel that meets the required specifications, the cleanliness of diesel fuel is seldom questioned. That has changed, and with the cleanliness requirements mandated by the Tier 4 injection systems it is now time to ask “How clean does my fuel need to be?” From the 2μm tolerances in the 30,000+ psi injection systems to compliance with the warranty requirements of the injector manufacturers, this question will in reality become the new benchmark. The game has changed and in the following pages we will clearly define how today’s fuel, fuel systems and new emissions requirements MANDATE that both OEM’s and END USERS use only the best filtration.

Ten years ago a diesel engine did not require anything close to the level of filtration provided by HYDAC. With poor quality filters the engine would still run, maybe not efficiently, but it would run. But with today’s engines, both the particulate and the coalescing filters must be of only the highest quality. Be assured the results of poor filtration are no longer just black smoke and a lack of horsepower. No, with Tier 4 engines, poor filtration will likely mean lost revenue due to downtime as the operator pays to replace a failed injector. These problems are both manageable and should not add cost. With quality filtration installed at the fill point and at the engine the diesel engine will run more efficiently and continuously, but the filters used and the higher level of filtration required can no longer be an afterthought. It must become the focal point of any fleet manager or operator. Filtration quality and the profitable operation of any Tier 4 engine will become one in the same.
Tier 4 Requirements Demand a Sophisticated Approach and the Highest Quality Filtration

The Tier 4 engine is a technology shift and when compared to Tier 1-3 engines, Tier 4 engines require a completely superior level of filtration to run, much less to run reliably and efficiently. Tier 4 diesel engines will now react more violently if the injectors are constantly bombarded by contamination. To put this into perspective newly delivered bulk diesel fuel typically has an ISO cleanliness level of ISO 22/20/18 to ISO 21/19/17 but today’s injectors need to see fluid with a cleanliness level of below ISO 11/8/6 (typical aerospace cleanliness).

As we have and continue to transition into the new world of Tier 4 requirements, the answer to the question “How clean does my fuel need to be” will be – ISO 11/8/6 or better and the most cost effective way to consistently achieve this is through the use of the highest capacity, highest quality, particulate and coalescing filtration at the point of use (at the bulk tank and on the engine itself). The engine filter can no longer be the only solution. There is simply not enough room in the engine and the cost to address the cleanliness only at the engine will become too high. Now going forward, bulk fuel filtration must be ground zero and it must be of the highest quality. The filtration performance specifications are now important and users must pay attention to the specifications and mandate only the best.

It’s against this emissions reduction backdrop that HYDAC has developed its series of bulk / on-board, fuel-specific filtration products. From an environmental, economic and regulatory viewpoint we defined the critical elements our products needed to meet customer requirements, and in doing so we have laid the ground work now and for the future. While our competitors approach with yesterday’s technology, HYDAC is focused on being a world leader in the fuels filtration field by being positioned to real issues of today.

High Pressure Common Rail System

This diesel fuel injection technology is built to more stringent specifications than ever before. High operating pressure in excess of 30,000 psi and 2-5 micron injector tolerances make diesel fuel injection systems vulnerable to contamination levels that were not an issue in the past. While the High Pressure Common Rail System does provide improved power, fuel efficiency and lower exhaust emissions, at the same time requires a new level of fuel cleanliness and care. This cleanliness requirement for the fuel is now mission critical to system operation. OEM engine and injection makers are requiring that fuel used in the engine meet tight guidelines before warranty claims are accepted. Today’s requirements call for diesel fuel cleanliness at the fuel injection system of ISO 11/8/6 and a water level of <200 ppm water, both of which are harder to obtain with the additives for lubricity found in today’s ULSD.

Ultra Low Sulfur Diesel | ULSD

Fuel requirements changed from Low Sulfur Diesel (LSD) to Ultra Low Sulfur Diesel or (ULSD). This change was mandated between 2006-2010 in North America and Europe. The purpose of moving to ULSD was to reduce the sulfur content from 500 ppm to 15 ppm, this in turn reduced exhaust emission by more than 90% from the engine. To achieve this much of the lubricity agents in Low Sulfur Diesel fuel are now stripped out in the production process. Not only is much of the sulfur removed, but so are some of the original fuels and built in lubricity. The result is an ultra-clean fuel where additives must be introduced to provide the needed lubricity. Diesel engines depend on the lubricity of the fuel to keep moving parts from wearing prematurely. Lubricity additives, enhancers and anti-wear additives have also in some fuels been replaced with biodiesel blended into the diesel. ULSD15 is generally hydrophobic (does not like to hold water) with a 25-110 ppm water saturation point at room temp. Unlike traditional LSD the biodiesel blends are hydrophilic (they like to hold water). For this reason when biodiesel is added, the diesel fuels’ saturation points can rise to 250 ppm (B2), 500 ppm (B5), and 1,800 ppm (B20). This water is dissolved, which is OK, but the user must understand that there is more water in the fuel and that this water can become free water when the temps decrease. More free water in storage tanks means more free water at the injector and more free water molecules in the combustion chamber. None of which are good for the engine or its performance. Water must be eliminated and this is now even more difficult when the Interfacial Tension (IFT) between the water and the Diesel with surfactants and or biodiesel blends is lower making it harder to separate the water in ULSD fluids than it was in the past. A coalescing filter that in the past was >80% efficient in traditional diesel is typically now only, 66% efficient at removing water in the new ULSD fuels.

OVERVIEW OF FUEL FILTRATION
OVERVIEW OF FUEL FILTRATION

Biodiesel Addition to ULSD15 as a Blend

The EPA requirement under Renewable Fuel Standard 2 required that renewable fuel, such as biodiesel, for diesel be blended into the fuels. The goal is to reduce dependence on carbon-heavy fuels and contribute to the goal of reducing carbon pollution 17 percent below 2005 levels by 2020. In 2008, this involved 9 billion gallons and is expected to increase to 36 billion gallons by 2022.

An additional challenge is the bulk tank and water from condensation and the delivered fuel itself. In hundreds of thousands of bulk tanks that exist in North America and around the world today exists water, microbes, and bacteria. Most bulk tanks have not been designed to help meet the cleanliness requirements of Tier 4. Many traditional bulk storage reservoirs are open to their surrounding atmospheres. Almost all have some volume of free water caused by temperature changes, ingress and delivered fuel quality. More importantly, current tank design makes the complete removal of all free water nearly impossible. Free water in diesel fuel accelerates corrosion and fuel degradation. It can also create an ideal growth environment for microbial contamination. Bacteria can grow in the water at the fuel interface, and can cause the liquid fuels to breakdown and involves all grades. The results can be the accelerated corrosion of metals, especially iron and steel along with plugged fuel systems and clogged filters and lines. Bacteria grows better in warm climates and with favorable conditions, meaning that they can double their population every 20 minutes; 8 Billion bacteria per gallon have no effect on fuel clarity! Fungus tends to grow on solid surfaces, and with favorable conditions, meaning that they can double their population every 20 minutes; 8 Billion bacteria per gallon have no effect on fuel clarity! Fungus tends to grow on solid surfaces, like filters, and in piping. Once established, the fungal biomass will grow faster than a bacterial biomass. It can grow over a wide range of temperatures but grows quicker in summer with the higher temperature, increased airborne contaminants and higher fluid temperature.

Previously acceptable “industry standard” filtration solutions won’t make the grade in Tier 4 engines

Against this backdrop, HYDAC developed its series of bulk diesel fuel specific filter products. The critical needs are defined and our desiccant breathing systems, our series of bulk housings and skids and our specially engineered patent-pending coalescing elements provide the world with the right portfolio of products to meet almost any of today’s bulk fuel requirements. We are focused on being a world leader in diesel fuel filtration by being positioned to addresses the needs of customers with the following experience and forward thinking technologies.

Past Practice

Separation of emulsified water from diesel fuel is a long standing requirement for diesel engine operation. Water removal has been traditionally performed by a fuel-water separation filter mounted in the engine fuel system or, in tough operating environments where downtime has been managed by implementing best practice fluid maintenance, as part of the bulk tanks staged filtration at the dispensing system. The most typical filtration media found in such separators is a single resin impregnated hydrophobic barrier, such as silicone treated cellulose. This media separates water on its water repellent surface. Water in the fuel is rejected and beads up on the upstream side of the barrier media. As more water is rejected, beads coalesce into large drops, and drain into a collection cup while the fuel passes through a port located above the sump.

There are often unintended outcomes when a process or specification change is made. The changes to diesel engines and fuels provide no exception to this rule. The transition to ultra-low sulfur diesel (ULSD) provides a specific example.

In order to meet mandated sulfur levels, ULSD is subjected to refining processes that removes not only the sulfur but also the inherent lubricity of the original higher sulfur diesel. The result is the ultra-clean fuel. Unfortunately, it is an ultra-clean fuel that has been stripped of its native lubricity. Fuel lubricity is critical as it is the fuel’s lubricity that is one characteristic needed for protecting the injection systems from catastrophic wear and precise control of combustion. A fuel system must hold pressure in order to inject fuel into the cylinder. Wear induced leaks can lead to engine failure.

As lubricity deficiencies were surfacing with early ULSD adoption, biodiesel production and the push to use biodiesel began to take hold in the North American diesel market. Biodiesel improved ULSD lubricity, and as a result, generated some independent motivation for its use as a blended lubricity component of diesel fuel. The additional perceived need for a domestic or “green” fuel supply, and pressure to minimize fossil carbon emissions has prompted governments mandate a percent of biodiesel in diesel blends.

Just as the processing of ULSD produced unforeseen side effects in diesel fuel lubricity, the failure of existing fuel-water separators to react to the changing needs became apparent. With the lubricity additives the ULSD blends containing biodiesel, created conditions that exist in North America and around the world today exists water, microbes, and bacteria. Most bulk tanks have not been designed to help meet the cleanliness requirements of Tier 4. Many traditional bulk storage reservoirs are open to their surrounding atmospheres. Almost all have some volume of free water caused by temperature changes, ingress and delivered fuel quality. More importantly, current tank design makes the complete removal of all free water nearly impossible. Free water in diesel fuel accelerates corrosion and fuel degradation. It can also create an ideal growth environment for microbial contamination. Bacteria can grow in the water at the fuel interface, and can cause the liquid fuels to breakdown and involves all grades. The results can be the accelerated corrosion of metals, especially iron and steel along with plugged fuel systems and clogged filters and lines. Bacteria grows better in warm climates and with favorable conditions, meaning that they can double their population every 20 minutes; 8 Billion bacteria per gallon have no effect on fuel clarity! Fungus tends to grow on solid surfaces, like filters, and in piping. Once established, the fungal biomass will grow faster than a bacterial biomass. It can grow over a wide range of temperatures but grows quicker in summer with the higher temperature, increased airborne contaminants and higher fluid temperature.

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Fuel Surfactant and ULSD15

The root cause of fuel-water separator failure in ULSD-biodiesel blends is a decrease in interfacial tension due to increased levels of surfactants in the fuel. Although given separate titles to address the lubricity issue, lubricity enhancers, anti-wear additives, and biodiesel all contain compounds that are considered surfactants. Fuel and water are classes that normally do not dissolve into one another; if forced to coexist, they are most stable as separate layers, with the fuel layer on top of the water layer. The degree to which these layers repel is measurable as the interfacial tension (IFT). If mixed, an emulsion is formed, where water briefly exists as suspended drops in the fuel. Surfactants are molecules unique in that they form strong associations with both fuel and water. When surfactants are in a fuel, they associate with water, and increase fuel-water compatibility. The increased compatibility is reflected in a lower IFT between the two fluids. This unique surfactant behavior allows more water to dissolve into the fuel.

Surfactants create sufficiently small water drops (because they do not want to coalesce into larger drops) that will often pass through the media without encountering it. Surfactants also stabilize the emulsion from separation so that drops that do impact the media are less likely to fall out of the fuel at the barrier media. Also, drops that impact other drops resist coalescing into the larger drops necessary for successful separation. Collectively, the result of blending additives and biodiesel into ULSD is a significant reduction of the fuel-water separation process efficiency and finally the escape of water into the injector circuit.

You may be asking “How this can take place and nobody knew?” Testing in obsolete fuels is the reply! Today’s fuel-water separating devices must prove efficacy in standardized industry tests like SAE J1488 (pressure side = smaller water droplets). Water separation tests involve mixing a precise amount of water into fuel and passing the resulting emulsion through the separating device. Water content in the fuel upstream and downstream of the device is measured at regular intervals and time-weighted average water removal efficiency for the device is calculated. Water removal testing is very much all or nothing, with most end users requiring at least 95% average water removal efficiency for any commercial device.

At the same time another unforeseen consequence of the mandated fuel change surfaced: A lack of correlation of the tests with actual field performance. The result, the end user is largely unaware of the alarming failure consistency of fuel dewatering systems in ULSD-biodiesel blends. This is the case because the time required for a legislative body to mandate 2% biodiesel inclusion in diesel is fleeting relative to the time needed to adapt proven standardized industry tests for the new fuel. Regardless of the procedure selected, there are currently key differences between fuels surfactants / emulsifications found in the field versus the tests that are still specified to measure and rate water separator performance. Until resolved, the result is a disconcerting overestimation of a separators fuel water separation performance and capability as measured using aging standardized testing methods.

<table>
<thead>
<tr>
<th>Organization</th>
<th>Particulate ISO 4406</th>
<th>Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bosch</td>
<td>11/8/6 at Injector</td>
<td>&lt;200 ppm</td>
</tr>
<tr>
<td>CAT</td>
<td>18/16/13 at storage</td>
<td>&lt;500 ppm</td>
</tr>
<tr>
<td>CUMMINS</td>
<td>18/16/13 at storage</td>
<td>&lt;200 ppm</td>
</tr>
<tr>
<td></td>
<td>11/8/3 at injector</td>
<td></td>
</tr>
<tr>
<td>Worldwide Fuel Charter</td>
<td>18/16/13</td>
<td>No free or emulsified, dissolved &lt;200 ppm</td>
</tr>
</tbody>
</table>

Most diesel storage tank owners, maintenance staff and company buyers are not knowledgeable of these guidelines.

HYDAC and Advanced Tier 4 Ready Diesel Fuel Filtration Solutions:

Particulate and fuel water separation filtration solutions for today fuels used in today’s engines-Job matched filtration; At the bulk tank, at the point of fuel dispense, and at the engine.

HYDAC is committed to delivering the solutions to allow OEM’s and users meet today’s diesel filtration requirements. We offer a series of diesel fuel filtration products working in-line and or in a fuel conditioning circuit with flow rates from 1.5 gpm to 1000 gpm. We offer condensation management solutions for the tank and the diagnostic tools such as particle counters and water sensors to measure the results.

You can SHOP ONLINE at www.airlinehyd.com or call 800-999-7378.
OVERVIEW OF FUEL FILTRATION

Design Principles of HYDAC Particulate Removal Filters & Elements

Our design standard is to provide the highest quality particulate removal filtration with the best combination of dirt holding capacity, low element delta P, the highest beta stability throughout the service life of the element at all of the available micron sizes applied to achieve and maintain the target cleanliness level for each application. We can provide contamination removal efficiencies from 1μm-Beta1000 to as open as 150μm metal mesh. Most importantly, when filtering diesel fuel we use these filters and elements upstream to protect and extend the life of the downstream dedicated coalescing elements. We do this because testing shows that with our patent-pending materials of construction, our coalescing elements can and will outperform the competition because they will, by their materials and design, last for years if protected from premature contamination related loading using the right upstream particulate filter. In short, HYDAC offers an entirely new level of coalescing performance, one that has an associated cost, but one, when used correctly, mandates total cost to use our solution to be the lowest over time. The technical details and the design principals of our particulate elements can be found in our elements literature.

Design principles of the water removal (Water Coalescing) filters and Elements - Inside-Out flow to optimize coalescing effect, 5 micron synthetic pre-filter pleat pack to protect the downstream media, a depth tube coalesces water which creates large droplets that drain to the bottom. Downstream, a 25 micron treated hydrophobic barrier sleeve traps droplets <25μ. This 3 elements in one pre-filter, coalescing, and separation (most competitors have separate elements for each function) = smaller size! Tested per SAE J1488 (pressure side = smaller water droplets), with fuel down to 12 dynes/cm IFT to replicate performance with more difficult fuels. Contaminated fuel enters the element with the fuel passing through a 3 or 5 micron synthetic media pleat pack. Wet fuel then passes through the coalescing layer. Water collects and drains from the element forming large droplets, the fuel then passes through the downstream hydrophobic barrier. Water droplets are repelled by barrier and fall to bottom of the element, which is collected into the filter housing sump. Through the union of particulate filtration with our coalescing media, the element provides the perfect balance to collect and trap both water and contaminants in a single element. The three phase element has been developed with greater than 99% water removal capability in all but the highest surfactant ULSD or ULSD-biodiesel blends. Our fuels product lines cover a range of particle removal efficiencies and dirt holding capacities, giving the end user flexibility in pairing flow requirements to their need. This coalescing media provides a minimum of 95% water removal efficiency from biodiesel blends (B5).

Design Principals for Diesel Fuel Skids and Carts for specific Fuel applications

HYDAC has developed many of the core diesel products into turnkey filtration solutions with integrated pump motor dispense functions for almost every diesel application from gen sets to fleet fueling tanks to the ag tank at a farm. All are designed to address the challenges of fuel in its environment.

In the balance of this catalog, we trust you will find the products you require to meet your demanding needs.
The Cost of Dirty Fuel

All new off-road diesel engines now must meet Tier 4 regulations. In order to achieve Tier 4 requirements, manufacturers of engines and injector systems have gone to high pressure, common rail, injection systems. The pressures can exceed 30,000 psi and might go even higher in the future. Particulates left in the fuel under the high pressure, combined with very small injector nozzle clearances as small as 2μm, can cause premature failure of nozzles or system components.

Failures of the injection system caused by particulates and water could result in repair costs of around $1,500 per injector. The associated costs for a failure due to parts damage, repair & down time, loss of production and image loss of the operation could add up to ten-thousands of dollars per incident!

Traditional on-board engine filtration & fuel water separation is no longer enough to insure performance. Instead, a comprehensive filter strategy is required to assure proper fuel quality for trouble free engine operation:

**Comprehensive Fuel Filtration Strategy by Application and by Products**
OVERVIEW OF FUEL FILTRATION

Element Technical Data

Performance Specifications / Filtration Rating

HYDAC filter elements meet a wide variety of requirements in today’s workplace, from the simplest to the most sophisticated fluid power systems. Established industry standards enable users to select the optimal filter element for any application.

Filter elements are rated on the basis of their ability to remove contaminants of specific targeted sizes from a fluid, under specific operating conditions. Filtration ratings can be measured by analyzing three areas of performance:

1. Efficiency or filter element Beta rating and resulting percent efficiency,
2. Dirt holding capacity (DHC), and
3. The pressure drop across the element over a range of flow conditions (PQ).

The Multi-Pass Test

Filter element efficiency ratings and capacities are determined by conducting a multi-pass test under controlled laboratory conditions. This is a standard industry test with procedure published by the International Standards Organization (ISO), the American National Standards Institute (ANSI), and the National Fluid Power Association (NFPA). The multi-pass test yields reproducible test data for appraising the filtration performance of a filter element including its particle removal efficiency under ideal conditions. These test results enable the user to: (1) compare the Beta efficiency, dirt holding capacity, and Beta stability characteristics of elements offered by various filter element suppliers and (2) helps one to select the proper filter element when also evaluating the structural integrity and pleat support system designed to obtain the optimal contamination control level for any particular system under dynamic operating conditions.

Hydraulic fluid (Mil. Spec. 5606) is circulated through a system containing the filter element to be tested. Additional fluid contaminated with ISO MTD Test Dust is introduced upstream of the element being tested. The fluid is monitored upstream and downstream of the test element to determine the element contamination removal efficiency.

\[ \beta_{x(c)} = \frac{\text{number of particles upstream} \geq x(c) \text{ microns}}{\text{number of particles downstream} \geq x(c) \text{ microns}} \]

where \( x(c) \) is a specified particle size (in microns).

Example: \( \beta_{10(c)} = \frac{7500}{100} = 75 \)

This particle capture efficiency can also be expressed as a percent by subtracting the number 1 from the Beta value, dividing by Beta value and multiplying the result by 100:

\[ \text{Beta}_{x(c)} \text{ efficiency} = \left(\frac{\beta_{x(c)} - 1}{\beta_{x(c)}}\right) \times 100 \]

\[ \text{Beta}_{10(c)} \text{ efficiency} = \left(\frac{75 - 1}{75}\right) \times 100 = 98.667\% \]

The example is read as “Beta ten is equal to 75, where 7500 particles, 10 microns and larger, were counted upstream of the test filter (before) and 100 particles, 10 microns and larger, were counted downstream of the test filter (after).”

