The Last Line of Defense Against Fuel Contaminants

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Petroleum dispensing filters:

Water in fuel storage systems can be a serious headache. It can cause poor engine performance, pump and injector wear, reduced fuel economy and excessive exhaust emission. Also, water in a fuel storage tank can allow microbiological activity that causes filter plugging, fuel/water emulsion, tank corrosion and sediment and sludge formation, as well as fuel-system freeze-ups during the cold winter months.

Water invades fuel systems in a variety of ways, including through vents; deteriorating tanks, pipes, gaskets and other components; and from condensation (from temperature change and exposure to air). Also, fuel may already contain water when delivered from the refinery, terminal or bulk plant.

Water can be detected by taking samples from the bottom of the storage tanks or by using a water-finding paste. But all too often, the results of those tests can provide a false sense of security. When fuel is tested at the terminal, it is often still warm. This means the fuel holds water in a tighter emulsion. Often, when the fuel cools off, some of the emulsified water separates from the fuel and becomes free water. Water removal through a petroleum dispensing filter is the last line of defense to ensure that customers receive clean, dry fuel.

Today's filter manufacturers have products available to remove water from a wide variety of fuel types. These filters contain super-absorbent polymers that encapsulate water molecules and store them inside the filter.

Figure 1

To best understand how a filter functions, it is important to look inside. The construction of spin-on filters requires several parts (See Figure 1).

• **Coil spring—**By compensating for normal variations in the height of the components, the coil spring maintains the element-to-backplate seal and prevents unfiltered fuel from bypassing the filtering element.

- **Metal end caps—**Most spin-on filters use metal end caps to seal the pleated paper element at both ends, top and bottom. A liberal amount of thermosetting adhesive creates a virtually indestructible, leak-proof bond between the end caps and paper element.
- **Metal shell—**Designed to withstand a system pressure far in excess of the normal operating pressure, the metal shell provides a leak-proof container for the filter element.
- **Filtering media—**This is the determining factor for fuel cleanliness. The filter media is comprised of super-absorbent polymers that capture water molecules. This provides a water barrier for the fuel stream. The level of filtration is determined by the media pore size, which can be customized to meet specific requirements.
- **Perforated metal core—**The metal center tube provides the strength and support to the pleated paper media. It enables the media to withstand high differential pressures when the filter approaches capacity.
- **Rubber sealing gasket—**This gasket provides a leak-proof seal between the element and backplate, preventing contaminated fuel from bypassing the element.
- **Cover and backplate assembly—**This assembly consists of a threaded backplate, a gasket retainer and a sealing gasket. The assembly is formed from thick, strong steel to prevent damage from minor pressure surges, The backplate threading provides the mechanism for attaching ("spinning on") the filter to the dispenser.

Figure 2

Contaminated fuel enters a spin-on type fuel dispenser filter through the inlet holes (See Figure 2). The fuel then passes through the filter media.

The filter media used in water removal is made of two layers. The first layer contains the super-absorbent polymer that captures the water molecules. The second layer, which is a blend of cellulose and synthetic fibers, captures the particulate contaminants. The clean fuel is then dispensed to the customer through the center-threaded port.

Spin-on filters are easy to maintain. As the filter begins to reach its water-holding capacity, the super-absorbent polymer within the media begins to expand. This expansion restricts the rate of flow and alerts the operator to replace the filter.

Nothing should be assumed about your fuel management program. Well designed filter components, along with a sound manufacturing process, can help eliminate concerns about fuel contamination.

How to select a good filter

A good petroleum-dispensing filter will provide reliable, long-lasting, high performance. To do this, a good filter should:

- Keep fuel clean by removing particulate contaminants.
- Provide superior water-removal capacity.
- Not promote bacteria growth.
- Be leak-proof.

- Be suitable for today’s gasoline and diesel fuels.
- Be a proven winner.

Filters are designed to meet different customer requirements. Some filters remove particulate only, while others remove both particulate and water. In either case, the filters are rated by their capability to remove a particular sized particle. This is referred to as a nominal micron rating.

Water creates havoc in a fuel system. Some filters trap only small amounts of free water, while others remove a higher percentage of both free and emulsified water. Learn the water removal capabilities of your filter. Contact the manufacturer for more information about specific product features.

It is important to reiterate that for superior water-removal capacity, a filter must have media impregnated with a super-absorbent polymer. Super absorbent polymers encapsulate water molecules and store them inside the filter. The polymer should be inorganic so it does not promote bacterial growth.

Make sure a filter is leak-resistant. Filter cans (metal shells) with epoxy coating on the inside are far less likely to develop pinhole leaks. These leaks develop due to the corrosive conditions that can occur when fuels become unstable. Epoxy coatings are fuel-resistant.

Some filters are suitable only for one grade of fuel, while others can handle different grades as well as different types of fuel, including Diesel 1 and Diesel 2, ethanol, methanol and MTBE blends (reformulated fuels and oxygenated fuels).

A good filter should have a proven track record. If a filter has been effective for you, it has achieved its purpose.

Know the in-house design and production capabilities of the company with which you are dealing. Does the manufacturer have complete control over the design and production process as well as in-house testing? Control of this process usually means better responsiveness and higher quality products. Production lines should also be clean and well-maintained to ensure the highest quality filters.

Remember, research your options before purchasing a fuel-dispensing filter. Being selective will pay off many times over.

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