The filter element tested was 98.667% efficient in removing particles 10 microns and larger.

Figure 5. Multi-Pass Test Schematic

<table>
<thead>
<tr>
<th>Metered MTD Slurry</th>
<th>Test Filter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Downstream Sample (( N_U &gt; 1 ))</td>
<td>X</td>
</tr>
<tr>
<td>Upstream Sample (( N_D &gt; 1 ))</td>
<td>X</td>
</tr>
<tr>
<td>Pump</td>
<td></td>
</tr>
</tbody>
</table>

Filtration Ratio (Beta) ISO 4572 vs. ISO 16889

Due to the changes in the way particles are measured and the fact that a new test dust (ISO MTD) is now utilized, a new standard for multi-pass testing was necessary. This new current standard, ISO 16889, replaces the old Multi-Pass Test Standard, ISO 4572.

The filtration ratio (more commonly referred to as the Beta ratio) is, in fact, a measure of the particle capture efficiency of a filter element.

ISO 4572 (Old)

\[ \beta_x = \frac{\text{number of particles upstream} \geq x \text{ microns}}{\text{number of particles downstream} \geq x \text{ microns}} \]

ISO 16889 (Current 1999)

\[ \beta_{x(c)} = \frac{\text{number of particles upstream} \geq x(c) \text{ microns}}{\text{number of particles downstream} \geq x(c) \text{ microns}} \]

where \( x(c) \) is a specified particle size (in microns).

Example: \( \beta_{10} = \frac{7500}{100} = 75 \)

This particle capture efficiency can also be expressed as a percent by subtracting the number 1 from the Beta value, dividing by Beta value and multiplying the result by 100:

\[ \text{Beta}_{10} \text{ efficiency} = \left(\frac{\beta_{10} - 1}{\beta_{10}}\right) \times 100 \]

\[ \text{Beta}_{10} \text{ efficiency} = \left(\frac{75 - 1}{75}\right) \times 100 = 98.667\% \]

The example is read as “Beta ten is equal to 75, where 7500 particles, 10 microns and larger, were counted upstream of the test filter (before) and 100 particles, 10 microns and larger, were counted downstream of the test filter (after).”

The filter element tested was 98.667% efficient in removing particles 10 microns and larger.
OVERVIEW OF FUEL FILTRATION

Percent Efficiency
To calculate a filter element’s percent efficiency, subtract 1 from the Beta, divide that answer by the Beta, then multiply by 100.

Table 7. Filter Element Percent Efficiency

<table>
<thead>
<tr>
<th>Example Per ISO 4572 (old):</th>
<th>Example Per ISO 16889 (new):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1: ( \beta_{10} \geq 75 )</td>
<td>( \beta_{10(c)} \geq 75 )</td>
</tr>
<tr>
<td>Step 2: 75 -1 = 74</td>
<td>75 -1 = 74</td>
</tr>
<tr>
<td>Step 3: 74 + 75 = 9.987</td>
<td>74 + 75 = 9.987</td>
</tr>
<tr>
<td>Step 4: 9.987 x 100 = 98.7%</td>
<td>9.987 x 100 = 98.7%</td>
</tr>
</tbody>
</table>

Using a calculator with a % key, you can use the shortcut version.

Example Per ISO 4572 (old): Example Per ISO 16889 (new):

| Step 1: \( \beta_{10} \geq 200 \) | \( \beta_{10(c)} \geq 200 \) |
| Step 2: 200 -1 = 199 | 200 -1 = 199 |
| Step 3: 199 ÷ 200 = 99.5% | 199 ÷ 200 = 99.5% |

Pressure Drop
When sizing a filter, it is important to consider the initial differential pressure (\( \Delta P \)) across the element and the housing. Elements offering a lower pressure drop at a high Beta efficiency are better than elements with a high \( \Delta P \) at the same efficiency. At every level of filtration, HYDAC Betamicro® media elements offer a superior combination of high efficiency, high dirt holding capacity, and low pressure drop with the media support design that provides the highest levels of performance under dynamic fluid conditions.

Collapse Rating
The collapse rating of a filter (determined by ISO 2941/ANSI B93.25) represents the differential pressure across the element that causes the media to fail. The collapse rating of an element should be on the order of 3 times higher than the filter bypass setting. The collapse rating for filter elements used in filter housings with no bypass valve should be at least the same as the setting of the system relief valve upstream of the high collapse element. When a collapsed element becomes clogged with contamination all functions downstream of the filter will become inoperative due to the release of high levels of contamination to the critical hydraulic components - loss of protection.

Filter Beta Rating
ISO 16889 replaces ISO 4572 as the International Standard for Multi-pass Testing. It provides a common testing format for filter manufacturers to rate filter element performance. For convenience, Betas are shown in this catalog for both old and new Multi-pass standards (ISO 4572 and 16889, respectively.)

According to ISO 16889, each filter manufacturer can test a given filter element at a variety of flow rates and terminal pressure drop ratings that fit the application, system configuration and filter element size. Results may vary depending on the configuration of the filter element tested and the test conditions.

Currently, there is no accepted ISO, ANSI, or NFPA standard regarding “absolute” ratings. Filter manufacturers have generally adopted an industry standard using \( \beta_{10} \geq 75 \) (98.7% efficiency) as a minimum efficiency to rate an element as a high efficiency depth filter media. Filter manufacturers generally rate their high efficiency elements as \( \beta_{10} \geq 100 \) (99.0% efficiency), \( \beta_{10} \geq 200 \) (99.5% efficiency), or \( \beta_{10} \geq 1000 \) (99.9% efficiency). Performance of HYDAC elements is typically a minimum rating of \( \beta_{10} \geq 1000 \), with high dirt holding capacities and lower pressure drops in optimum balance to meet the dynamics and stresses of all applications.

Dirt Holding Capacity
Dirt holding capacity (DHC) is the amount of contaminant (expressed in grams) the element will retain before it goes into alarm (terminal pressure). All other factors being equal, an element’s DHC can provide indication of how long the element will last until full. This characteristic, taken into context with a structural and pleat support evaluation will provide good indication of what element should last longer in system operation.

Dirt holding capacity, sometimes called “apparent capacity,” is a very important and often overlooked factor in selecting the right element for the application. The dirt holding capacity of an element is measured in grams of ISO medium test dust contaminant as determined from the multi-pass test (ISO 16889), and measured at the terminal \( \Delta P \) (alarm point). When selecting filter elements, it is beneficial to compare the dirt holding capacities of elements with similar particle removal efficiencies and good structural and pleat support characteristics.
Overview of Fuel Filtration

Element Selection

The Right Media for the Right Application = Job Matched Filtration

Filtration Application Guidelines

Selecting the proper HYDAC media for your application is easy if you follow these simple guidelines.

Step 1. Remember that the key to cost effective contamination control is to maintain the system’s cleanliness at the tolerance level of the system’s most sensitive component. So, the first step is to identify the most sensitive component.

Step 2. Determine the desired cleanliness level (ISO Code) for that component by referring to Table 5 (in this Overview) by reference to the customer’s component manuals or by contacting the component manufacturer directly.

Step 3. Referring to Table 8 identify the HYDAC filter medium that will meet or exceed the desired cleanliness level.

Step 4. Remember to regularly check the effectiveness of the selected media through the use of contamination monitoring tools and equipment.

Table 8. HYDAC Element Media Recommendations

<table>
<thead>
<tr>
<th>Desired Cleanliness Levels (ISO Code 4406)</th>
<th>HYDAC Media</th>
</tr>
</thead>
<tbody>
<tr>
<td>19/16/13 to 22/19/16</td>
<td>25 µm</td>
</tr>
<tr>
<td>18/15/12 to 21/18/15</td>
<td>20 µm</td>
</tr>
<tr>
<td>17/14/11 to 20/17/14</td>
<td>15 µm</td>
</tr>
<tr>
<td>15/12/9 to 19/16/13</td>
<td>10 µm</td>
</tr>
<tr>
<td>12/9/6 to 17/14/11</td>
<td>5 µm</td>
</tr>
<tr>
<td>10/7/4 to 13/10/7</td>
<td>3 µm</td>
</tr>
</tbody>
</table>

Effect of Dirt Ingression

Filter element life varies with the true dirt holding capacity of the element under dynamic flow conditions and the amount of dirt introduced into the circuit. The rate of this dirt ingestion in combination with the desired cleanliness level should be considered when selecting the media to be used for a particular application.

The amount of dirt introduced can vary from day to day and hour to hour, generally making it difficult to predict when an element will become fully loaded. This is why we recommend specifying a filter indicator.

Filter indicators provide a vital measure of protection for your system by indicating when the filter element needs to be changed or cleaned. HYDAC filters are available with visual, electrical and electrical-visual combination filter indicators. These indicators may also be purchased as separate items.

Amount of Fluid Filtered

To obtain the desired cleanliness level (ISO Code) using the suggested HYDAC filter medium, it is recommended that a minimum of one-third of the total fluid volume in the system pass through the filter per minute. If fluid is filtered at a higher flow rate, better results may be achieved. If only a lesser flow rate can be filtered, a more efficient media may be required.

Systems operating in a clean environment, with efficient air-breather filters and effective cylinder rod wiper seals, may achieve the desired results at a lower turnover rate. Systems operating in a severe environment or under minimal maintenance conditions should have a higher turnover. Turnover must be considered when selecting the location of the system’s filter(s).

Sizing a Filter Element

Since the pressure drop versus flow data contained in our filter catalog is for fluids with a viscosity of 141 SUS (30 cSt), and a specific gravity of 0.86, we are often asked how to size a filter with a viscosity other than 141 SUS (30 cSt) or a specific gravity other than 0.86. In those instances where the viscosity or specific gravity is significantly higher, it may be necessary to use a larger element. To make this determination, we need to calculate the life of the element, using the following equation:

\[
EL = IA - (H + E)
\]

Where:

- \( EL \) = Element Life (expressed in psi)
- \( H \) = Housing pressure drop
- \( IA \) = Indicator Alarm trip point
- \( E \) = Element pressure drop

1. The housing pressure drop can be read directly from a graph. This value is not significantly affected by viscosity or the number of elements in the housing, since housing flow is turbulent.
2. The element pressure drop is directly proportional to viscosity, influenced by high pressure since element flow is laminar.

A “rule of thumb” for element life, as calculated from the above equation, is to work towards a filter assembly differential pressure drop that is typically no greater than 20% of alarm trip setting.

Table 9. Typical Pressure Drop Maximum Targets for Filter sizing:

<table>
<thead>
<tr>
<th>Max. Pressure Drop</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 – 15 psid</td>
<td>Pressure Filters</td>
</tr>
<tr>
<td>4 – 8 psid</td>
<td>Return Filters</td>
</tr>
<tr>
<td>2 – 6 psid</td>
<td>Lube Systems</td>
</tr>
</tbody>
</table>

Filter assembly differential pressure should never exceed 50% alarm trip point even in most demanding applications. The interval between element change-outs can be extended by increasing the total filter element area. Many HYDAC filters can be furnished with one, two, or three elements or with larger elements. By selecting a filter with additional element area, the time between servicing can be extended for minimal additional cost.

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Bulk Diesel Coalescing Filtration Fundamentals

Prepare for Tier 4 Off-Highway Engine Requirements

- Fuel injectors operate at high pressures to achieve emissions standards (30,000+ psi)
- Injector nozzles openings as small as 2 µm (for perspective 40 µm is visibility limit with human eye)
- Requirements for diesel fuel based on ISO Code cleanliness levels (18/16/13 storage, 12/9/6 or better at the injector)
- Requirements for water removal from fuel (levels down to 50 ppm)

HYDAC’s Bulk Diesel Filters and systems provide exceptional, ≥ 99.5% single-pass diesel purification to protect the latest in high pressure, common-rail, fuel injection systems that require fuel with particulate filtration down to 1 µm.

Why is highly efficient particulate and coalescing fuel filtration a critical requirement in today’s application?

- 2004: U.S. Environmental Protection Agency announced rules to reduce emissions from on- and off-road diesel engines by more than 90% over 11 years (Tier 3 & 4)
- 2011: Ultra Low Sulfur Diesel (ULSD15) became standard for all diesel fuel in the US, Canada & Europe
- 2013-2014 & Beyond: Tier 4 and Tier 4 final Engines are being shipped with fuel cleanliness requirements and enhanced water level removal needs
- Fuel cleanliness and ppm levels that were acceptable in Tier 3 and lower engines will most likely cause significant issues in today’s Tier 4 Final engines. Injector manufacturers advise: No warranty coverage due to improper fuel filtration

Application Introduction: Better Bulk Fuel Filtration is now a critical competence in achieving cost effective engine performance

Coalescing filtration can be a highly effective method to remove water from diesel fuels. Water is typically introduced into the fuel supply by condensation or water ingress during delivery or transfer. Water in a vehicle’s fuel system can reduce lubricity causing seizure of close tolerance parts, increased TAN, reduced lubricity at the injector, lower burn efficiency, reduced power or emissions violations and corrosion. Water in fuel storage tanks causes rust and promotes microbial growth. Microbial growth in fuel storage systems begins in free water at the tank bottom and can quickly migrate through the fuel. In warm weather, microbial “blooms” can quickly overwhelm and bypass fuel filters causing contamination to reach the fuel injectors. Today’s high pressure 36,000+ psi (2,800bar) common-rail, Tier 4 fuel injection systems have tighter tolerances and require water removal of less than 200 ppm to minimize wear related failures.
OVERVIEW OF FUEL FILTRATION

We test to SAE J1488 and ISO16332 - Fuel Standards. Below are examples of HYDAC tests and results of third-party product testing.

**SAE J1488** is a fuel/water separation test with continuous water injection of .25% of the fuel flow rate. The test is performed with the water injected upstream (suction side) of the pump resulting in emulsified or finely dispersed water droplets.

**ISO 16332** is a fuel/water separation test with continuous water injection of .15% of the fuel flow rate. The test is performed with the water injected either downstream (pressure side) or upstream (suction side) of the pump resulting in emulsified/finely dispersed or larger water droplets, respectively.

Third-party testing show the performance of the HYDAC ICF rated for 16 gpm and a competitor product rated for 25 gpm at a test flow rate of 10 gpm. HYDAC product is fully synthetic where competitor’s is a combination of systolic and cellulose. As the test goes on, the competitor’s element loses separation efficiency. The result is a clear sump sample (Figure 3) versus a cloudy sump sample with fuel and water (Figure 2).

**Figure 1**

Test Circuit Sample of UNFILTERED Sump Discharge:
(Tested without the coalescing element installed at 16 gpm flow) 0% removal efficiency and the unfiltered sump sample is milky and filled with fuel.

**Figure 2**

Competitive Fuel Filter:
Sample of Drain Discharge after Coalescing filtration at 16 gpm at an average efficiency of 61%. The sample is a mixture of fuel and water due to poor separation efficiency.

**Figure 3**

HYDAC ICF Coalescing Element:
Water removal performance at 25 gpm is 97.7% efficiency and as a result the sump drain output sample is clean and free of visible fuel. NOTE: for comparison, competitor’s filter efficiency at only 16 gpm is 61% and testing of the competitors unit at 25 gpm provided downstream results that were too saturated to measure on a Karl Fischer, showing reduced separation efficiency.
Cellulose vs Fully Synthetic Medium

Independent Testing (Sept. 2014) at Southwest Research Institute® (SwRI)
- SAE J1488
- In-line fuel coalescing filter (ICF)
- Flow rate 16 gpm
- Water feed rate: 152 ml/min (2,500 ppm)
- Test Duration 150 minutes

HYDAC Coalescing Technology: the Difference in Performance

Equipment:
- MPT Multipurpose Stand
- 10 Gallon Reservoir
- Coulometric Karl Fischer Unit
- Controlled Environmental Conditions

ICF vs Competition Efficiency Testing

Flow Rate 10 gpm

![Efficiency Graph]

- ICF
- Competitor

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OVERVIEW OF FUEL FILTRATION

Diesel Fuel Filtration in the Engine – Why it Matters

Tier 4 Rail Injection Engine - Cutaway

- Bacterial Growth
- Blocked Fuel Filter
- Clogged Fuel Injectors
- Damaged Fuel Pump
- Oil Degradation/Leakages
- Seal Failures
- Unseen Particles

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PARTICULATE FILTRATION

GHPF Series
GeoSeal® High-Flow Particulate Filter
150 psi • up to 100 gpm

Description
The GHPF is a high flow, compact particulate filter for use where superior performance is needed in fuel transfer, kidney-loop, or dispensing applications. The filter assembly uses a performance optimized synthetic filter media along with the GeoSeal® element interface to ensure quality filtration with every replacement. The filter dimensions allow for installations where spin-on filters are commonly used.

Features
• Diesel fuel particulate filter for dispensing, transfer or polishing filtration applications
• Uses patented GeoSeal® elements
• All-aluminum filter housing is fully compatible with diesel and biodiesel
• Minimal clearance needed for element service, ideal for enclosure installations
• Cartridge style element improves performance and reduces waste compared to spin-on solutions
• Port to port and mounting pattern dimensions match standard spin-on assembly

Applications
• Fleet fill/bulk fuel transfer
• Bulk fuel unloading
• Protection for high-flow fuel injection systems
• Bulk tank kidney loop/recirculation

Technical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow Rating</td>
<td>Up to 100 gpm (380 l/min)</td>
</tr>
<tr>
<td>Max. Operating Pressure</td>
<td>150 psi (10.3 bar)</td>
</tr>
<tr>
<td>Min. Yield Pressure</td>
<td>2600 psi (179 bar)</td>
</tr>
<tr>
<td>Temperature Range</td>
<td>-20°F to 225°F (-29°C to 107°C)</td>
</tr>
<tr>
<td>Bypass Setting Cracking</td>
<td>40 psi (2.8 bar)</td>
</tr>
<tr>
<td>Porting Head Case</td>
<td>Cast Aluminum, Anodized Aluminum, Anodized</td>
</tr>
<tr>
<td>Element Case</td>
<td>Cast Aluminum, Anodized</td>
</tr>
<tr>
<td>Weight GHPF</td>
<td>7.64 lbs. (3.47 kg)</td>
</tr>
<tr>
<td>Element Change Clearance</td>
<td>2&quot; (51 mm)</td>
</tr>
</tbody>
</table>

Markets
• Industrial
• Mobile Vehicles
• Marine
• Mining Technology
• Agriculture
• Power Generation
• Common Rail Injector Systems
• Fleet
• Railroad
• Bulk Fuel Filtration

Model No. of filter in photograph is: GHPFG03VS24VMR

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PARTICULATE FILTRATION

Model Code

Filter Series
GHPF = GeoSeal® High-Flow Particulate Filter

Element Series
G = GeoSeal®

Micron Rating (microns)
01 = (1 µm)
03 = (3 µm)
05 = (5 µm)
10 = (10 µm)
25 = (25 µm)

Sealing Material
V = Fluorocarbon Elastomer (FKM)

Bypass Setting
Omit = 40psid

Inlet Port
S24 = SAE-24
P24 = 1.5” NPTF

Dirt Alarm® Options
VM = Visual pop-up with manual reset

Indicator Orientation
R = Right side
L = Left side

Options
Omit = None
U = Downstream test point

Element Performance Information

Filtration Ratio Per ISO 16889
Using automated particle counter (APC) calibrated per ISO 11171

<table>
<thead>
<tr>
<th>Media Type</th>
<th>Element</th>
<th>0.1 (c) ≥ 200</th>
<th>0.1 (c) ≥ 1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Betamicron® Media</td>
<td>5.40.11 D 01 BN4/-V-G</td>
<td>&lt;4.0</td>
<td>4.5</td>
</tr>
<tr>
<td></td>
<td>5.40.11 D 03 BN4/-V-G</td>
<td>4.6</td>
<td>5.8</td>
</tr>
<tr>
<td></td>
<td>5.40.11 D 05 BN4/-V-G</td>
<td>5.9</td>
<td>7.8</td>
</tr>
<tr>
<td></td>
<td>5.40.11 D 10 BN4/-V-G</td>
<td>11.4</td>
<td>13.2</td>
</tr>
<tr>
<td></td>
<td>5.40.11 D 25 BN4/-V-G</td>
<td>15.8</td>
<td>17.5</td>
</tr>
</tbody>
</table>

Dirty Holding Capacity

<table>
<thead>
<tr>
<th>Media Type</th>
<th>Element</th>
<th>DHC (gm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Betamicron® Media</td>
<td>5.40.11 D 01 BN4/-V-G</td>
<td>172</td>
</tr>
<tr>
<td></td>
<td>5.40.11 D 03 BN4/-V-G</td>
<td>148</td>
</tr>
<tr>
<td></td>
<td>5.40.11 D 05 BN4/-V-G</td>
<td>174</td>
</tr>
<tr>
<td></td>
<td>5.40.11 D 10 BN4/-V-G</td>
<td>165</td>
</tr>
<tr>
<td></td>
<td>5.40.11 D 25 BN4/-V-G</td>
<td>164</td>
</tr>
</tbody>
</table>

Element Collapse Rating: 150 psid (10.3 bar) for standard and non-bypassing elements

Flow Direction: Outside In
Element Nominal Dimensions: 5” (127 mm) O.D. x 11” (305 mm) long
PARTICULATE FILTRATION
Dimensions
GHPF

Dimensions shown are inches [millimeters] and for general information only. For complete dimensions please contact HYDAC to request a certified print.

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**Fluid Compatibility**

Diesel Fuel and Biodiesel (B100).

For other Distillate Petroleum, Contact Factory.

**Element Selection**

<table>
<thead>
<tr>
<th>Pressure</th>
<th>Element</th>
<th>Micron Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>To 150 psi (10.3 bar)</td>
<td>5.40.11 D xx BN4</td>
<td>Series</td>
</tr>
<tr>
<td>1</td>
<td>5.40.11 D 01 BN4</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>5.40.11 D 03 BN4</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>5.40.11 D 05 BN4</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>5.40.11 D 10 BN4</td>
<td>10</td>
</tr>
<tr>
<td>25</td>
<td>5.40.11 D 25 BN4</td>
<td>25</td>
</tr>
</tbody>
</table>

**Sizing Information**

Total pressure loss through the filter is as follows:

Assembly \( \Delta P = \) Housing \( \Delta P + \) Element \( \Delta P \)

**Housing Curve**

Pressure loss through housing is as follows:

\[ \text{Housing } \Delta P = \text{Housing Curve } \Delta P \times \frac{\text{Actual Specific Gravity}}{0.86} \]

**Housing Pressure Drop GHPF**

\[ \text{Flow (L/min)} \]

\[ \text{Flow gpm} \]

\[ \Delta P \text{ psi} \]

\[ \Delta P \text{ bar} \]

**Element K Factors**

\[ \Delta P \text{ Elements} = \text{Elements (K) Flow Factor x Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{37 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86} \]

**Betamicon**

<table>
<thead>
<tr>
<th>Size</th>
<th>1(\mu)</th>
<th>3(\mu)</th>
<th>5(\mu)</th>
<th>10(\mu)</th>
<th>25(\mu)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.40.11 D XX BN4</td>
<td>0.074</td>
<td>0.052</td>
<td>0.049</td>
<td>0.049</td>
<td>0.039</td>
</tr>
</tbody>
</table>
## Description
A versatile, base ported high flow particulate filter housing for use with diesel fuel. The QF5 can be configured in a single housing assembly to support 300 gpm of flow, or expand the capacity by choosing the 2QF5 assembly configured in parallel.

### Features
- Element changeout from the top minimizes fuel spillage
- For fuel filtration applications, the ECOMicron® is chosen as standard with FKM seals.
- Offered in pipe, SAE straight thread, and flange porting
- Optional inlet and outlet test points
- Various element service indicator options

### Applications
- Industrial
- Automotive manufacturing
- Machine tool
- Steel making
- Mining technology
- Power generation
- Pulp & paper
- Bulk fuel filtration

## Technical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow Rating</td>
<td>Up to 300 gpm (1135 L/min) for 150 SUS (32 cSt) fluids</td>
</tr>
<tr>
<td>Max. Operating Pressure</td>
<td>500 psi (35 bar)</td>
</tr>
<tr>
<td>Min. Yield Pressure</td>
<td>2500 psi (172 bar), per NFPA T2.6.1-R1-2005</td>
</tr>
<tr>
<td>Rated Fatigue Pressure</td>
<td>Contact Factory</td>
</tr>
<tr>
<td>Temperature Range</td>
<td>-20°F to 212°F (-29°C to 100°C)</td>
</tr>
<tr>
<td>Bypass Setting</td>
<td>Cracking: 30 psi (2.1 bar) Full Flow: 55 psi (3.8 bar)</td>
</tr>
<tr>
<td>Porting Head</td>
<td>Element Case: Cast Aluminum Steel</td>
</tr>
<tr>
<td>Cap:</td>
<td>Ductile Iron</td>
</tr>
<tr>
<td>Weight of QF539</td>
<td>185 lbs. (84 kg)</td>
</tr>
<tr>
<td>Element Change Clearance</td>
<td>39Q 33.8&quot; (859 mm)</td>
</tr>
</tbody>
</table>
## Model Code

### Filter Series
- **QF5** = In-Line Filter

### Element Length (in)
- 39

### Element Style
- Q

### Micron Rating
- **03** = 3 µm ECOmicron®
- **05** = 5 µm ECOmicron®
- **10** = 10 µm ECOmicron®

### Housing Seal Material
- **Omit** = Buna N
- **V** = Fluorocarbon elastomer (FKM)

### Porting
- **P32** = 2” NPTF
- **P40** = 2 1/2” NPTF
- **P48** = 3” NPTF
- **S32** = SAE -32 o-ring boss
- **F32** = -32 (2”) SAE 4-bolt flange Code 61
- **F40** = -40 (2 1/2”) SAE 4-bolt flange Code 61
- **F48** = -48 (3”) SAE 4-bolt flange Code 61

### Bypass Setting
- **Omit** = 30 psi cracking

### Differential Pressure Clogging Indicator Options
- **Omit** = None
- **VM** = Visual pop-up, manual reset

*for electrical indicators, contact factory*
Element Performance Information

<table>
<thead>
<tr>
<th>Element</th>
<th>Filtration Ratio Per ISO 4572/NFPA T3.10.8.8 Using automated particle counter (APC) calibrated per ISO 4402</th>
<th>Filtration Ratio per ISO 16889 Using APC calibrated per ISO 11171</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$8 \times \geq 75$</td>
<td>$8 \times \geq 100$</td>
</tr>
<tr>
<td>39Q</td>
<td>&lt;1.0</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td>03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05</td>
<td>2.5</td>
<td>3.0</td>
</tr>
<tr>
<td>10</td>
<td>7.4</td>
<td>8.2</td>
</tr>
</tbody>
</table>

Dirt Holding Capacity

<table>
<thead>
<tr>
<th>Element</th>
<th>DHC (gm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>39Q</td>
<td></td>
</tr>
<tr>
<td>03</td>
<td>1293</td>
</tr>
<tr>
<td>05</td>
<td>1302</td>
</tr>
<tr>
<td>10</td>
<td>1214</td>
</tr>
</tbody>
</table>

Element Collapse Rating: ECOMicron: 145 psid (10 bar)
Flow Direction: Outside In
Element Nominal Dimensions: Q: 6.0” (150 mm) O.D. x 40.0” (1016 mm) long

Dimensions shown are inches (millimeters) and for general information only. For complete dimensions please contact HYDAC to request a certified print.
Fluid Compatibility

<table>
<thead>
<tr>
<th>Compatible Fluid Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel Fuel</td>
</tr>
<tr>
<td>Biodiesel (with FKM seals)</td>
</tr>
</tbody>
</table>

Housing Pressure Drop
QF5

\[ \Delta P_{\text{element}} = \text{flow} \times \text{element} \Delta P \text{ factor} \times \text{viscosity factor} \]

El. \( \Delta P \) factors @ 150 SUS (32 cSt):
- 16QCLQFZ3 .05 Q03 .02
- 16QCLQFZ5 .05 Q05 .02
- 16QCLQFZ10 .04 Q10 .01

If working in units of bars & L/min, divide above factor by 54.9.
Viscosity factor: Divide viscosity by 150 SUS (32 cSt).

sp gr = specific gravity
Sizing of elements should be based on element flow information provided in the Element Selection chart above.
PARTICULATE FILTRATION

LVHF Series
High Flow | Low Viscosity Housing Filter
150 psi • up to 211-951 gpm

Features
- Excellent filtration performance in a single pass
- Low pressure loss due to innovative element technology
- Easy to service thanks to intelligent element design
- Easy to adapt to filter housings for the removal of the fine particles in diesel
- The Low Viscosity-Housing Filter LVH-F is mainly used to filter low-viscosity fluids. It is especially suitable for applications with large amounts of dirt that need to be removed in just a single pass
- The Optimicron® filter elements used here ensure that both the required cleanliness and a long service life are achieved.
- Available in various sizes, the filters can be optimally integrated into new or existing systems.
- The filters are designed according to ASME Code Section VIII rules and regulations for pressure vessels as well as the ability to certify to other global standards upon request.

Technical Specifications

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow Rating</td>
<td>211-951 gpm (799-3600 L/min)</td>
</tr>
<tr>
<td>Inlet/Outlet Connection</td>
<td>ANSI 150#: 2”-12”</td>
</tr>
<tr>
<td></td>
<td>DIN: DN50-DN300</td>
</tr>
<tr>
<td>Max. Operating Pressure</td>
<td>150 psi (10 bar)</td>
</tr>
<tr>
<td>Max. Ambient Temperature</td>
<td>122°F (50°C)</td>
</tr>
<tr>
<td>Max. Operating Temperature</td>
<td>158°F (70°C)</td>
</tr>
<tr>
<td>Material Housing</td>
<td>Stainless Steel or Carbon Steel</td>
</tr>
</tbody>
</table>

Applications
- Point of use fuel dispensing
- Fleet fill/bulk fuel transfer
- Bulk fuel unloading
- Protection for high-flow fuel injection systems
- Bulk tank kidney loop/recirculation

Markets
- Industrial
- Bulk Fuel Filtration
- Marine
- Mining Technology
- Agriculture
- Power Generation

Model no. of filter in photograph is:
LVHF340NVBFRZZA

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800-999-7378

SHOP ONLINE at www.airlinehyd.com
## Model Code

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Filter Series</strong></td>
<td>LVH = Low Viscosity Housing</td>
</tr>
<tr>
<td><strong>Function</strong></td>
<td>F = Particulate Filter</td>
</tr>
<tr>
<td><strong>Housing Size</strong></td>
<td>1 = 1 Filter Element</td>
</tr>
<tr>
<td></td>
<td>3 = 3 Filter Elements</td>
</tr>
<tr>
<td></td>
<td>4 = 4 Filter Elements</td>
</tr>
<tr>
<td></td>
<td>5 = 5 Filter Elements</td>
</tr>
<tr>
<td></td>
<td>8 = 8 Filter Elements</td>
</tr>
<tr>
<td><strong>Filter Element Length</strong></td>
<td>40 = 40”</td>
</tr>
<tr>
<td><strong>Housing Material</strong></td>
<td>N = Carbon Steel</td>
</tr>
<tr>
<td></td>
<td>E = Stainless Steel</td>
</tr>
<tr>
<td><strong>Mounting Orientation</strong></td>
<td>V = Vertical</td>
</tr>
<tr>
<td></td>
<td>H = Horizontal</td>
</tr>
<tr>
<td><strong>Pressure Range</strong></td>
<td>B = 150 psi (10 bar)</td>
</tr>
<tr>
<td></td>
<td>X = other (available upon request)</td>
</tr>
<tr>
<td><strong>Hydraulic Connection</strong></td>
<td>A2 = 2” ANSI 150# SORF</td>
</tr>
<tr>
<td></td>
<td>A3 = 3” ANSI 150# SORF</td>
</tr>
<tr>
<td></td>
<td>A4 = 4” ANSI 150# SORF</td>
</tr>
<tr>
<td></td>
<td>A6 = 6” ANSI 150# SORF</td>
</tr>
<tr>
<td></td>
<td>A8 = 8” ANSI 150# SORF</td>
</tr>
<tr>
<td></td>
<td>R = DIN DN 100</td>
</tr>
<tr>
<td></td>
<td>V = DIN DN 150</td>
</tr>
<tr>
<td></td>
<td>W = DIN DN 200</td>
</tr>
<tr>
<td></td>
<td>Y = DIN DN 300</td>
</tr>
<tr>
<td></td>
<td>X = other (available upon request)</td>
</tr>
<tr>
<td><strong>Sealing Material</strong></td>
<td>F = FKM (FPM, Viton®)</td>
</tr>
<tr>
<td><strong>Clogging Indicator</strong></td>
<td>D43 = Differential Pressure Gauge, Visual</td>
</tr>
<tr>
<td></td>
<td>D44 = Differential Pressure Gauge, Visual/Electrical</td>
</tr>
<tr>
<td></td>
<td>Z = Without Clogging Indicator</td>
</tr>
<tr>
<td><strong>Certification</strong></td>
<td>ZA = ASME “U” Stamp Certification</td>
</tr>
</tbody>
</table>

Notes: Filter elements must be ordered separately and installed before initial operation on site.

## Fuel Oils
- ULSD15, low sulfur diesel and high sulfur diesel
- Biodiesel blends
- Synthetic diesel and blends
- No. 2 fuel oil and heating oil
Dimensions shown are inches (millimeters) and for general information only. For complete dimensions please contact HYDAC to request a certified print.
PARTICULATE FILTRATION

Pressure Drop
LVHF

The lower curve applies to diesel at 20°C (the upper curve is for mineral oil with viscosity to 30 cSt for comparison).

LVH-F 140

LVH-F 440

LVH-F 340

LVH-F 840

Y-axis: Pressure Drop (bar)
X-axis: Flow Rate (L/min)

Filter Calculation

<table>
<thead>
<tr>
<th>Filter Size (Model)</th>
<th>Maximum Flow Rate</th>
<th>Number of Filter Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>LVH-F-1 40</td>
<td>211 gpm</td>
<td>1 pc.</td>
</tr>
<tr>
<td>LVH-F-3 40</td>
<td>317 gpm</td>
<td>3 pcs.</td>
</tr>
<tr>
<td>LVH-F-4 40</td>
<td>476 gpm</td>
<td>4 pcs.</td>
</tr>
<tr>
<td>LVH-F-5 40</td>
<td>632 gpm</td>
<td>5 pcs.</td>
</tr>
<tr>
<td>LVH-F-8 40</td>
<td>951 gpm</td>
<td>8 pcs.</td>
</tr>
</tbody>
</table>

Filter Element Selection

<table>
<thead>
<tr>
<th>Element</th>
<th>Designation</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filter Element 40*</td>
<td>N42ON-DF003-FA40F</td>
<td>3965085</td>
</tr>
<tr>
<td></td>
<td>N42ON-DF005-FA40F</td>
<td>3916691</td>
</tr>
<tr>
<td></td>
<td>N42ON-DF010-FA40F</td>
<td>4055947</td>
</tr>
</tbody>
</table>

* Contact Factory for More Details
ICF Series
In-line Bulk Fuel Coalescing Filter
150 psi • up to 16 gpm

Technical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow Rating</td>
<td>Up to 16 gpm (60 L/min) for ULSD15</td>
</tr>
<tr>
<td>Inlet / Outlet Pressure</td>
<td>1 1/2” NPTF (standard), -16 (ORB) SAE J1926 (optional)</td>
</tr>
<tr>
<td>Max. Operating Pressure</td>
<td>150 psi (10 bar)</td>
</tr>
<tr>
<td>Min. Yield Pressure</td>
<td>450 psi (31 bar)</td>
</tr>
<tr>
<td>Rated Fatigue Pressure</td>
<td>90 psi (6 bar), per NFPA T2.6.1-2005</td>
</tr>
<tr>
<td>Temp. Range</td>
<td>32°F to 165°F (0°C to 74°C) (standard) and AWD option</td>
</tr>
<tr>
<td></td>
<td>-20°F to 165°F (-29°C to 74°C) H (optional)</td>
</tr>
<tr>
<td>Bypass Indication</td>
<td>36 psi (2.5 bar) (lower indication options available)</td>
</tr>
<tr>
<td>Bypass Valve Cracking</td>
<td>40 psi (2.8 bar)</td>
</tr>
<tr>
<td>Porting Head/Cap:</td>
<td>Aluminum (Coating Option - see Box 7)</td>
</tr>
<tr>
<td>Element Bowl</td>
<td>Steel - Epoxy paint w/high-phos electroless nickel plating (standard)</td>
</tr>
<tr>
<td>Filter Housing Weight</td>
<td>15 lbs (6.8 kg) (base unit w/o options or element)</td>
</tr>
<tr>
<td>Element Change Clearance</td>
<td>18” (457.2mm) (access from top, remove cap)</td>
</tr>
<tr>
<td></td>
<td>2.5” (63.5mm) (access from below, remove bowl)</td>
</tr>
<tr>
<td>Housing Sump</td>
<td>32 oz. (0.95 L)</td>
</tr>
<tr>
<td>Optional</td>
<td>External water sump and non-immersion heater (power 120VAC, 235W), sight glass, bracket, water in fuel sensor w/ or w/o remote mount light &amp; 6 ft. lead</td>
</tr>
</tbody>
</table>

Note: Other electrical options, contact factory, element sold separately

Features and Benefits
- Patent-pending, three-phase, particulate and fuel/water separation media technology
- A revolutionary element designed for the highest single-pass water and particulate removal efficiencies in today’s ultra-low sulfur diesel (ULSD) fluids
- Protects expensive Tier 3 and Tier 4 engine components against failures caused by particulate and water transferred from bulk fuel tanks to the vehicle
- Allows users to achieve or exceed the particulate and water removal specifications of the injection system OEMs
- Previously acceptable industry standard products no longer provide the high-efficiency separation needed in today’s ULSD fluids
- Housing design allows for field upgrade of any available option
- HYDAC Stat-Free media is standard for all coalescing elements
- Pressure bypass indicator setting at 36 psi, with bypass valve cracking at 40 psi, allows for early indication before by-pass of filter for advanced time for maintenance
- In application >32°F (0°C) complete automation is achievable with fail-safe auto-drain feature using a remote 5 gallon (18L) or 20 gallon (75L) sump with alarm and auto shutdown

Applications
- Fleet fill or bulk fuel transfer
- Bulk fuel unloading
- Protection for high-flow fuel injection systems
- Bulk tank kidney loop or recirculation
- Point of use fuel dispensing

Markets
- Industrial
- Mobile Vehicles
- Marine
- Mining Technology
- Agriculture
- Power Generation
- Common Rail Injector Systems
- Fleet
- Railroad
- Bulk Fuel Filtration

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COALESCING FILTRATION

Model Code

Filter Series
ICF = In-line Coalescing Filter

Seals
V = FKM

Port Configuration
P24 = 1 1/2'' NPTF (standard)
S16 = 1'' SAE -16 Straight Thread O-ring Boss

Element Change Indicator
L = in cap bar indicator

Mounting Option
Omit = None
B = Bracket (Element top loading)
R = Bracket (Element bottom loading)

Sump Level Indicator Option*
Omit = None
S = Sight glass
I = Water in fuel sensor w/ remote light indicator & 6 ft. lead for use in factory supplied control panel
T = Water in fuel sensor w/o remote light for use in customer supplied control panel

Coating Option*
EP = Epoxy painting and plating (standard)
A = Anodized cap & head (optional)

Heating Option
Omit = None
H = Filter Sump Heater

Automatic Drain Option
Omit = None
AWD5 = Auto water drain 5 gal. tank w/failsafe (only offered for applications above 32°F (0°C) & units ordered w/o heater)
AWD20 = Auto water drain 20 gal. tank w/failsafe (only offered for applications above 32°F (0°C) & units ordered w/o heater)

Optional Sump for Manual Drain
Omit = None
S5 = 5 gal. sump tank
S20 = 20 gal. sump tank

Note: Unless automatic drain option is specified, ICF units will come standard with manual drain.

*HYDAC Stat-Free media is standard

Element Water Coalescing Performance

<table>
<thead>
<tr>
<th>Coalescing Element</th>
<th>Recommended Flow</th>
<th>Single Pass Water Removal Efficiency*</th>
</tr>
</thead>
<tbody>
<tr>
<td>C18425V</td>
<td>16 gpm</td>
<td>&gt; 99.5%*</td>
</tr>
<tr>
<td>C18423V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C18427VE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Contact HYDAC for Economy Element Data

Pressure Drop

Flow L/min

ΔP in psi

Flow gpm

Fuel Oils
- ULSD15, low and high sulfur diesels
- Biodiesel blends
- Synthetic diesel and blends
- No. 2 fuel oil & heating oil
COALESCING FILTRATION
Dimensions
ICF

Optional Brackets:

Element top loading Option
'B'

Element bottom loading Option
'R'

Dimensions shown are inches [millimeters] and for general information only. For complete dimensions please contact HYDAC to request a certified print.
ICF Options Filter Cap Assembly

Reservoir Available Options

Automatic Drain w/ Redundant Safety Features

Automatic or Manual Remote Sump

Note: Water in fuel sensor (WIF) supplied with or w/o remote mount indicator light to show full filter housing sump.

T Option = WIF sensor only w/out filter housing sump full indication light or control panel.

I Option = WIF sensor w/ remote mount filter housing sump full indicator light and NEMA 4X control panel supplied.

Notes: Filter Sump Heater Control Panel dimension:
6.5” W x 5.5” H x 6.5” D
(165 W x 140 H x 165 D)

Automatic Water Drain Control Panel dimension:
10” W x 8” H x 12” D
(254 W x 203.20 H x 304.80 D)
*For use above 32°F (0°C) only

Electrical cable length (Control Panel to ICF): 4 ft.
(1.22m)

Hose length for Automatic Water Drain feature
(ICF to Tank): 6 ft.(1.83m)

All control panels “NEMA 4X” rated

Metric dimensions in ( ).

Note: Remote Tank dimension:
5 Gallon Tank: 22” W x 9.25” L x 7.125” H
(558.80 W x 234.95 L x 180.97 H)
20 Gallon Tank: 15” W x 11” L x 31” H
(381 W x 279.40 L x 787.40 H)

Power supply for tank high level LED light: 9 VDC (battery included) Supplied w/ 9 VDC terminal for customer wiring provided.

Metric dimensions in ( ).

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COALESCING FILTRATION

GHCF Series
GeoSeal® High-Flow Coalescing Filter
150 psi • up to 25 gpm

Description
The GHCF is a high flow, compact coalescing filter for use where superior performance is needed in fuel transfer, kidney-loop, or dispensing applications. The filter assembly uses a patent-pending coalescing filter media along with the GeoSeal® element interface to ensure quality filtration with every replacement. The GHCF can be used alone to provide superior particulate and water removal, or in conjunction with a high efficiency particulate filter to provide additional performance with reduced maintenance costs.

Features
• Diesel fuel coalescing filter for dispensing, transfer or polishing filtration applications
• Uses patented GeoSeal® elements
• All-aluminum filter housing is fully compatible with diesel and biodiesel
• Minimal clearance needed for element service, ideal for enclosure installations
• Cartridge style element improves performance and reduces waste compared to spin-on solutions
• A compact design with reduced dimensions compared to similar cartridge filter and spin-on solutions on the market

Applications
• Point of use fuel dispensing
• Fleet fill/bulk fuel transfer
• Bulk fuel unloading
• Protection for high-flow fuel injection systems
• Bulk tank kidney loop/recirculation

Technical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow Rating</td>
<td>Up to 25 gpm (95 l/min)</td>
</tr>
<tr>
<td>Max. Operating Pressure</td>
<td>150 psi (10.3 bar)</td>
</tr>
<tr>
<td>Min. Yield Pressure</td>
<td>2600 psi (179 bar)</td>
</tr>
<tr>
<td>Temperature Range</td>
<td>32°F to 225°F (0°C to 107°C) Standard; -20°F to 225°F (-29°C to 107°C) Heater Option</td>
</tr>
<tr>
<td>Bypass Setting</td>
<td>40 psi (2.8 bar)</td>
</tr>
<tr>
<td>Porting Head</td>
<td>Cast Aluminum, Anodized Aluminum, Anodized</td>
</tr>
<tr>
<td>Element Case</td>
<td>Cast Aluminum, Anodized</td>
</tr>
<tr>
<td>Sump</td>
<td>Cast Aluminum, Anodized</td>
</tr>
<tr>
<td>Weight GHPF</td>
<td>19.45 lbs. (8.82 kg)</td>
</tr>
<tr>
<td>Element Change Clearance</td>
<td>4.5” (114 mm)</td>
</tr>
</tbody>
</table>

Markets
• Industrial
• Mobile Vehicles
• Marine
• Mining Technology
• Agriculture
• Power Generation
• Common Rail Injector Systems
• Fleet
• Railroad
• Bulk Fuel Filtration
Model Code

COALESCING FILTRATION

PN#2208201  / 08.18 / FFD1702-1879

COALESCING FILTRATION
PN#2208201  / 08.18 / FFD1702-1879

Model Code

Filter Series
GHCF = GeoSeal® High-Flow Coalescing Filter
CG5 = C125GZ5V Coalescing Element

Coalescing Filtration
CS

Sealing Material
V = Fluorocarbon Elastomer (FKM)

Bypass Setting
Omit = 40psi

Inlet Port
S24 = SAE-24
P24 = 1.5” NPTF

Indicator Options
VM = Visual pop-up with manual reset

Indicator Orientation
R = Right side
L = Left side

Sump Options
Omit = Sight Glass (standard)
U = Downstream test point
I = WIF Sensor Only
H = Sump Heat (74W)
AWD5 = Auto Water Drain with 5 gallon Collection Tank
AWD20 = Auto Water Drain with 20 gallon Collection Tank

Element Performance Information

<table>
<thead>
<tr>
<th>Coalescing Element</th>
<th>Pressure Side Coalescing</th>
</tr>
</thead>
<tbody>
<tr>
<td>C125GZ5</td>
<td>Recommended Flow 25 gpm</td>
</tr>
</tbody>
</table>

Flow Direction: Inside Out
Element Nominal Dimensions: 5.0” (127 mm) O.D. x 12’ (305 mm) long

*Element Collapse Rating 150 psid (10.3 bar) for standard and non-bypassing element

Note: Efficiency based on ULSD15 with 27 Dynes/CM surface tension and 0.25% (2500 PPM) water injection. Discharge water concentration of <100 PPM free and emulsified water.

Fuel Compatibility

• Diesel Fuel and Biodiesel (B100).
• For other Distillate Petroleum, Contact Factory.
COALESCING FILTRATION

Dimensions

GHCF

Dimensions shown are inches [millimeters] and for general information only. For complete dimensions please contact HYDAC to request a certified print.
**Sizing Information**

Total pressure loss through the filter is as follows:
Assembly $\Delta P = \text{Housing } \Delta P + \text{Element } \Delta P$

**Housing Curve**

Pressure loss through housing is as follows:
$\text{Housing } \Delta P = \text{Housing Curve } \Delta P \times \frac{\text{Actual Specific Gravity}}{0.86}$

**Housing Pressure Drop**

GHCF

![Housing Pressure Drop Graph]

**Element K Factors**

$\Delta P \text{ Elements} = \text{Elements (K) Flow Factor x Flow Rate (gpm) x } \frac{\text{Actual Viscosity (SUS)}}{37 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$

$C125GZ5V = 0.09$
COALESCING FILTRATION

QCF Series
Bulk Diesel Fuel Coalescing Filter
100 psi • up to 70 gpm

Description
Application Introduction:
The Reason for Better Bulk Fuel Filtration:
Advances in diesel engine fuel injection systems have been instrumental in complying with future emission standards. Higher pressure fuel injectors produce a finer mist of fuel, which burns cleaner. Common rail injection systems run at higher pressures and allow more injections per combustion cycle improving fuel economy, engine performance with lower noise. Higher pressure fuel injector systems have tighter tolerances and require the highest efficiency, single-pass particulate and water removal to minimize wear related failures.

Features
• Patent-pending, three-phase, particulate and fuel/water separation media technology
• A revolutionary element designed for the highest single-pass water and particulate removal efficiencies in today’s ultra-low sulfur diesel (ULSD) fluids
• Protects expensive Tier 3 and Tier 4 engine components against failures caused by particulate and water transferred from the bulk fuels tanks to the vehicle
• Allows users to achieve or exceed the particulate and water removal specifications of the injection system OEMs
• Previously acceptable industry standard products no longer provide the high-efficiency separation needed in today’s ULSD fluids
• Complete automation is achievable with fail-safe auto-drain feature using a remote 5 gallon (18L) or 20 gallon (75L) sump with alarm and auto shutdown in application above 32°F (0°C)

Technical Specifications
Flow Rating Up to 70 gpm (265 l/min) for ULSD15
Inlet/Outlet Connection -24 (ORB) SAE J1926
Drain Connection Upper 1/4” NPT Ball Valve
Drain Connection Lower 1/4” NPT Ball Valve
Max. Operating Pressure 100 psi (7 bar)
Min. Yield Pressure 400 psi (27.6 bar) without sight glass
Rated Fatigue Pressure Contact Factory
Temperature Range 32°F to 165°F (0°C to 74°C) (standard)
-20°F to 165°F (-29°C to 74°C) (with optional sump heater)
Bypass Indication 25 psi (1.7 bar) (Lower indication options available)
Bypass Valve Cracking 30 psi (2 bar)
Materials of Construction Porting Base: Anodized Aluminum
Element Bowl: Epoxy Paint w/ High-phos Electroless Nickel Plating
Cap: Nickel Coated Ductile Iron
Weight 155 Lbs. (77 kg)
Element Change Clearance 33.8” (858 mm)

Note: Element is sold with housing

Applications
• Point of use fuel dispensing
• Fleet fill/bulk fuel transfer
• Bulk fuel unloading
• Protection for high-flow fuel injection systems
• Bulk tank kidney loop/recirculation

Markets
• Industrial
• Mobile Vehicles
• Marine
• Mining Technology
• Agriculture
• Power Generation
• Common Rail Injector Systems
• Fleet
• Railroad
• Bulk Fuel Filtration

Model no. of filter in photograph is: QCFCSVS24VM

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C10

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COALESCING FILTRATION

Model Code

Filter Series
QCF = High Flow Coalescing Filter

Element Series
C = Coalescing

Element Media
5 = 5 µm High Efficiency Coalescing

Sealing Material
V = Fluorocarbon Elastomer (FKM)

Port Configuration
S24 = 1 ½" SAE -24 Straight Thread O-ring Boss

Element Change Indicator
VM = Visual Pop-Up w/ Manual Reset

Options
Omit = None
S = Sight Glass
H = Filter Sump Heater, 120 VAC 60 Hz Single Phase
AWD5 = Auto water drain 5 gal. tank w/failsafe valve (only offered for applications above 32°F (0°C) and units ordered without heater)
AWD20 = Auto water drain 20 gal. tank w/failsafe valve (only offered for applications above 32°F (0°C) and units ordered without heater)

Note: Optional AWD’s for use only > 32° F (0° C)

Element Water Coalescing Performance

<table>
<thead>
<tr>
<th>Coalescing Element</th>
<th>Pressure Side Coalescing</th>
</tr>
</thead>
<tbody>
<tr>
<td>C396Z5V</td>
<td>Max Flow 70 gpm</td>
</tr>
<tr>
<td></td>
<td>Single Pass Efficiency &gt; 99.5%</td>
</tr>
</tbody>
</table>

Note: Based on ULSD15 with 27 Dyne/cm surface tension and 0.25% (2500 PPM) water injection

Flow Direction: Inside Out
Element Nominal Dimensions: 6.4” (163mm) x 39.4” (1001mm) long

Fuel Oils
- ULSD15, low sulfur diesel and high sulfur diesel
- Biodiesel blends
- Synthetic diesel and blends
- No. 2 fuel oil and heating oil

Pressure Drop QCF

Flow gpm
Flow L/min
Pressure Drop
(0.68)
(0.45)
(0.22)

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PN#2208201 / 08.18 / FFD1702-1879
COALESCING FILTRATION

Dimensions
QCF

Dimensions shown are inches (millimeters) and for general information only. For complete dimensions please contact HYDAC to request a certified print.

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800-999-7378
Features
- Excellent filtration performance in a single pass
- Low pressure loss due to innovative element technology
- Easy to service thanks to intelligent element design
- The Low Viscosity-Housing Coalescer LVH-C is mainly used for dewatering of diesel, making it especially suitable for applications with large amounts of water that need to be removed in just a single pass.
- The Optimicron® filter elements used ensure that both the required cleanliness and long service life are achieved.
- Available in various sizes, the filters can be optimally integrated into new or existing systems.
- The filters are designed according to the ASME Code Section VIII rules and regulations for pressure vessels as well as the ability to certify to other global standards upon request.

Applications
- Point of use fuel dispensing
- Fleet fill/bulk fuel transfer
- Bulk fuel unloading
- Protection for high-flow fuel injection systems
- Bulk tank kidney loop/recirculation

Markets
- Industrial
- Bulk Fuel Filtration
- Marine
- Mining Technology
- Agriculture
- Power Generation

LVHCD Series
High Flow | Low Viscosity Housing Coalescer
150 psi • up to 211-476 gpm

Technical Specifications

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow Rating</td>
<td>211-476 gpm (799-1802 L/min)</td>
</tr>
<tr>
<td>Inlet/Outlet Connection</td>
<td>ANSI 150#: 2&quot;-12&quot;</td>
</tr>
<tr>
<td></td>
<td>DIN: DN50-DN300</td>
</tr>
<tr>
<td>Max. Operating Pressure</td>
<td>150 psi (10 bar)</td>
</tr>
<tr>
<td>Max. Ambient Temperature</td>
<td>122°F (50°C)</td>
</tr>
<tr>
<td>Max. Operating Temperature</td>
<td>122°F (50°C)</td>
</tr>
<tr>
<td>Material Housing</td>
<td>Stainless Steel or Carbon Steel</td>
</tr>
</tbody>
</table>
### COALESCING FILTRATION

<table>
<thead>
<tr>
<th>Model Code</th>
<th>LVH</th>
<th>CD</th>
<th>4</th>
<th>40</th>
<th>N</th>
<th>V</th>
<th>B</th>
<th>A3</th>
<th>F</th>
<th>Z</th>
<th>ZA</th>
</tr>
</thead>
</table>

- **Filter Series**
  - LVH = Low Viscosity Housing
- **Function**
  - CD = Coalescing Diesel Filter
- **Housing Size**
  - 4 = 4 Coalescing Elements, 3 Separator Elements
  - 6 = 6 Coalescing Elements, 4 Separator Elements
  - 9 = 9 Coalescing Elements, 6 Separator Elements
- **Filter Element Length**
  - 40 = 40”
- **Housing Material**
  - N = Carbon Steel
  - E = Stainless Steel
- **Mounting Orientation**
  - V = Vertical
  - H = Horizontal
- **Pressure Range**
  - B = 150 psi (10 bar)
  - X = other (available upon request)
- **Hydraulic Connection**
  - A2 = 2” ANSI 150# SORF
  - A3 = 3” ANSI 150# SORF
  - A4 = 4” ANSI 150# SORF
  - A6 = 6” ANSI 150# SORF
  - A8 = 8” ANSI 150# SORF
  - J = DIN DN 50
  - R = DIN DN 100
  - V = DIN DN 150
  - W = DIN DN 200
  - Y = DIN DN 300
  - X = other (available upon request)
- **Sealing Material**
  - F = FKM (FPM, Viton®)
- **Clogging Indicator**
  - D43 = Differential Pressure Gauge, Visual
  - D44 = Differential Pressure Gauge, Visual/Electrical
  - Z = Without Clogging Indicator
- **Certification**
  - ZA = ASME “U” Stamp Certification

**Notes:** Filter elements must be ordered separately and installed before initial operation on site.

---

### Fuel Oils

- ULSD15, low sulfur diesel and high sulfur diesel
- Biodiesel blends
- Synthetic diesel and blends
- No. 2 fuel oil and heating oil
Dimensions
LVH-CD-4-40

Dimensions shown are inches (millimeters) and for general information only. For complete dimensions please contact HYDAC to request a certified print.
COALESCING FILTRATION
Dimensions
LVH-CD-9-40

Filter Calculation

<table>
<thead>
<tr>
<th>Filter Size (Model)</th>
<th>Maximum Flow Rate</th>
<th>Number of Coalescing Elements</th>
<th>Number of Separator Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>LVH-CD-4 40</td>
<td>211 gpm</td>
<td>4 pc.</td>
<td>3 pcs.</td>
</tr>
<tr>
<td>LVH-CD-6 40</td>
<td>317 gpm</td>
<td>6 pcs.</td>
<td>4 pcs.</td>
</tr>
<tr>
<td>LVH-CD-9 40</td>
<td>476 gpm</td>
<td>9 pcs.</td>
<td>6 pcs.</td>
</tr>
</tbody>
</table>

Filter Element Selection

<table>
<thead>
<tr>
<th>Element</th>
<th>Model Code</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Separation Element 30&quot;</td>
<td>N32ON-DSZ-SA80F</td>
<td>3910259</td>
</tr>
<tr>
<td>Coalescing Element 40&quot;</td>
<td>N42ON-DCZ-CA60F</td>
<td>3910257</td>
</tr>
</tbody>
</table>

Dimensions shown are inches (millimeters) and for general information only. For complete dimensions please contact HYDAC to request a certified print.
Particulate & Coalescing
**Features and Benefits**

- Designed with integrated particulate removal pre-filtration for maximum coalescing filter element life in the down stream housing
- Routine element change is only needed on the particulate filter which saves time and money
- Particulate filtration at 1 or 3 microns utilizing element for contamination control
- Optional electrical with amber colored particulate element change indicator light
- Patent-pending, three-phase, particulate and fuel/water separation media technology
- A revolutionary element designed for the highest single-pass water and particulate removal efficiencies in today’s ultra-low sulfur diesel (ULSD) fluids
- Protects expensive Tier 3 and Tier 4 engine components against failures caused by particulate and water transferred from the bulk fuel tank to the vehicle
- Allows users to achieve or exceed the particulate and water removal specifications of the injection system OEMs
- Previously acceptable industry standard products no longer provide the high-efficiency separation needed in today’s ULSD fluids
- Housing design allows for field upgrade of any available option
- HYDAC Stat-Free media is standard for all coalescing elements
- Bypass indication for the coalescing ICF filter at 36 psi, with bypass cracking at 40 psi, and for the particulate filter bypass indication at 25 psi with bypass cracking at 30 psi, allows for early indication before bypass of filter for advanced time for maintenance
- Complete automation is achievable with a HYDAC Stat-Free media sensor and auto-drain feature using a remote 5 gallons (18L) or 20 gallons (75L) sump with alarm and auto shutdown, in application >32°F (0°C)
- Easy mounting and element service

**Technical Specifications**

<table>
<thead>
<tr>
<th>Flow Rating</th>
<th>BDF1: up to 16 gpm (60 L/min)</th>
<th>BDF2: up to 32 gpm (120 L/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inlet/Outlet Connection</td>
<td>-16 (ORB) SAE J1926</td>
<td></td>
</tr>
<tr>
<td>Max. Operating Pressure</td>
<td>150 psi (10 bar)</td>
<td></td>
</tr>
<tr>
<td>Min. Yield Pressure</td>
<td>450 psi (31 bar)</td>
<td></td>
</tr>
<tr>
<td>Temperature Range</td>
<td>-20°F to 165°F (-29°C to 74°C) w/ optional water sump heater 32°F to 165°F (0°C to 74°C) standard with AWD options</td>
<td></td>
</tr>
<tr>
<td>Bypass Indication Particulate Filter</td>
<td>25 psi (1.7 bar)</td>
<td>Coalescing Filter 36 psi (2.5 bar)</td>
</tr>
<tr>
<td>Bypass Valve Cracking Particulate Filter</td>
<td>30 psi (2.1 bar)</td>
<td>Coalescing Filter 40 psi (2.8 bar)</td>
</tr>
<tr>
<td>Materials of Construction Porting Head/Cap: Cast Aluminum Element Bowl: Steel</td>
<td></td>
<td>Coalescing Filter Porting Head/Cap: Anodized Aluminum Element Case: Nickel Coated Steel</td>
</tr>
<tr>
<td>Weight</td>
<td>BDF1: 46 lbs</td>
<td>BDF2: 78 lbs</td>
</tr>
<tr>
<td>Element Change Clearance Particulate Filter</td>
<td>2.50° (64 mm)</td>
<td>Coalescing Filter With mounting bracket - 18° (457.2 mm) - Access from top (remove cap) Without mounting bracket - Access from below 2.5° (63.5 mm) (remove bowl)</td>
</tr>
<tr>
<td>Housing Sump</td>
<td>32 oz (95 L)</td>
<td></td>
</tr>
<tr>
<td>Optional Water Sump Heater</td>
<td>120VAC, 1 x 235W (BDF1) / 2 x 235W (BDF2)</td>
<td></td>
</tr>
<tr>
<td>Optional Remote Mount Visual Electrical Indicator</td>
<td>120VAC</td>
<td></td>
</tr>
</tbody>
</table>

**Applications**

- Point of use fuel dispensing
- Fleet fill/bulk fuel transfer
- Bulk fuel unloading
- Protection for high-flow fuel injection systems
- Bulk tank kidney loop/recirculation

**Markets**

- Industrial
- Mobile Vehicles
- Marine
- Mining Technology
- Agriculture
- Power Generation
- Common Rail Injector Systems
- Fleet
- Railroad
- Bulk Fuel Filtration

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PARTICULATE & COALESCING

Model Code

Filter Series
- BDF = Bulk Diesel Filter

Flow Rate
- 1 = 16 gpm
- 2 = 32 gpm

Sealing Material
- V = Fluorocarbon Elastomer (FKM)

Port Configuration
- S16 = 1" SAE -16 Straight Thread O-ring Boss

Coalescing Element Change Indicator
- L = in cap bar indicator

Particulate Element Change Indicator
- VM = Visual Pop-Up w/ Manual Reset (standard)
- E = MSS Electrical indicator with amber light in NEMA 4X box (optional)

Sump Level Indicator Option*
- Omit = None
- S = Sight glass
- I = Water In Fuel Sensor w/ Remote Mount Light Indicator

Coating Option*
- EP = Epoxy Paint and Plating (standard)
- A = Anodized cap & head (optional)

Heating Option
- Omit = None
- H = Filter Sump Heater, 120 VAC 60 Hz Single Phase

Automatic Drain Option
- Omit = None
- AWDS = Auto Water Drain 5 gal. tank w/ failsafe valve (only offered for applications above 32°F (0°C) and units ordered without heater)
- AWD20 = Auto Water Drain 20 gal. tank w/ failsafe valve (only offered for applications above 32°F (0°C) and units ordered without heater)

Optional Sump for Manual Drain
- Omit = None
- S5 = 5 gal. sump tank
- S20 = 20 gal. sump tank

Note: Unless automatic drain option is specified, ICF units will come standard with manual drain.

*Only Options that allow a combination.

Element Particulate Performance

<table>
<thead>
<tr>
<th>Element</th>
<th>DHC</th>
<th>Filtration Ratio Per ISO 16889</th>
<th>( \beta_0 (c) \geq 200 )</th>
<th>( \beta_0 (c) \geq 1000 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.03.18D01BN/V</td>
<td>224 grams</td>
<td>&lt;4.0</td>
<td>4.2</td>
<td></td>
</tr>
<tr>
<td>5.03.18D03BN/V</td>
<td>230 grams</td>
<td>&lt;4.0</td>
<td>4.8</td>
<td></td>
</tr>
</tbody>
</table>

Element Water Coalescing Performance

<table>
<thead>
<tr>
<th>Element</th>
<th>Pressure Side Coalescing</th>
<th>Max Flow</th>
<th>Single Pass Water Removal Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>C184Z5V</td>
<td></td>
<td>16 gpm</td>
<td>&gt; 99.5% &gt; 99.5%</td>
</tr>
<tr>
<td>C184Z3V</td>
<td></td>
<td>16 gpm</td>
<td>&gt; 99.5% &gt; 99.5%</td>
</tr>
</tbody>
</table>

Particulate Element

Flow Direction: Outside In
Element Nominal Dimensions: 4.0" (102 mm) O.D. x 18.5" (470 mm) long

Coalescing Element

Flow Direction: Inside Out
Element Nominal Dimensions: 4.0" (102 mm) O.D. x 18.5" (470 mm) long

Fuel Oils
- ULSD15 and similar petroleum diesels
- Biodiesel and blends
- Synthetic diesel and blends

Pressure Drop

### BDF1

<table>
<thead>
<tr>
<th>Flow L/min</th>
<th>( \Delta P ) (bar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>(0.16)</td>
</tr>
<tr>
<td>2</td>
<td>(0.14)</td>
</tr>
<tr>
<td>4</td>
<td>(0.12)</td>
</tr>
<tr>
<td>6</td>
<td>(0.10)</td>
</tr>
<tr>
<td>8</td>
<td>(0.08)</td>
</tr>
<tr>
<td>10</td>
<td>(0.06)</td>
</tr>
<tr>
<td>12</td>
<td>(0.04)</td>
</tr>
<tr>
<td>14</td>
<td>(0.02)</td>
</tr>
<tr>
<td>16</td>
<td>(0)</td>
</tr>
</tbody>
</table>

### BDF2

<table>
<thead>
<tr>
<th>Flow L/min</th>
<th>( \Delta P ) (bar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>(0.16)</td>
</tr>
<tr>
<td>2</td>
<td>(0.14)</td>
</tr>
<tr>
<td>4</td>
<td>(0.12)</td>
</tr>
<tr>
<td>6</td>
<td>(0.10)</td>
</tr>
<tr>
<td>8</td>
<td>(0.08)</td>
</tr>
<tr>
<td>10</td>
<td>(0.06)</td>
</tr>
<tr>
<td>12</td>
<td>(0.04)</td>
</tr>
<tr>
<td>14</td>
<td>(0.02)</td>
</tr>
<tr>
<td>16</td>
<td>(0)</td>
</tr>
</tbody>
</table>

800-999-7378

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Dimensions

BDF1

Dimensions shown are inches (millimeters) and for general information only. For complete dimensions please contact HYDAC to request a certified print.
Dimensions shown are inches (millimeters) and for general information only. For complete dimensions please contact HYDAC to request a certified print.
BDS Series
Bulk Diesel Fuel Skid/ Bulk Diesel Multi-Skid
100 psi • up to 70-280 gpm

Features
- Designed with integrated particulate removal pre-filtration for maximum coalescing filter element life in the downstream housing
- Sized for high flow or highly contaminated fluid applications
- Routine element change is only needed on Pre-filter (the particulate filter) which saves time and money
- Patent-pending, three-phase, particulate and fuel/water separation media technology
- A revolutionary element designed for the highest single-pass water and particulate removal efficiencies in today’s ultra-low sulfur diesel (ULSD) fluids
- Protects expensive Tier 3 and Tier 4 engine components against failures caused by particulate and water transferred from the bulk fuel tank to the vehicle
- Allows users to achieve or exceed the particulate and water removal specifications of the injection system OEMs
- Previously acceptable industry standard products no longer provide the high-efficiency separation needed in today’s ULSD fluids
- In applications >32°F (0°C) complete automation is achievable with a water in fuel sensor and fail-safe auto-drain feature using a remote 5 gallons (18L) or 20 gallons (75L) sump with alarm and auto shutdown
- HYDAC Stat-Free media is standard for all coalescing elements

Applications
- Point of use fuel dispensing
- Fleet fill/bulk fuel transfer
- Bulk fuel unloading
- Protection for high-flow fuel injection systems
- Bulk tank kidney loop/recirculation

Markets
- Industrial
- Mobile Vehicles
- Marine
- Mining Technology
- Agriculture
- Power Generation
- Common Rail Injector Systems
- Fleet
- Railroad
- Bulk Fuel Filtration

Technical Specifications

| Flow Rating | BDS1: Up to 70 gpm (265 l/min) for ULSD15
| Inlet/Outlet Connection | BDS1: -24 (ORB) SAE J1926
| Drain Connection Upper | 1/4” NPT Ball Valve
| Drain Connection Lower | 1/4” NPT Ball Valve
| Max. Operating Pressure | 100 psi (7 bar)
| Min. Yield Pressure | 400 psi (27.6 bar) without sight glass (Contact factory for use with sight gauge)
| Rated Fatigue Pressure | Contact Factory
| Temperature Range | -20°F to 165°F (-29°C to 74°C) (standard)
| Bypass Valve Cracking | Particulate Filter: 15 psi (1.03 bar) Coalescing Filter: 25 psi (1.7 bar)
| Bypass Valve Porting Base | Anodized Aluminum
| Element Bowl | Epoxy Paint
| w/ High-phos Electroless Nickel Plating (Standard) Cap: Plated Steel
| Weight | BDS1: 441 lbs (200 kg)
| BDS2: 596 lbs. (270 kg)
| BDS3: 751 lbs. (341 kg)
| BDS4: 906 lbs. (411 kg)

Element Change Clearance 33.8” (858 mm)

Markets
- Industrial
- Mobile Vehicles
- Marine
- Mining Technology
- Agriculture

Note: Elements are sold with the housing

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PARTICULATE & COALESCING

Model Code

Filter Series
BDS = Bulk Diesel Skid

Number of Coalescing Filters
- Omit = 1 Coalescing Filter at 70 gpm
- 2 = 2 Coalescing Filter at 140 gpm
- 3 = 3 Coalescing Filter at 210 gpm
- 4 = 4 Coalescing Filter at 280 gpm

Particulate Filtration Rating
- Q1 = 1 µm
- Q3 = 3 µm

Sealing Material
V = Fluorocarbon Elastomer (FKM)

Element Change Indicator
VM = Visual Pop-Up w/ Manual Reset

Options
- Omit = None
- S = Sight Glass
- H = Filter Sump Heater, 120 VAC 60 Hz Single Phase
- AWD5* = Auto water drain 5 gal. tank w/failsafe valve (only offered for applications above 32°F (0°C) and units ordered without heater)
- AWD20* = Auto water drain 20 gal. tank w/failsafe valve (only offered for applications above 32°F (0°C) and units ordered without heater)

*Note: Optional and AWD’s for use only >32° F (0° C)

Element Particulate Performance

<table>
<thead>
<tr>
<th>Particulate Elements</th>
<th>Filtration Ratio Per ISO 16889 Using automated particle counter (APC) calibrated per ISO 11171</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DHC</td>
</tr>
<tr>
<td>1.14.39D01ECON2 / -V</td>
<td>1259 grams</td>
</tr>
<tr>
<td>1.14.39D03ECON2 / -V</td>
<td>1293 grams</td>
</tr>
</tbody>
</table>

Element Water Coalescing Performance

<table>
<thead>
<tr>
<th>Element</th>
<th>Pressure Side Coalescing</th>
</tr>
</thead>
<tbody>
<tr>
<td>C396Z5V</td>
<td>Max Flow 70 gpm</td>
</tr>
<tr>
<td></td>
<td>Single Pass Water Removal Efficiency</td>
</tr>
</tbody>
</table>

Flow Direction: Inside Out

Element Nominal Dimensions: ø6.4” (163mm) x 39.4” (1001mm) long

Note: Based on ULSD15 with 27 Dynes/cm surface tension and 0.25% (2500 PPM) water injection

Particulate Element
Flow Direction: Outside In
Element Nominal Dimensions: 6.0” (150 mm) O.D. x 37.80” (960 mm) long

Coalescing Element
Flow Direction: Inside Out
Element Nominal Dimensions: 6.4” (163 mm) O.D. x 39.4” (1001 mm) long

Fuel Oils
- ULSD15, low sulfur diesel and high sulfur diesel
- Biodiesel blends
- Synthetic diesel and blends
- No. 2 fuel oil and heating oil
PARTICULATE & COALESCING

Pressure Drop
BDS1

BDS2

Note: For BDS3 and BDS4 pressure curve information, contact factory.

Dimensions
BDS1

Dimensions shown are inches (millimeters) and for general information only. For complete dimensions please contact HYDAC to request a certified print.
Dimensions shown are inches and for general information only. For complete dimensions please contact HYDAC to request a certified print.
PARTICULATE & COALESCING

Dimensions
BDS4

Dimensions shown are inches and for general information only. For complete dimensions please contact HYDAC to request a certified print.
Particulate & Absorbing
PARTICULATE & ABSORBING

BDFA1 & BDFA2 Series
In-Line Water Absorbing Diesel Fuel Filter
100 psi • up to 16-32 gpm

Description
Application Introduction:
The Reason for Better Bulk Fuel Filtration:
The BDFA1 and BDFA2 provide exceptional single-pass diesel filtration and water removal. Both filters combine HYDAC’s Betamicron media in a particulate pre-filter with our fast-acting water absorbing filter to fully protect vital diesel engine components from dirt and water. The BDFA1 and BDFA2 are ideal for fuel dispensing operations.
The BDFA1 is also ideal for generator sets in a single-pass or kidney loop installation.

Features and Benefits
- Designed with integrated particulate removal pre-filter for maximum absorbent filter performance in the downstream housing
- Two stage filtration for particulate and water removal through absorption
- Particulate filtration at 1 or 3 microns utilizing Betamicron element
- Water removal element capable of removing free and emulsified water
- Easy mounting and service

Applications
- Point of use fuel dispensing
- Fleet fill/bulk fuel transfer
- Bulk fuel unloading
- Protection for high-flow fuel injection systems
- Bulk tank kidney loop/recirculation

Technical Specifications
<table>
<thead>
<tr>
<th>Flow Rating</th>
<th>BDFA1: up to 16 gpm (60 L/min)</th>
<th>BDFA2: up to 32 gpm (120 L/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inlet / Outlet Connection</td>
<td>1” NPT female thread</td>
<td></td>
</tr>
<tr>
<td>Max. Operating Pressure</td>
<td>100 psi (7 bar)</td>
<td></td>
</tr>
<tr>
<td>Min. Yield Pressure</td>
<td>450 psi (31 bar)</td>
<td></td>
</tr>
<tr>
<td>Temperature Range</td>
<td>-20°F to 165°F (-29°C to 74°C)</td>
<td></td>
</tr>
<tr>
<td>Bypass Indication (Lower indication options available)</td>
<td>Particulate Filter 25 psi (1.7 bar)</td>
<td>Water Absorbing Filter 20 psi (1.37 bar)</td>
</tr>
<tr>
<td></td>
<td>Particulate Filter 30 psi (2 bar)</td>
<td>Water Absorbing Filter 25 psi (1.7 bar)</td>
</tr>
<tr>
<td></td>
<td>Water Absorbing Filter 30 psi (2 bar)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Water Absorbing Filter 40 psi (2.7 bar)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Porting Head/Cap: Cast Aluminum Element Bowl: Steel</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Porting Head/Cap: Anodized Aluminum Element Bowl: Epoxy Paint w/ High-phos Electroless Nickel Plating (Standard)</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>BDFA1: 45 lbs. (20.4 kg)</td>
<td>BDFA2: 90 lbs. (40.8 kg)</td>
</tr>
<tr>
<td>Element Change Clearance</td>
<td>20” (508 mm)</td>
<td></td>
</tr>
</tbody>
</table>

Materials of Construction
- Particulate Filter: Cast Aluminum Element Bowl: Steel
- Water Absorbing Filter: Anodized Aluminum Element Bowl: Epoxy Paint w/ High-phos Electroless Nickel Plating (Standard)

Weight
- BDFA1: 45 lbs. (20.4 kg)
- BDFA2: 90 lbs. (40.8 kg)

Note: elements sold separately

Markets
- Industrial
- Mobile Vehicles
- Marine
- Mining Technology
- Agriculture
- Power Generation
- Common Rail Injector Systems
- Fleet
- Railroad
- Bulk Fuel Filtration

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PARTICULATE & ABSORBING

Model Code

Filter Series
BDFA = Absorbing Bulk Diesel Filter

Flow Rate
1 = 16 gpm
2 = 32 gpm

Sealing Material
V = Fluorocarbon Elastomer (FKM)

Particulate Element Change Indicator
VM = Visual Pop-Up w/ Manual Reset

Note: Particulate and absorbing elements sold separately.

Element Particulate Performance

<table>
<thead>
<tr>
<th>Particulate Element</th>
<th>Filtration Ratio Per ISO 16889</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Using automated particle counter (APC)</td>
</tr>
<tr>
<td></td>
<td>DHC</td>
</tr>
<tr>
<td>5.03.18D01BN/-V/V</td>
<td>224 grams</td>
</tr>
<tr>
<td>5.03.18D03BN/-V/V</td>
<td>230 grams</td>
</tr>
</tbody>
</table>

Element Water Coalescing Performance

<table>
<thead>
<tr>
<th>Water Absorbing Element</th>
<th>Flow Rate gpm (L/min)</th>
<th>Water Holding Capacity ml (ounces)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.03.18D40AM/-V</td>
<td>16 (60)</td>
<td>400 (13.5)</td>
</tr>
</tbody>
</table>

Pressure Drop

BDFA1

<table>
<thead>
<tr>
<th>Flow l/min</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.02</td>
</tr>
<tr>
<td>0.015</td>
</tr>
<tr>
<td>0.01</td>
</tr>
<tr>
<td>0.005</td>
</tr>
</tbody>
</table>

BDFA2

<table>
<thead>
<tr>
<th>Flow l/min</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.15</td>
</tr>
<tr>
<td>0.1</td>
</tr>
<tr>
<td>0.075</td>
</tr>
<tr>
<td>0.05</td>
</tr>
</tbody>
</table>

Particulate Element
Flow Direction: Outside In
Element Nominal Dimensions: 4.0" (102 mm) O.D. x 18.5" (470 mm) long

Water Absorbing Element
Flow Direction: Outside In
Element Nominal Dimensions: 4.0" (102 mm) O.D. x 18.5" (470 mm) long

Fuel Oils
- ULSD15, low sulfur diesel and high sulfur diesel
- Biodiesel blends
- Synthetic diesel and blends
- No. 2 fuel oil and heating oil

PN#2208201 / 08.18 / FFD1702-1879
Dimensions shown are inches (millimeters) and for general information only. For complete dimensions please contact HYDAC to request a certified print.
Fuel Products & Systems for Bulk & Mobile Applications
FUEL FILTRATION SYSTEMS

Bulk Diesel Mobile Filtration Units

Mobile units provide a fuel filtration solution that addresses the particulate contamination and water removal in an easy-to-use package. Because of its mobility, it can be deployed in remote sites or transferred to different bulk diesel storage tanks in a facility.

Bulk Diesel Tanks containing contaminated diesel fuel can jeopardize all of the efforts put into cleaning the new fuel being transferred into those tanks. Over time, fuel in bulk diesel storage tanks can ingress particulate and water contamination from the environment.

Water provides an ideal environment for organic growth such as bacteria and/or fungus. Bacteria or fungus can cause rapid filter clogging, as well as increased rust, corrosion or emissions problems. The effects can be accelerated as the fuel ages and the level of acidity and oxidation can be shown with the Total Acid Number TAN (mg KOH/g) Acid Number.

<table>
<thead>
<tr>
<th>Contamination Type</th>
<th>Sources</th>
<th>Effects</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Particulates</td>
<td>• Contaminated fuel delivery • Missing tank breather • Tank corrosion • Debris left from tank installation</td>
<td>• Wear and tear of diesel engine components • Premature failure</td>
<td>• Fuel Filtration • Periodic tank cleaning/fuel polishing • Add desiccant breathers • Filtration at each stage of fuel movement</td>
</tr>
<tr>
<td>Water</td>
<td>• Contaminated fuel delivery • Ambient humidity • Leaks and outside influences</td>
<td>• Engine combustion and/or injector problems • Corrosion • Clogged/saturated filters • Organic/Biological growth</td>
<td>• Fuel Filtration • Close any openings on tank • Periodic tank cleaning/fuel polishing</td>
</tr>
<tr>
<td>Organic Growth</td>
<td>• Generated by presence of water</td>
<td>• Clogs filters, engine components • Increased TAN number (corrosive effect)</td>
<td>• Periodic tank cleaning/fuel polishing • Prevent water from entering tank • Use desiccant breathers</td>
</tr>
</tbody>
</table>

Natural Gas Drilling Site Example

A bulk diesel fuel storage tank on a remote Natural Gas Drilling site, used to fuel the generator was found with heavy sludge buildup. The sludge and dirt caused loss of production (generator not running) and damage to diesel engine components totaling over $100,000 in lost production in one hour.

Due to the severe contamination, the fuel was pumped into another, clean tank by the BDC bulk diesel filter cart and cleaned in a single pass. With this single pass, particulate and free water were removed in one step. The first stage Bag Filter on the BDC was ideal for the gross removal of microbial bloom/growth, rust and large particulates from the fuel. With the addition of a bag housing, the BDC can handle the high dirt loads often found in on-site service tanks.

After the original tank was emptied, the sludge at the bottom of the tank (picture) was removed and the tank was thoroughly cleaned to have it ready for the next delivery of fuel. To maintain a clean tank and clean fuel, the BDC is ideal as a kidney loop system that polishes the fuel on a regular basis or can be permanently installed.
BDFP Series
Bulk Diesel Filtration Panel
Up to 25 gpm

Model no. of filter in photograph is: BDFPG03CG5VVM14

Description:
A simple turn key stationary fuel filtration system
The BDFP provides a simple turn key stationary fuel filtration system for exceptional fuel transfer, polishing, and dispensing applications. Both filters combine HYDAC’s fully synthetic filter media in a particulate pre-filter, the GHPF, with our patent-pending coalescing water removal filter, the GHCF, to fully protect vital diesel engine components from dirt and water. The BDFP provides premium filtration in a simple system which can easily be integrated into new and existing fuel storage systems.

Features
• Turn key coalescing and filtration system, for use as a fuel transfer, polishing, and dispensing solution
• Incorporates high-efficiency particulate and water removal filtration into a stationary mounted system with pump
• Available with either electrical or air operated pump options for more system flexibility
• GHPF and GHCF filter housings use patented GeoSeal® elements
• All-aluminum filter housings are fully compatible with diesel and biodiesel
• Minimal clearance needed for element service, ideal for enclosure installations
• Routine element change only needed on GHPF particulate filter, reducing operating cost
• Patent-pending, three-phase particulate, coalescing and fuel/water separation media technology
• A revolutionary element designed for the highest single-pass water and particulate removal efficiencies in today’s ultra-low sulfur diesel (ULSD) fluids
• Protects expensive Tier 3 and Tier 4 engine components against failures caused by particulate and water transferred from the fuel storage tanks to the equipment
• Allows users to achieve or exceed the particulate and water removal specifications of the injection system OEMs

Applications:
• Point of use fuel dispensing
• Fleet fill/bulk fuel transfer
• Bulk fuel unloading
• Protection for high-flow fuel injection systems
• Bulk tank kidney loop/recirculation

Technical Specifications

<table>
<thead>
<tr>
<th></th>
<th>Electric Motor Option: 14 gpm or 25 gpm (53 or 95 L/min)</th>
<th>Air Operated Option: 16 or 25 gpm (53 or 95 L/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow Rating</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluid Temp. Range</td>
<td>32°F to 104°F (0°C to 40°C) Standard</td>
<td>-20°F to 104°F (-29°C to 40°C) Heater Option</td>
</tr>
<tr>
<td>Bypass Indication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Particulate Filter</td>
<td>Electric Motor: 35 psi (2.4 bar)</td>
<td>Coalescing Filter Electric Motor: 35 psi (2.4 bar)</td>
</tr>
<tr>
<td></td>
<td>Air Operated: 25 psi (1.7 bar)</td>
<td>Air Operated: 15 psi (1.0 bar)</td>
</tr>
<tr>
<td>Bypass Cracking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Particulate Filter</td>
<td>Electric Motor: 40 psi (2.8 bar)</td>
<td>Coalescing Filter Electric Motor: 40 psi (2.8 bar)</td>
</tr>
<tr>
<td></td>
<td>Air Operated: 30 psi (2.1 bar)</td>
<td>Air Operated: 20 psi (1.4 bar)</td>
</tr>
<tr>
<td>Materials of...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>Particulate Filter Porting Head: Cast Aluminum, Anodized</td>
<td>Coalescing Filter Porting Head: Cast Aluminum, Anodized</td>
</tr>
<tr>
<td></td>
<td>Element Bowl: Aluminum, Anodized</td>
<td>Element Bowl: Aluminum, Anodized</td>
</tr>
<tr>
<td></td>
<td>Sump: Cast Aluminum, Anodized</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>130 - 150 lbs. (59 - 68 kg)</td>
<td></td>
</tr>
<tr>
<td>Element Change</td>
<td>GHPF: 2” (51 mm)</td>
<td></td>
</tr>
<tr>
<td>Clearance</td>
<td>GHCF: 4.5” (114 mm)</td>
<td></td>
</tr>
<tr>
<td>Operating Frequency</td>
<td>60 Hz</td>
<td></td>
</tr>
<tr>
<td>Operating Phase</td>
<td>Single</td>
<td></td>
</tr>
<tr>
<td>Full Load Amperage</td>
<td>13.4 A @ 115 VAC</td>
<td></td>
</tr>
<tr>
<td>@ Operating Voltage</td>
<td>7.2-6.7 A @ 208-230 VAC</td>
<td></td>
</tr>
<tr>
<td>Service Factor Amperage @ Operating Voltage</td>
<td>15.2 A @ 115 VAC</td>
<td>8.1-7.8 A @ 208-230 VAC</td>
</tr>
</tbody>
</table>

Markets:
• Industrial
• Power Generation
• Bulk Fuel Filtration
• Mining Technology
• Railroad
• Marine
• Fleet
• Mobile Vehicles
• Agriculture
• Common Rail Injector Systems

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FUEL FILTRATION SYSTEMS

Model Code

<table>
<thead>
<tr>
<th>Filter Series</th>
<th>Configuration</th>
<th>Particulate Filtration</th>
<th>Coalescing Filtration</th>
<th>Sealing Material</th>
<th>Element Change Indicator</th>
<th>Options</th>
<th>Pump/Motor Configuration</th>
<th>Element Particulate Performance</th>
<th>Element Water Coalescing Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>BDF</td>
<td>P</td>
<td>GxX</td>
<td>CG5</td>
<td>V</td>
<td>VM</td>
<td>Omit</td>
<td>14 = 14 gpm 120VAC 60Hz Single Phase</td>
<td>5.40.11 D 01 BN4 /-V-G 172 grams &lt;4.0</td>
<td>C125GZ5V Max Flow 25 gpm Single Pass Water Removal Efficiency ≥ 95%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>U</td>
<td>25 = 25 gpm 120VAC 60Hz Single Phase</td>
<td>5.40.11 D 03 BN4 /-V-G 148 grams &lt;4.0</td>
<td></td>
</tr>
</tbody>
</table>

Particulate Element
Flow Direction: Outside In
Element Nominal Dimensions: 5.0” (27 mm) O.D. x 11” (279 mm) long

Coalescing Element
Flow Direction: Inside Out
Element Nominal Dimensions: 5.0” (27 mm) O.D. x 12” (305 mm) long

Fuel Oils
- ULSD15, low sulfur diesel and high sulfur diesel
- Biodiesel blends
- Synthetic diesel and blends
- No. 2 fuel oil and heating oil

Note: Based on ULSD15 with 27 Dynes/cm surface tension and 0.25% (2500 ppm) water injection
Dimensions shown are inches [millimeters] and for general information only. For complete dimensions please contact HYDAC to request a certified print.
FUEL FILTRATION SYSTEMS

Dimensions
BDFP - Air Operated Option

Dimensions shown are inches [millimeters] and for general information only. For complete dimensions please contact HYDAC to request a certified print.
BDFC Series
Bulk Diesel Fuel Filter Cart
*Coalescing Elements Patent-Pending

14 gpm

Features
• Designed with integrated particulate removal pre-filtration for maximum coalescing filter element life in the downstream housing
• Routine element change only needed on particulate filter, saving time and money
• Patent-pending, three-phase, particulate and fuel/water separation media technology
• A revolutionary element designed for the highest single-pass water and particulate removal efficiencies in today’s ultra-low sulfur diesel (ULSD) fluids
• Protects expensive Tier 3 and Tier 4 engine components against failures caused by particulate and water transferred from the bulk tanks to the vehicle
• Allows users to achieve or exceed the particulate and water removal specifications of the injection system OEMs
• Previously acceptable industry standard products no longer provide the high-efficiency separation needed in today’s ULSD fluids
• HYDAC Stat-free media is standard for all coalescing elements
• 10’ Hoses with 3’ wands
• At just 22” wide, cart will fit through standard doorways
• Pump motor is 115VAC with resettable overload and 7’ power cord
• Pressure indicator setting for the coalescing ICF filter at 36 psi bypass indication, with bypass valve cracking at 40 psi, and for the particulate filter at 25 psi bypass indication with bypass valve cracking at 30 psi, allows for early indication before bypass of filter for advanced time for maintenance

Description
Application Introduction:
The Reason for Better Bulk Fuel Filtration
The BDFC provides exceptional single-pass or kidney loop diesel particulate filtration and continuous water removal. Both filters combine HYDAC’s Betamicron® media in a particulate pre-filter, with our patent-pending coalescing water removal filter, the ICF, to fully protect vital diesel engine components from dirt and water. The BDFC is ideal for fuel maintenance operations.

Applications
• Point of use fuel dispensing
• Fleet fill/bulk fuel transfer
• Bulk fuel unloading
• Protection for high-flow fuel injection systems
• Bulk tank kidney loop/recirculation

Markets
• Industrial
• Mobile Vehicles
• Marine
• Mining Technology
• Agriculture
• Power Generation
• Common Rail Injector Systems
• Fleet
• Railroad
• Bulk Fuel Filtration

Technical Specifications

<table>
<thead>
<tr>
<th>Flow Rating</th>
<th>Up to 14 gpm (53 l/min) for ULSD15 and biodiesel blends</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluid Temp. Range</td>
<td>-20°F to 165°F (-29°C to 74°C) Standard</td>
</tr>
<tr>
<td>Ambient Environment</td>
<td>32°F to 104°F (-29°C to 40°C)</td>
</tr>
<tr>
<td>Bypass Indication</td>
<td>Particulate Filter 25 psi (1.7 bar) Coalescing Filter 36 psi (2.5 bar)</td>
</tr>
<tr>
<td>Bypass Valve Cracking</td>
<td>Particulate Filter: 30 psi (2 bar) Coalescing Filter: 40 psi (2.8 bar)</td>
</tr>
<tr>
<td>Weight</td>
<td>131 lbs. (59.4 kg)</td>
</tr>
<tr>
<td>Element Change Clearance</td>
<td>18” (457.2 mm) (Elements sold with the filter cart)</td>
</tr>
<tr>
<td>Operating Frequency</td>
<td>60 Hz</td>
</tr>
<tr>
<td>Operating Phase</td>
<td>Single</td>
</tr>
<tr>
<td>Full Load Amperage</td>
<td>13.4 A @ 115 VAC 7.2-6.7 A @ 208-230 VAC</td>
</tr>
<tr>
<td>Service Factor</td>
<td>Amperage @ Operating Voltage: 15.2 A @ 115 VAC 8.7-7.6 A @ 208-230 VAC</td>
</tr>
</tbody>
</table>

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FUEL FILTRATION SYSTEMS

Model Code

<table>
<thead>
<tr>
<th>Filter Series</th>
<th>BDFC – BN03 – V – VM – S-M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Particulate Filtration Rating</td>
<td></td>
</tr>
<tr>
<td>BDFC = Bulk Diesel Filter Cart</td>
<td></td>
</tr>
<tr>
<td>BN01 = 1 µm</td>
<td></td>
</tr>
<tr>
<td>BN03 = 3 µm</td>
<td></td>
</tr>
<tr>
<td>Sealing Material</td>
<td></td>
</tr>
<tr>
<td>V = Fluorocarbon Elastomer (FKM)</td>
<td></td>
</tr>
<tr>
<td>Element Change Indicator</td>
<td></td>
</tr>
<tr>
<td>VM = Visual Pop-Up w/ Manual Reset</td>
<td></td>
</tr>
<tr>
<td>Options</td>
<td></td>
</tr>
<tr>
<td>Omit = None</td>
<td></td>
</tr>
<tr>
<td>S = Sight Glass</td>
<td></td>
</tr>
<tr>
<td>M = Pump Inlet Y-Strainer</td>
<td></td>
</tr>
<tr>
<td>N = Fuel Nozzle with Integrated Flow Meter</td>
<td></td>
</tr>
</tbody>
</table>

Notes: For 50Hz applications, contact factory

Element Particulate Performance

<table>
<thead>
<tr>
<th>Particulate Elements</th>
<th>DHC</th>
<th>( \beta_x (c) \geq 200 )</th>
<th>( \beta_x \geq 1000 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.03.18D01BN/-V</td>
<td>224 grams</td>
<td>&lt;4.0</td>
<td>&lt;4.2</td>
</tr>
<tr>
<td>5.03.18D03BN/-V</td>
<td>230 grams</td>
<td>&lt;4.0</td>
<td>&lt;4.8</td>
</tr>
</tbody>
</table>

Element Water Coalescing Performance

<table>
<thead>
<tr>
<th>Coalescing Element</th>
<th>Pressure Side Coalescing</th>
</tr>
</thead>
<tbody>
<tr>
<td>C184Z5V</td>
<td>Max Flow 16 gpm</td>
</tr>
<tr>
<td></td>
<td>Single Pass Water Removal Efficiency &gt; 99.5%</td>
</tr>
</tbody>
</table>

Note: Based on ULSD15 with 27 Dyne/cm surface tension and 0.25% (2500 PPM) water injection

Particulate Element
Flow Direction: Outside In
Element Nominal Dimensions: 4.0” (102 mm) O.D. x 15.5° (470 mm) long

Coalescing Element
Flow Direction: Inside Out
Element Nominal Dimensions: 4.0” (102 mm) O.D. x 15.5° (470 mm) long

Fuel Oils
• ULSD15, low sulfur diesel and high sulfur diesel
• Biodiesel blends
• Synthetic diesel and blends
• No. 2 fuel oil and heating oil
Dimensions
BDFC

Dimensions shown are inches [millimeters] and for general information only. For complete dimensions please contact HYDAC to request a certified print.

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Features

• Great for kidney loop clean-up of highly contaminated reservoirs and single pass transfer
• Incorporates a bag element pre-filter down to 5 micron, for gross removal of microbial bloom contamination and rust
• Fuel and water separation media technology in a three-phase element construction for high efficiency, single-pass removal of emulsified and free-water in Ultra-low Sulfur Diesel (ULSD) and blends
• Designed because prior generation coalescing products no longer provide high-efficiency separation in ULSD and Biofuels
• Pump motor is 115VAC with resettable overload and 7’ power cord for 25 gpm models and available as 220V Single Phase, 230V Three Phase, or 460V Three Phase for 70 gpm models
• Helps protect expensive, vital engine components against failures caused by water contaminated fuel
• Manual water drains and up and downstream test points

Technical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>25 gpm</th>
<th>70 gpm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow Rating</td>
<td>Up to 25 gpm (95 L/min) or 70 gpm (265 L/min) for ULSD15 &amp; biodiesel blends</td>
<td></td>
</tr>
<tr>
<td>Fluid Temp. Range</td>
<td>-20°F to 165°F (-29°C to 74°C) (with heater option) and 32°F to 165°F (0°C to 74°C) (standard, with sight gauge option) or with automatic water drain option</td>
<td></td>
</tr>
<tr>
<td>Ambient Environment Temp. Range</td>
<td>-20°F to 104°F (-29°C to 40°C) (with heater option) and 32°F to 165°F (0°C to 74°C) (standard, with sight gauge option or with automatic water drain option)</td>
<td></td>
</tr>
<tr>
<td>Bypass Indication</td>
<td>Particulate Filter 15 psi (1.03 bar) Coalescing Filter 25 psi (1.7 bar)</td>
<td></td>
</tr>
<tr>
<td>Bypass Valve Cracking</td>
<td>Particulate Filter 20 psi (1.37 bar) Coalescing Filter 30 psi (2 bar)</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>25 gpm model - 785 lbs. (356 kg), 70 gpm model - contact factory</td>
<td></td>
</tr>
<tr>
<td>Element Change Clearance</td>
<td>33.8” (858 mm)</td>
<td></td>
</tr>
</tbody>
</table>

For 25 GPM Models:

- Operating Frequency: 60 Hz
- Operating Phase: Single
- Full Load Amperage @ Operating Voltage: 13.4 A @ 115 VAC 7.2-6.7 A @ 208-230 VAC
- Service Factor Amperage @ Operating Voltage: 15.2 A @ 115 VAC 8.1-7.6 A @ 208-230 VAC

For 70 GPM Models:

- Contact Factory
Fuel Oils
- ULSD15, low sulfur diesel and high sulfur diesel
- Biodiesel blends
- Synthetic diesel and blends
- No. 2 fuel oil and heating oil

Element Particulate Performance

<table>
<thead>
<tr>
<th>Particulate Elements</th>
<th>DHC</th>
<th>Filtration Ratio Per ISO 16889</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.14.39D01ECON2 /V</td>
<td>1259 grams</td>
<td>( \beta_{(c)} \geq 200 )</td>
</tr>
<tr>
<td>1.14.39D03ECON2 /V</td>
<td>1293 grams</td>
<td>( \beta_{(c)} \geq 1000 )</td>
</tr>
</tbody>
</table>

Element Water Coalescing Performance

<table>
<thead>
<tr>
<th>Coalescing Element</th>
<th>Pressure Side Coalescing</th>
</tr>
</thead>
<tbody>
<tr>
<td>C396Z5V</td>
<td>Max Flow 70 gpm Single Pass Water Removal Efficiency ≥ 99.5%</td>
</tr>
</tbody>
</table>

Note: Based on ULSD15 with 27 Dyne/cm surface tension and 0.25% (2500 PPM) water injection

Replacement Elements

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Micron Rating</th>
<th>Elements Per Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>C396Z5V</td>
<td>Coalescing Element</td>
<td>5 µm</td>
<td>1</td>
</tr>
<tr>
<td>1.14.39D01ECON2 /V</td>
<td>Particulate Element</td>
<td>1 µm</td>
<td>1</td>
</tr>
<tr>
<td>1.14.39D03ECON2 /V</td>
<td>Particulate Element</td>
<td>3 µm</td>
<td>1</td>
</tr>
<tr>
<td>PEF5P2PH</td>
<td>Bag Element</td>
<td>5 µm</td>
<td>50</td>
</tr>
<tr>
<td>PEF25P2PH</td>
<td>Bag Element</td>
<td>25 µm</td>
<td>50</td>
</tr>
<tr>
<td>PEF50P2PH</td>
<td>Bag Element</td>
<td>50 µm</td>
<td>50</td>
</tr>
<tr>
<td>PEF100P2PH</td>
<td>Bag Element</td>
<td>100 µm</td>
<td>50</td>
</tr>
</tbody>
</table>
FUEL FILTRATION SYSTEMS

Dimensions
BDC

Dimensions shown are inches (millimeters) and for general information only. For complete dimensions please contact HYDAC to request a certified print.
On-Board Fuel Filtration Products
(Particulate and Coalescing)
ON-BOARD FUEL FILTRATION PRODUCTS

Why is On-Board Diesel Filtration Required?
Mobile machines and commercial vehicles are subject to the toughest working conditions all over the world. To ensure smooth running vehicles and to protect both the engine and the whole drive system from damage, optimum diesel fuel conditioning is particularly important. With its HDP On-Board diesel coalescing/particulate filter, HYDAC offers a modern system for diesel filtration which protects vehicle manufacturers and operators from failures, breakdowns and expensive service interventions. The HYDAC HDP On-Board Filter is a cartridge filter system available in two versions: automatic drain (HDP-HT) and manual drain (HDP-BC).
HYDAC’s HDP on-board Diesel Coalescing Filters provide the industry’s best engine fuel filtration to ensure that your injectors never see poor quality fuel, and you never see the bill for expensive engine failures. All of HYDAC’s fuel filters are compatible up to B100.
In addition, all Tier 4 diesel engines (on- or off-road) now require a fuel cleanliness level of 12/9/6 at injector or better. The typical spin-on type, on-board fuel filters were not designed to filter to this level. HYDAC fuel filtration on-board diesel coalescing/particulate filters provide this level of filtration.
With all of the various additives and biodiesel now added to ULSD 15 diesel fuel to regain lubricity, compensate for seasonal differences, minimize microbial growth, and prevent gelling, additional filter clogging problems have arisen compared to fuels used in the past. Filter clogging leads to reduced power or complete breakdown due to filters being run in bypass mode (no filtration). This can lead to common-rail fuel injector failure which will cost in the thousands of dollars to fix. The use of HYDAC’s HDP filters is imperative to remove all of the clogging elements.

The HYDAC HDP On-Board Filter’s product benefits are:
• Low investment costs due to cost-optimized design.
• Small installation space required, since lower section of filter does not have to be accessible
• Great flexibility with regard to installation position since inlet and outlet can be in either direction
• Consistent dewatering over the entire life of the filter element since water is separated on the clean side
• Robust design thanks to aluminum housing.
• Economical and technically reliable operation as a result of long element service life
• High Tech design: Reliable dewatering thanks to automatic water discharge, even during suction side operation
• Simple adaptation to the on-board power supply through the use of independently controlled water discharge
• Low residues of diesel left in the filter element in the event of service
• Reliable radial seal with captive seal design
• Visual analysis of the contamination possible (Rust, metallic swarf, unusual deposits which require further investigation)
• Water sensor and fuel preheating available as options

The HYDAC HDP On-Board Filter results in reliable machine availability:
• From first-class contamination retention
• Due to highly effective and stable water separation on the clean-side for the entire life of the filter element
• Life-long efficiency, because at element change, the water separation stage is also replaced at the same time
• Due to the excellent water separation (achieved by using first class materials) of >95 % to ISO CD 16332

Engine Sizes vs. HDP On-Board Filter Solutions

![Engine Sizes vs. HDP On-Board Filter Solutions](image)

Power Rating Engine [KW]

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SHOP ONLINE at www.airlinehyd.com
800-999-7378
800-999-7378
HDP-BC Series
Heavy-Duty Diesel PreCare - Manual Water Drain
up to 1800 l/h

Description
Mobile machines and commercial vehicles are subject to the toughest working conditions. To ensure smooth running of vehicles, and to protect both the engine and the drive system from damage, optimum diesel fuel conditioning is particularly important. HYDAC Fuel Filtration On-Board Diesel Coalescing filter offers a modern cartridge filter system design available in a manual water drain configuration to protect equipment operators from failures, breakdowns and expensive service interventions.

Features
- Manual water drain
- Optional fuel pre-heater, Water-In-Fuel (WIF) sensor, and hand priming pump
- Small envelope size offers greater flexibility in mounting locations
- Low investment cost due to the economical design
- Long service life of the element yields low operating costs
- Easy installation due to various porting configurations
- Easy adaption of accessories to the on-board power supply
- Unsurpassed water removal for ULSD

Technical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow Rating</td>
<td>up to 476 gph (up to 1800 lph)</td>
</tr>
<tr>
<td>Operating Pressure</td>
<td>&lt;14.5 psia, (&lt;1 bar absolute) suction side application</td>
</tr>
<tr>
<td>Temperature Range</td>
<td>BC: -40°F to 194°F (-40°C to 90°C)</td>
</tr>
<tr>
<td></td>
<td>*for extended ranges, contact factory</td>
</tr>
<tr>
<td>Nominal Voltage</td>
<td>WIF: 12/24VDC</td>
</tr>
<tr>
<td></td>
<td>Heater: 24VDC, 12VDC is optional</td>
</tr>
<tr>
<td>Rated Power Fuel Preheating</td>
<td>300W</td>
</tr>
<tr>
<td>Weight of incl. Element</td>
<td>340 BC: 5.1 lbs (2.3 kg)</td>
</tr>
<tr>
<td></td>
<td>600 BC: 6.8 lbs (3.1 kg)</td>
</tr>
<tr>
<td></td>
<td>*other models available upon request</td>
</tr>
<tr>
<td>Water Separation Efficiency</td>
<td>&gt;95% to ISO CD 16332</td>
</tr>
<tr>
<td>Porting Thread</td>
<td>340 BC: M22x1.5</td>
</tr>
<tr>
<td></td>
<td>600 BC: M27x2.0, SAE -12 ORB (optional)</td>
</tr>
</tbody>
</table>

Model No. of filter in photograph is: HDP KF1
600 BC1 10 W 1.1

Model No. of filter in photograph is: HDP KF1
600 BC1 10 W 1.1 /-H2-PE2
## ON-BOARD FUEL FILTRATION PRODUCTS

### Model Code (also order example)

- **HDP** KF1 600 BC1 10 W 1 . X / -AS1

### Filter Series
- **HDP** = HYDAC Diesel PreCare

### Filter Material
- **KF1** = Dieselmicron®

### Size
- 340 = 90 gph (340 lph)
- 600 = 160 gph (600 lph)
- 1200 = 317 gph (1200 lph)
- 1800 = 476 gph (1800 lph)

### Evolution Stage
- **BC1** = Manual Drain Configuration

### Filtration Rating
- 7 = 7 µm
- 10 = 10 µm
- 30 = 30 µm

### Type of Clogging Indicator
- **W** = No Clogging Indicator

### Modification Number
- **X** = latest version number always supplied

### Options
- **-AS1** = Water-In-Fuel Sensor (12/24 VDC)
- **-AS3** = Cummins® Ready Water-In-Fuel Sensor
- **-H1** = Fuel Pre-Heater (12 VDC)
- **-H2** = Fuel Pre-Heater (24 VDC)
- **-PH3** = Hand Priming Pump (600, 1200, or 1800 BC1 only)
- **-PE1** = Integral Electric Pump (12 VDC)
- **-PE2** = Integral Electric Pump (24 VDC)

### Porting
- **Omit** = M22 x 1.5 (340 size)
- **M27 x 2.0** (600 size)
- **-08** = SAE -08 ORB (340 size only)
- **-12** = SAE -12 ORB (600 size only)

### Bowl Material
- **Omit** = Polyamide Bowl
- **-ALU** = Aluminum Bowl

### Notes:
For other options or configurations not listed, please contact factory

### Element Particulate Performance

<table>
<thead>
<tr>
<th>Particulate Elements</th>
<th>Filtration Ratio Per ISO 19438</th>
<th>Dirt Retention Per ISO 19438</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 µm</td>
<td>&gt; 99%</td>
<td>300 mbar m &gt; 42g</td>
</tr>
</tbody>
</table>

### Element Water Coalescing Performance

<table>
<thead>
<tr>
<th>Coalescing Element</th>
<th>Suction Side Coalescing Per ISO CD 16332</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 µm</td>
<td>Max Flow 160 gal/h, Single Pass Water Removal Efficiency &gt; 95%</td>
</tr>
</tbody>
</table>

Flow Direction: Outside In
Element Nominal Dimensions: 3.8” (95.6 mm) O.D. x 7.0” (177.2 mm) long - 340 Size
3.8” (95.6 mm) O.D. x 9.4” (238.2 mm) long - 600 Size

Note: For additional HDP performance information, please contact the factory

### Fuel Oils
- ULSD15 and similar petroleum diesels
- Biodiesel blends
- Synthetic diesel and blends

Note: For Flow and Pressure information, please contact the factory

### Replacement Elements

<table>
<thead>
<tr>
<th>Size</th>
<th>Evolution Stage</th>
<th>Filtration Rating</th>
<th>Filter Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>0340</td>
<td>BC1</td>
<td>007</td>
<td>KF1</td>
</tr>
<tr>
<td>0600</td>
<td></td>
<td>010</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>030</td>
<td></td>
</tr>
</tbody>
</table>
ON-BOARD FUEL FILTRATION PRODUCTS

Dimensions
HDP-BC 340

Optional:
Power supply
Water level sensor

Optional:
Power supply
Fuel heating system

Dimensions shown are [inches] millimeters and for general information only. For complete dimensions please contact HYDAC to request a certified print.

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ON-BOARD FUEL FILTRATION PRODUCTS

Dimensions
HDP-BC 600

Dimensions shown are [inches] millimeters and for general information only. For complete dimensions please contact HYDAC to request a certified print.
Dimensions shown are [inches] millimeters and for general information only. For complete dimensions please contact HYDAC to request a certified print.

<table>
<thead>
<tr>
<th>HDP</th>
<th>340 BC</th>
<th>600 BC</th>
<th>1200 BC</th>
<th>1800 BC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight incl. element lbs. (kg)</td>
<td>5.1 (2.3)</td>
<td>6.8 (3.1)</td>
<td>20.1 (9.1)</td>
<td>30.9 (14.0)</td>
</tr>
</tbody>
</table>

For drawing of configurations not shown, contact factory.
ON-BOARD FUEL FILTRATION PRODUCTS

HDP-HT Series

Heavy-Duty Diesel PreCare - Automatic Water Drain

14.5 psia • up to 476 gph

Model No. of filter in photograph is: HDP KF1 600
HT1 XX UED 1.1 /-AS1-H2

Description

Mobile machines and commercial vehicles are subject to the toughest working conditions. To ensure smooth running of vehicles, and to protect both the engine and the drive system from damage, optimum diesel fuel conditioning is particularly important. HYDAC Fuel Filtration On-Board Diesel Coalescing filter offers a modern cartridge filter system design available in a fully automated water drain configuration, in order to minimize operator intervention and protect equipment from failures, breakdowns and expensive service interventions.

Features

• Fully Automatic water drain
• Optional fuel pre-heater and standard Water-In-Fuel (WIF) sensor
• Small envelope size offers greater flexibility in mounting locations
• Low investment cost due to the economical design
• Long service life of the element yields low operating costs
• Easy installation due to various porting configurations
• Easy adaption to the on-board power supply
• Unsurpassed water removal for ULSD

Technical Specifications

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow Rating:</td>
<td>up to 476 gph (up to 1800 lph)</td>
</tr>
<tr>
<td>Operating Pressure:</td>
<td>&lt;14.5 psia, (&lt;1 bar absolute) suction side application</td>
</tr>
<tr>
<td>Temperature Range:</td>
<td>HT: -4°F to 194°F (-20°C to 90°C) *for extended ranges, contact factory</td>
</tr>
<tr>
<td>Nominal Voltage:</td>
<td>24V DC (12V DC is optional for heater)</td>
</tr>
<tr>
<td>Rated Power Fuel Preheating:</td>
<td>300W</td>
</tr>
<tr>
<td>Weight of incl. Element:</td>
<td>600 HT: 9.4 lbs (4.25 kg) *other models available upon request</td>
</tr>
<tr>
<td>Water Separation Efficiency:</td>
<td>&gt;95% to ISO CD 16332</td>
</tr>
<tr>
<td>Porting Thread:</td>
<td>600 HT: G 3/4” (BSPP)</td>
</tr>
</tbody>
</table>

SHOP ONLINE at www.airlinehyd.com

800-999-7378
ON-BOARD FUEL FILTRATION PRODUCTS

**Element Particulate Performance**

<table>
<thead>
<tr>
<th>Particulate Elements</th>
<th>Filtration Ratio Per ISO 19438</th>
<th>Dirt Retention Per ISO 19438</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 μm</td>
<td>&gt; 99%</td>
<td>300 mbar m &gt; 42g</td>
</tr>
</tbody>
</table>

**Element Water Coalescing Performance**

<table>
<thead>
<tr>
<th>Coalescing Element</th>
<th>Suction Side Coalescing Per ISO CD 16332</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 μm</td>
<td>Max Flow</td>
</tr>
<tr>
<td></td>
<td>Single Pass Water Removal Efficiency</td>
</tr>
<tr>
<td></td>
<td>160 gal/h</td>
</tr>
<tr>
<td></td>
<td>&gt; 95%</td>
</tr>
</tbody>
</table>

Flow Direction: Outside In
Element Nominal Dimensions:
- 3.8” (95.6 mm) O.D. x 7.0” (177.2 mm) long - 340 Size
- 3.8” (95.6 mm) O.D. x 9.4” (238.2 mm) long - 600 Size

Note: For additional HDP performance information, please contact the factory

**Fuel Oils**
- ULSD15 and similar petroleum diesels
- Biodiesel blends
- Synthetic diesel and blends

Note: For Flow and Pressure information, please contact the factory

**Replacement Elements**

<table>
<thead>
<tr>
<th>Size</th>
<th>Evolution Stage</th>
<th>Filtration Rating</th>
<th>Filter Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>0600</td>
<td>HT1</td>
<td>007</td>
<td>KF1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>010</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>030</td>
<td></td>
</tr>
</tbody>
</table>

PN#2208201 / 08.18 / FFD1702-1879

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HYDAC
ON-BOARD FUEL FILTRATION PRODUCTS

Dimensions
HDP-HT 600

Dimensions shown are [inches] millimeters and for general information only. For complete dimensions please contact HYDAC to request a certified print.

<table>
<thead>
<tr>
<th>HDP</th>
<th>600 HT</th>
<th>1200 HT</th>
<th>1800 HT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight incl. element lbs. (kg)</td>
<td>9.5 (4.3)</td>
<td>24.3 (11.0)</td>
<td>37.5 (17.0)</td>
</tr>
</tbody>
</table>

For drawing of configurations not shown, contact factory
HDPD-BC Series
Heavy-Duty Diesel PreCare Duplex Filter
14.5 psia • up to 476 gph

Description
The Heavy-Duty Diesel PreCare Duplex Filter is an advanced system for diesel pre-filtration which protects equipment OEMs and operators from costly service calls and downtime. The duplex configuration consists of an assembly with multiple filter housings, which are connected by a change-over ball valve with a simple, single lever operation. The HDPD is available in the familiar BC (manual drain) or HT (auto drain) version.

Features
• Simple, single-lever change-over ball valve for seamless operation and service
• Manual or fully automatic Water-In-Fuel (WIF) sensor
• Optional fuel pre-heater and water sensor
• Small envelope size offers greater flexibility in mounting locations
• Low investment cost due to the economical design
• Long service life of the element yields low operating costs
• Easy installation due to various porting configurations
• Easy adaption to the on-board power supply
• Unsurpassed water removal for ULSD

Technical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow Rating</td>
<td>up to 476 gph (up to 1800 lph)</td>
</tr>
<tr>
<td>Operating Pressure</td>
<td>&lt;14.5 psia, (&lt;1 bar absolute) suction side application</td>
</tr>
<tr>
<td>Temperature Range</td>
<td>BC: -40°F to 194°F (-40°C to 90°C)</td>
</tr>
<tr>
<td>*for extended ranges, contact factory</td>
<td></td>
</tr>
<tr>
<td>Nominal Voltage</td>
<td>24V DC (12V DC is optional for heater or water sensor)</td>
</tr>
<tr>
<td>Rated Power Fuel Preheating</td>
<td>300W</td>
</tr>
<tr>
<td>Weight</td>
<td>contact factory for your specific model code weight</td>
</tr>
<tr>
<td>Water Separation Efficiency</td>
<td>&gt;95% to ISO CD 16332</td>
</tr>
</tbody>
</table>
| Porting Thread                 | 340 BC: M22x1.5  
600 BC: M27x2.0, SAE -12 ORB (optional)  
600 HT: G 3/4” (BSPP)            |
### ON-BOARD FUEL FILTRATION PRODUCTS

**Model Code** (also order example)

<table>
<thead>
<tr>
<th>HDPD</th>
<th>KF1</th>
<th>600</th>
<th>BC1</th>
<th>10</th>
<th>UED</th>
<th>1</th>
<th>X</th>
<th>-AS1-H2-PH3</th>
</tr>
</thead>
</table>

**Filter Series**
- HDPD = HYDAC Diesel PreCare, Duplex

**Filter Material**
- KF1 = Dieselmicron®

**Size**
- 340 = 90 gph (340 lph)
- 600 = 160 gph (600 lph)
- 1200 = 317 gph (1200 lph)
- 1800 = 476 gph (1800 lph)

**Evolution Stage**
- BC1 = Manual Drain Configuration
- HT1 = Auto Drain Configuration

**Filtration Rating**
- 7 μm = 10 μm
- 30 μm = 30 μm

**Type of Clogging Indicator**
- W = No Clogging Indicator (BC1 only)
- A = Blanking Plug In Indicator Port (HT1 only)
- UED = Vacuum Gauge (HT1 only)

**Type Code**

<table>
<thead>
<tr>
<th>X</th>
<th>Latest version number always supplied</th>
</tr>
</thead>
</table>

**Options**
- -AS1 = Water-In-Fuel Sensor (12/24 VDC) (standard on 600 HT1)
- -AS3 = Cummins® Ready Water-In-Fuel Sensor
- -H1 = Fuel Pre-Heater (12 VDC)
- -H2 = Fuel Pre-Heater (24 VDC)
- -PH3 = Hand Priming Pump (600 BC1 only)

**Porting**
- Omit = M22 x 1.5 (340 size)
- M27 x 2.0 (600 size)
- -08 = SAE -08 ORB (340 size only)
- -12 = SAE -12 ORB (600 size only)

**Bowl Material**
- Omit = Polyamide Bowl
- -ALU = Aluminum Bowl

Notes: For other options or configurations not listed, please contact factory

### Element Particulate Performance

<table>
<thead>
<tr>
<th>Particulate Elements</th>
<th>Filtration Ratio Per ISO 19438</th>
<th>Dirt Retention Per ISO 19438</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 μm</td>
<td>&gt; 99%</td>
<td>300 mbar &gt; 42g</td>
</tr>
</tbody>
</table>

### Element Water Coalescing Performance

<table>
<thead>
<tr>
<th>Coalescing Element</th>
<th>Suction Side Coalescing Per ISO CD 16332</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 μm</td>
<td>Max Flow: 160 gal/h, Single Pass Water Removal Efficiency &gt; 95%</td>
</tr>
</tbody>
</table>

Note: For additional HDP performance information, please contact the factory

**Flow Direction:**
- Outside In

**Element Nominal Dimensions:**
- 3.8" (95.6 mm) O.D. x 7.0" (177.2 mm) long - 340 Size
- 3.8" (95.6 mm) O.D. x 9.4" (238.2 mm) long - 600 Size

**Fuel Oils**
- ULSD15 and similar petroleum diesels
- Biodiesel blends
- Synthetic diesel and blends

Note: For Flow and Pressure information, please contact the factory

### Replacement Elements

<table>
<thead>
<tr>
<th>Size</th>
<th>Evolution Stage</th>
<th>Filtration Rating</th>
<th>Filter Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>0340</td>
<td>BC1</td>
<td>007</td>
<td>KF1</td>
</tr>
<tr>
<td>0600</td>
<td></td>
<td>010</td>
<td></td>
</tr>
<tr>
<td>1200</td>
<td></td>
<td>030</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HDPD</th>
<th>340 BC</th>
<th>600 BC</th>
<th>1200 BC</th>
<th>1800 BC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight incl. element lbs. (kg)</td>
<td>19.8 (9.0)</td>
<td>24.3 (11.0)</td>
<td>43.2 (19.6)</td>
<td>66.1 (30)</td>
</tr>
</tbody>
</table>

For drawing of configurations, contact factory
HDPD-HT Series
Diesel PreCare
up to 1800 l/h

Technical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow Rating</td>
<td>up to 476 gph (up to 1800 lph)</td>
</tr>
<tr>
<td>Operating Pressure</td>
<td>&lt;14.5 psia, (&lt;1 bar absolute) suction side application</td>
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<tr>
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<td>HT: -4°F to 194°F (-20°C to 90°C)</td>
</tr>
<tr>
<td></td>
<td>*for extended ranges, contact factory</td>
</tr>
<tr>
<td>Nominal Voltage</td>
<td>24V DC (12V DC is optional for heater or water sensor)</td>
</tr>
<tr>
<td>Rated Power Fuel Preheating</td>
<td>300W</td>
</tr>
<tr>
<td>Weight</td>
<td>contact factory for your specific model code weight</td>
</tr>
<tr>
<td>Water Separation Efficiency</td>
<td>&gt;95% to ISO CD 16332</td>
</tr>
<tr>
<td>Porting Thread</td>
<td>340 BC: M22x1.5 600 BC: M27x2.0, SAE -12 ORB (optional) 600 HT: G 3/4&quot; (BSPP)</td>
</tr>
</tbody>
</table>

Description
The Heavy-Duty Diesel PreCare Duplex Filter is an advanced system for diesel pre-filtration which protects equipment OEMs and operators from costly service calls and downtime. The duplex configuration consists of an assembly with multiple filter housings, which are connected by a change-over ball valve with a simple, single lever operation. The HDPD is available in the familiar BC (manual drain) or HT (auto drain) version.

Features
- Simple, single-lever change-over ball valve for seamless operation and service
- Manual or fully automatic Water-In-Fuel (WIF) sensor
- Optional fuel pre-heater and water sensor
- Small envelope size offers greater flexibility in mounting locations
- Low investment cost due to the economical design
- Long service life of the element yields low operating costs
- Easy installation due to various porting configurations
- Easy adaption to the on-board power supply
- Unsurpassed water removal for ULSD

Model No. of filter in photograph is:
HDPD KF1 600 BC1 xx W 1.1/-AS1-PH3
ON-BOARD FUEL FILTRATION PRODUCTS

Model Code (also order example)  

| HDPD | KF1 | 600 | HT1 | 10 | UED | 1 | X | / -AS1-H2-PH3 |

Filter Series  
HDPD = HYDAC Diesel PreCare, Duplex

Filter Material  
KF1 = Dieselmicron®

Size  
600 = 160 gph (600 lph)
1200 = 317 gph (1200 lph)
1800 = 476 gph (1800 lph)

Evolution Stage  
HT1 = Auto Drain Configuration

Filtration Rating  
7 = 7 µm
10 = 10 µm
30 = 30 µm

Type of Clogging Indicator  
A = Blanking Plug In Indicator Port (600 HT1 only)
UED = Vacuum Gauge (600 HT1 only)

Type Code (Latest Version Number Always Supplied)  
1

Modification Number  
X =

Options  
-AS1 = Water-In-Fuel Sensor (12/24 VDC) (standard on 600 HT1)
-H1 = Fuel Pre-Heater (12 VDC)
-H2 = Fuel Pre-Heater (24 VDC)

Notes: For other options or configurations not listed, please contact factory

Element Particulate Performance

<table>
<thead>
<tr>
<th>Particulate Elements</th>
<th>Filtration Ratio Per ISO 19438</th>
<th>Dirt Retention Per ISO 19438</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 µm</td>
<td>&gt; 99%</td>
<td>300 mbar m &gt; 42g</td>
</tr>
</tbody>
</table>

Element Water Coalescing Performance

<table>
<thead>
<tr>
<th>Coalescing Element</th>
<th>Suction Side Coalescing Per ISO CD 16332</th>
<th>Single Pass Water Removal Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 µm</td>
<td>Max Flow 158 gal/h</td>
<td>&gt; 95%</td>
</tr>
</tbody>
</table>

Note: For additional HDP performance information, please contact the factory

Flow Direction:  
Outside In

Element Nominal Dimensions:  
3.8” (95.6 mm) O.D. x 7.0” (177.2 mm) long - 340 Size
3.8” (95.6 mm) O.D. x 9.4” (238.2 mm) long - 600 Size

Fuel Oils  
- ULSD15 and similar petroleum diesels
- Biodiesel blends
- Synthetic diesel and blends

Note: For Flow and Pressure information, please contact the factory

Replacement Elements

<table>
<thead>
<tr>
<th>Size</th>
<th>Evolution Stage</th>
<th>Filtration Rating</th>
<th>Filter Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>0600</td>
<td>HT1</td>
<td>007</td>
<td>KF1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>010</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>030</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Size</th>
<th>600 HT</th>
<th>1200 HT</th>
<th>1800 HT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight incl.</td>
<td>44.1 (20.0)</td>
<td>88.2 (40.0)</td>
<td>132.3 (60.0)</td>
</tr>
<tr>
<td>element lbs. (kg)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For drawing of configurations, contact factory

PN#2208201 / 08.18 / FFD1702-1879
### Description

The Heavy-Duty Diesel PreCare Duplex Filter - Marine Configuration is an advanced system for diesel pre-filtration which is specifically designed for marine applications needing to meet the SOLAS guidelines. Providing safety in redundancy, the duplex configuration consists of an assembly with two filter housings, which are connected by a single change-over valve which can isolate the housings or operate them in parallel. The ductile iron construction also meets the high melting point requirements.

### Features

- Simple, single-lever change-over ball valve for seamless operation and service
- Ductile iron construction, with no aluminum or plastic components to meet fire safety requirements
- Optional water sensor available with 10 marine approval certificates
- ATEX pressure transducers available
- Long service life of the element yields low operating costs
- Easy installation due to various porting configurations
- Unsurpassed water removal for ULSD

### Technical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow Rating</td>
<td>up to 238 gph (900 l/h) per side, 476 gph (1800 l/h) in dual operation</td>
</tr>
<tr>
<td>Operating Pressure</td>
<td>&lt;22 psia, (&lt;1.5 bar absolute) suction side application</td>
</tr>
<tr>
<td>Environmental Temperature Range</td>
<td>-13°F to 185°F (-25°C to 85°C) *for extended ranges, contact factory</td>
</tr>
<tr>
<td>Nominal Voltage</td>
<td>24V DC *for other requirements, contact factory</td>
</tr>
<tr>
<td>Weight</td>
<td>contact factory for your specific model code weight</td>
</tr>
<tr>
<td>Water Separation Efficiency</td>
<td>&gt;95% to ISO CD 16332</td>
</tr>
<tr>
<td>Porting Thread</td>
<td>M33x2.0 (ISO 6149-1) *for other porting, contact factory</td>
</tr>
</tbody>
</table>

Model No. of filter in photograph is: HDPD KF2 1800 UC1 XX HDA 1.X /-AS8
## ON-BOARD FUEL FILTRATION PRODUCTS

### Model Code (also order example)

<table>
<thead>
<tr>
<th>Filter Series</th>
<th>HDPD</th>
<th>KF2</th>
<th>1800</th>
<th>UC1</th>
<th>7</th>
<th>UED</th>
<th>1</th>
<th>X</th>
<th>/-AS1-H2-PH3</th>
</tr>
</thead>
</table>

**Filter Series**
- HDPD = HYDAC Diesel PreCare, Duplex

**Filter Material**
- KF2 = Dieselmicron®

**Size**
- 1800 = 238 gph (900 l/h) per side, 476 gph (1800 l/h) dual operation

**Evolution Stage**
- UC1 = Marine Filter Configuration

**Filtration Rating**
- 7 = 7 µm

**Type of Clogging Indicator**
- A = Blanking Plug In Indicator Port (600 HT1 only)

**Type Code**
- 1

**Modification Number**
- X = Latest version number always supplied

**Options**
- -AS8 = Water-In-Fuel Sensor with Marine Approvals (contact factory for details)

---

Notes: For other options, configurations, drawings or approvals not listed, please contact factory
Contamination Monitors

SHOP ONLINE at www.airlinehyd.com
800-999-7378
Description

The Fluid Control Unit FCU 1315 series combines the advantages of the portable contamination measurement units with the measurement technology of the TestMate® Contamination Monitor (TCM) and TWS (TestMate® Water Sensor), in a portable, field-ready package for diesel fuel applications. The FCU 1315 is a portable service unit and is designed for temporary measurement of solid particle contamination and water saturation in diesel storage, diesel transfer and diesel filling applications.

The FCU 1315 will measure contamination levels of diesel fuel, as well as mineral based hydraulic oils compatible with Viton® seals. The FCU 1315 is not compatible with water glycol fluids.

The integrated pump and the hoses with test point connections, which are included with the FCU 1315, allow operation on diesel fuel storage tanks and transfer circuits, as well as on hydraulic reservoirs, control circuits, and pressure circuits.

To ensure safe operation with diesel fuel, the FCU 1315 is equipped with a grounding wire, along with an integral temperature monitoring system to ensure the device switches off when operated above the critical temperature of diesel fuel (113°F, 45°C).

Features

- Particulate contamination is detected with an optical measurement cell
- Automatic measurement and display of cleanliness ratings as ISO 4406:1999; SAE AS 4059, and NAS 1638
- Measurement Accuracy +/- 1/2 ISO code
- Supply voltage 24 VDC
- Integrated pump for automatic control of oil flow
- Viscosity range: 33 to 1622 SUS (2 to 350 cSt)
- Water saturation (0 - 100%)

Applications

- Diesel Storage
- Diesel Transfer and Filling
- Diesel Service and Maintenance

Technical Specifications

<table>
<thead>
<tr>
<th>General Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-diagnosis</td>
</tr>
<tr>
<td>Measured Value</td>
</tr>
<tr>
<td>Measuring Range</td>
</tr>
<tr>
<td>Accuracy</td>
</tr>
<tr>
<td>Seal Material</td>
</tr>
<tr>
<td>Ambient Temperature Range</td>
</tr>
<tr>
<td>Storage Temperature Range</td>
</tr>
<tr>
<td>Dimensions (cover closed)</td>
</tr>
<tr>
<td>IP class</td>
</tr>
<tr>
<td>Weight</td>
</tr>
<tr>
<td>With Diesel According to</td>
</tr>
</tbody>
</table>

- Hydraulic Data

| Hydraulic Fluid Operating Pressure | in: -7.25 to 650 psi (-0.5 to 45 bar) out: 0 to 7.5 bar (0 to .5 psi) |
| with Adaptor for Pressure Lines    | in: 15 to 345 bar / 217 to 5000 psi out: 0 to 0.5 bar / 0 to 7.5 psi |
| Pressure Max.                      | 5000 psi (345 bar) |
| Permissible Viscosity Range        | 3 to 1622 SUS (1.5 to 350 cSt) |
| Fluid Temperature Range            | 32 to 158°F (0 to 70°C), or up to 113°F (45°C) for diesel fuel |

- Electrical Data

| Power Supply Voltage               | 24 VDC ±20%, residual ripple < 10% |
| Max. Power / Current Consumption   | 100 Watt / 4 A |
| Interface                          | Plug connection, 5-pole, male, M12x1 and USB |

We do not guarantee the accuracy or completeness of this information. The information is based on average working conditions. For exceptional operating conditions please contact our technical department. All details are subject to technical changes.
CONTAMINATION MONITORS

Model Code

<table>
<thead>
<tr>
<th>Type</th>
<th>FCU = Fluid Control Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series</td>
<td>1 = 1000 Series, 4 Particle Size Channels</td>
</tr>
<tr>
<td>Contamination Codes</td>
<td>3 = ISO 4406:1987; NAS 1638 / 2-5 µm, 5-15 µm, 15-25 µm, &gt; 25 µm; can be switched to ISO 4406:1999; SAE AS 4059 (D) / &gt; 4 µm(c), &gt; 6 µm(c), &gt; 14 µm(c), &gt; 21 µm(c)</td>
</tr>
<tr>
<td>Housing</td>
<td>1 = For Mobile Use (Plastic Case with Appending Bag for Hoses and Cables)</td>
</tr>
<tr>
<td>Fluids</td>
<td>5 = Diesel Fuel According to ASTM D975 4-D / DIN EN 590, as well as Hydraulic and Lubrication Fluids Based on Mineral Oils</td>
</tr>
<tr>
<td>Options</td>
<td>4 = With Integrated Pump</td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>U = 24 V DC</td>
</tr>
<tr>
<td>Integral Sensor</td>
<td>AS = AquaSensor AS 1000</td>
</tr>
<tr>
<td>Power Supply Adapter</td>
<td>1 = 100 to 240 V AC / 50/60 Hz / Single Phase</td>
</tr>
</tbody>
</table>

Scope of Delivery

We do not guarantee the accuracy or completeness of this information. The information is based on average working conditions. For exceptional operating conditions, please contact our technical department. All details are subject to technical changes.

Items supplied with FCU 1315-4-U-AS-1 include:

- Fluid Control Unit (FCU 1315)
- Power supply AC adapter with connecting cables to supply voltage for Europe, USA/Canada, UK, Australia, and Japan
- Adapter for pressure lines
- Adapter for clear suction hose
- Inlet pressure hose with screw connection for 1620 test point, length = 2 meters (approx. 79 inches)
- Inlet suction pipe (metallic) for bottle sampling
- 2x suction/return hoses, clear, quick couple terminations, 1 meter (approx. 39 inches)
- Operation Manual & Calibration Certificate
- CD Rom of FluMoS Light Software
- USB Flash Drive (which includes Operation and Maintenance Instructions in other languages)
- Grounding Terminal
- Accessories:
  - Battery Pack (approx. 5 hours of use) Part No. 3504605
  - Field Verification Startup Kit - Part No. 3443253
  - Field Verification Kit (fluid only) - Part No. 3443249

Dimensions

Dimensions shown are inches (millimeters) and for general information only. For complete dimensions please contact HYDAC to request a certified print.
**CONTAMINATION MONITORS**

**Diesel Fuel Quality Analysis Kits**

Fuel analysis can identify potential causes for fuel filter plugging, smoking, loss of power, poor injector performance, malfunctioning throttle position sensors and sticking valves. Testing also confirms a diesel fuel's sulfur content, biodiesel content and compliance with manufacturer specifications and standards for cleanliness that could affect equipment warranty requirements. HYDAC offers Troubleshooting and Diesel fuel quality test packages. All packages include pre-paid testing and the required number of fuel containers for sample.

*Total sample volume 32 oz required for all tests listed below*

**Complete Fuel Quality and fuel filter ability | Fuel Stability Bio Content Test**

<table>
<thead>
<tr>
<th>Troubleshooting Test Packages</th>
<th>Complete Diesel Fuel Analysis</th>
<th>Includes</th>
<th>Sample Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Complete fuel quality, fuel filter-ability, fuel stability and bio content test (8 critical ASTM tests with a single comprehensive relational summary)</td>
<td>Filter Plugging Free Contamination</td>
<td>Computability</td>
<td>Loss of Power</td>
</tr>
<tr>
<td></td>
<td>Filter Plugging</td>
<td>Injector Scoring</td>
<td>Corrosion</td>
</tr>
<tr>
<td></td>
<td>All Cultures of Microbes</td>
<td>Microscopic Composition</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Filter Plugging</td>
<td>Injector Scoring</td>
<td>Microbial Promoting</td>
</tr>
</tbody>
</table>

**Contamination Tests**

- Identifies contamination from external sources - oil, biological growth, water, sediment
- Identifies contamination to be the result of a change in the fuel’s physical properties - low thermal stability may require use of an asphaltene conditioner

<table>
<thead>
<tr>
<th>Includes</th>
<th>Sample Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICP</td>
<td>2mL</td>
</tr>
<tr>
<td>Flash Point</td>
<td>200mL</td>
</tr>
<tr>
<td>Thermal Stability</td>
<td>120mL</td>
</tr>
<tr>
<td>Water and Sediment</td>
<td>200mL</td>
</tr>
<tr>
<td>Bacteria, Fungi, Mold</td>
<td>120mL</td>
</tr>
</tbody>
</table>

**Smoking Tests**

- Identifies low cetane index or water contamination - loss of power, white smoke
- Identifies excessive sulfur content - black smoke

<table>
<thead>
<tr>
<th>Includes</th>
<th>Sample Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfur</td>
<td>50mL</td>
</tr>
<tr>
<td>Cetane Index</td>
<td>100mL</td>
</tr>
<tr>
<td>API Gravity</td>
<td>400mL</td>
</tr>
<tr>
<td>Distillation</td>
<td>200mL</td>
</tr>
<tr>
<td>Water and Sediment</td>
<td>200mL</td>
</tr>
</tbody>
</table>

**Filter Plugging Tests**

- Identifies contamination from external sources specific to filter plugging - high particle count, biological growth
- Identifies contamination due to a change in the fuel’s physical properties - low thermal stability or insufficient cold weather capability for operating environment

<table>
<thead>
<tr>
<th>Includes</th>
<th>Sample Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal Stability</td>
<td>120mL</td>
</tr>
<tr>
<td>Bacteria, Fungi, Mold</td>
<td>120mL</td>
</tr>
<tr>
<td>Pour Point</td>
<td>100mL</td>
</tr>
<tr>
<td>Cloud Point</td>
<td>100mL</td>
</tr>
<tr>
<td>Cold Filter Plug Point</td>
<td>100mL</td>
</tr>
<tr>
<td>Particle Count</td>
<td>80mL</td>
</tr>
</tbody>
</table>

**Cleanliness Tests**

- Identifies water contamination - can lead to smoking, biological growth and corrosion
- Identifies particulate contamination - can result in extreme wear in high pressure fuel systems which may cause premature injector failure

<table>
<thead>
<tr>
<th>Includes</th>
<th>Sample Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Karl Fischer</td>
<td>10mL</td>
</tr>
<tr>
<td>Particle Count</td>
<td>80mL</td>
</tr>
</tbody>
</table>

**Wear Prevention Tests**

- Identifies cause of wear - water contamination, excessive particles or insufficient lubricity

<table>
<thead>
<tr>
<th>Includes</th>
<th>Sample Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Karl Fischer</td>
<td>10mL</td>
</tr>
<tr>
<td>Particle Count</td>
<td>80mL</td>
</tr>
<tr>
<td>Lubricity</td>
<td>20mL</td>
</tr>
</tbody>
</table>
### Fuel Quality Test Packages

**Summer Tests**
- Identifies contamination from external sources - oil, biological growth, water, sediment
- Identifies contamination to be the result of a change in the fuel’s physical properties - low thermal stability may require use of an asphaltene conditioner

<table>
<thead>
<tr>
<th>Includes</th>
<th>Sample Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flash Point</td>
<td>200mL</td>
</tr>
<tr>
<td>Water and Sediment</td>
<td>200mL</td>
</tr>
<tr>
<td>Kinematic Viscosity</td>
<td>2mL</td>
</tr>
<tr>
<td>Sulfur</td>
<td>50mL</td>
</tr>
<tr>
<td>Cetane Index</td>
<td>100mL</td>
</tr>
<tr>
<td>API Gravity</td>
<td>400mL</td>
</tr>
<tr>
<td>Distillation</td>
<td>200mL</td>
</tr>
<tr>
<td>Thermal Stability</td>
<td>120mL</td>
</tr>
<tr>
<td>ICP</td>
<td>2mL</td>
</tr>
</tbody>
</table>

**Winter Tests**
- Identifies low cetane index or water contamination - loss of power, white smoke
- Identifies excessive sulfur content - black smoke

<table>
<thead>
<tr>
<th>Includes</th>
<th>Sample Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flash Point</td>
<td>200mL</td>
</tr>
<tr>
<td>Water and Sediment</td>
<td>200mL</td>
</tr>
<tr>
<td>Kinematic Viscosity</td>
<td>2mL</td>
</tr>
<tr>
<td>Sulfur</td>
<td>50mL</td>
</tr>
<tr>
<td>Cetane Index</td>
<td>100mL</td>
</tr>
<tr>
<td>API Gravity</td>
<td>400mL</td>
</tr>
<tr>
<td>Distillation</td>
<td>200mL</td>
</tr>
<tr>
<td>Thermal Stability</td>
<td>120mL</td>
</tr>
<tr>
<td>Pour Point</td>
<td>100mL</td>
</tr>
<tr>
<td>Cloud Point</td>
<td>100mL</td>
</tr>
<tr>
<td>Bacteria, Fungi, Mold</td>
<td>120mL</td>
</tr>
<tr>
<td>ICP</td>
<td>2mL</td>
</tr>
</tbody>
</table>
BetterFit® Fuel Elements

SHOP ONLINE at www.airlinehyd.com
800-999-7378

SHOP ONLINE at www.airlinehyd.com
800-999-7378
Betterfit® Elements

Description
The filter elements in the Betterfit Diesel filter element series are particularly suitable for removing particles of dirt from diesel fuels. In this process, the Optimicron® diesel material with Helios pleated geometry is applied, which was developed especially for use with diesel fuels.

- Kaydon
- Parker
- Facet
- Gulfgate
- Murphy
- Racor
- Velcon
- And others

* Contact Factory for Crossovers not listed.

Features and Benefits
- Good price/performance ratio
- Lower maintenance costs due to longer service life
- Significant reduction in pressure loss and integrated pleat stabilization due to Helios pleated geometry
- High level of fluid cleanliness due to graduated structure of depth filter
- High contamination retention due to large depth effect of the filter material
- High media compatibility
- Filter element geometry suitable for use in housings made by other manufacturers

Technical Specifications

<table>
<thead>
<tr>
<th>Differential Pressure Rating</th>
<th>Up to 75 psid (dependent on part number)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Operating Temperature Range</td>
<td>225°F (ºC)</td>
</tr>
<tr>
<td>End Cap Material</td>
<td>Plated Aluminum</td>
</tr>
<tr>
<td>(Threaded base elements have injection-molded, glass filled nylon end caps)</td>
<td></td>
</tr>
<tr>
<td>Center Tube Material (when included)</td>
<td>Plated Steel</td>
</tr>
<tr>
<td>Seal Material</td>
<td>Buna N (other materials available upon request)</td>
</tr>
<tr>
<td>Filter Element Length, Typical</td>
<td>20&quot;, 40&quot;, 60&quot; (others on request)</td>
</tr>
<tr>
<td>Filtration Rating</td>
<td>5, 10, 20 µm (others on request)</td>
</tr>
<tr>
<td>Degree of Separation</td>
<td>&gt; 99.5%</td>
</tr>
<tr>
<td>Permissible Fluid temperature</td>
<td>14ºF to 176ºF (-10ºC to 80ºC)</td>
</tr>
</tbody>
</table>
BETTERFIT FUEL ELEMENTS

Model Code

Filter Element Type

Element Length

Version

D = Standard

Filtration Rating

3 = 3 µm
5 = 5 µm
10 = 10 µm
20 = 20 µm
Z = Coalescing / Separation

Filter Material

ON/DF = Optimicron® / Diesel Filtration
ON/DC = Optimicron® / Diesel Coalescing
ON/DS = Optimicron® / Diesel Separation

Sealing Material

V = Fluorocarbon Elastomer (FKM)

Note: Use the HYDAC Betterfit Cross Reference Tool to Identify The Appropriate Model Code
Ordering HYDAC Literature...

HYDAC literature is available for ordering via our website, www.hydac-na.com then click on the Downloads button to proceed with ordering printed copies (digital versions excluded) or email us at HYD.catalog@hydac-na.com using the appropriate Part Number (PN) and name. Other brochures, manuals and technical documents are also available when ordering from our website.

Various market and product brochures are also available for ordering.

Ordering HYDAC Literature...

- Overview Brochure PN02088157
- Filters Catalog PN02081318
- Accumulators Catalog PN02068195
- Compact Hydraulics Catalog - PN02087369
- Standard Coolers Catalog - PN02085359
- Filter Systems Catalog PN02075860
- Accessories Catalog PN02080105
- Mobile Valves Brochure PN02092408
- Hydraulic Cylinders Brochure PN0204454
- Accumulators Catalog PN02068195
- Electronics Catalog* (online only)
- Control Technology* Catalog (online only)
- Process Technology* Catalog (online only)
- Compact Hydraulics Catalog - PN02087369
- Standard Coolers Catalog - PN02085359
- Filter Systems Catalog PN02075860
- Accessories Catalog PN02080105
- Mobile Valves Brochure PN02092408
- Hydraulic Cylinders Brochure PN0204454

*These catalogs are digital file versions only.

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www.hydac-na.com

PN#2208201 / 08.18 / FFD1702-1879
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Process Filter Division
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+1.724.318.1100

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**Email:** info@hydac.com

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Col Puente de Vigas
Tlahuapan, Edomex Mexico
CP 54090
Mexico
+011.52.55.4777.1262

**Water Filter Catalog**

**USA**

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