

# THE CLARIFIER

Volume 11 Number 1

March 2000

## Diesel Fuel – Water Removal & Filtration

Over the years, Velcon has recommended our all-fiberglass “4” series coalescers (e.g., I-6334TB) and pleated paper separators (e.g., SO-29PLF3) for diesel fuel service. In addition, the recommended flow rate is between 60-70% the flow rate we recommend for kerosene.

Diesel fuel can vary from batch to batch, and from location to location. However, compared to kerosene, diesel fuel generally has a higher specific gravity, is more viscous, and has a higher amount of the waxy substances. Our tighter “6” series all-fiberglass coalescers will do a good job coalescing water out of diesel, but they will plug up more rapidly because of the waxy substances. Our more open “2” series coalescers will last longer than the “4” series coalescers, but they will not remove water as efficiently. We have found the “4” series coalescers to be the best “compromise” coalescer for diesel fuel.

In a diesel filter/separator vessel sized as per our recommendations, fitted with the “4” series coalescers, the vessel/element combination will remove water to less than 50 parts per million (ppm). (The coalescers do not remove the dissolved water, of course.)

Teflon Coated Separators can be used in diesel fuel service, but we have found that they are more difficult to clean, as compared to those used in kerosene or jet fuel service. This is because of the accumulation of the waxy substances, which can be difficult to remove using the standard soft

bristle brush or lint-free rag cleaning procedure. Therefore, we recommend the disposable pleated paper separators in diesel fuel service for better economics.

If Diesel Aquacon cartridges are to be used in diesel service (e.g., AD-51225) they are nominally rated at 25 micron, and will remove free (suspended or emulsified) water to less than 25 ppm. It is important to drain upstream storage tanks of settled water on a frequent basis to keep from replacing the water absorbing cartridges too often.

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## NEW TRAINING VIDEO

*Pictured at left: Julie Brewster and production crew filming in Atlanta for new Velcon Cartridge Changeout Training Video. The video will be available in mid-May.*

## Coalescers in Pre-Mixed Fuel

In our December 1999 issue of The Clarifier, we advised that we would discuss the effects of Di-EGME (anti-icing additive) on coalescers.

We have received various types of coalescers submitted for single element testing from both military and “civilian” customers. The large majority of the coalescers returned

still coalesced acceptably. Most of the IFT (Interfacial Tension) tests run on the first fuel over the first water from these coalescers were also in the “acceptable” range of 30 or more dynes/cm. These coalescers had been in service 2 or more years.

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## **Pink “Flecks” in Hydrokit Tubes**

Users of the Velcon Hydrokit may occasionally see some small pink “flecks” of material in the tube interspersed with the powder. These pink “flecks” are pieces of the red rubber stopper that can be generated by the penetration of the needle through the stopper.

Disregard the color of these small pink “flecks”. They are most likely to occur with a well used needle, whose point has been dulled with use. The overall color of the powder is still the proper indicator of any water in the test fuel. In normal use, the powder color will be very uniform, with no obvious spots of red or pink.

We looked into different color rubber stoppers, but the red rubber stopper is a stock item. Other colors would have to be specially ordered and would have a major impact on the Hydrokit price. In order to keep costs down for everyone, we have decided to continue with the red stopper.

## **Diesel Fuel – Water Removal & Filtration**

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We have seen a technical review of diesel fuels by Chevron Products Company. It states: “While the fuel filters recommended by engine manufacturers have a nominal pore size of 10 microns, studies by Southwest Research Institute reveal that the critical particle size for initiating significant abrasive wear in rotary injection fuel pumps and in high-pressure fuel injection systems is 6-7 microns.”

Velcon will continue to recommend the nominal 5 micron pre-filter elements for diesel service.

## **Clay Element Changeout – When?**

The question is still asked: When do I change out my clay elements? This is touched on in Section D.8 of Manual 5, the ASTM Manual of Aviation Fuel Quality Control Procedures.

Historically, some locations have used throughput, time, increase of differential pressure, and/or comparisons of filter membrane tests taken upstream and downstream of the vessel.

Manual 5 states: “Since clay media is used to remove surfactants, the most reliable indicator for determining when to change the clay media is a reduction in its surfactant removal efficiency.”

There are a couple of ways to check the surfactant removal efficiency. Take samples upstream and downstream of the clay vessel when fuel is flowing. Run MSEP (WSIM) tests on the samples. If the MSEP value is higher in the downstream sample, the clay is still working. If the downstream MSEP is the same or lower than the upstream MSEP, the clay needs changing. See the Interpretations in Section D.8 of Manual 5 for further details.

The second way to check clay performance is with the SwiftKit. Take samples upstream and downstream when flow is passing through the vessel. If the downstream SwiftKit reading is higher than the upstream reading, the clay is still working.

If customers wait until the

differential pressure reaches 15 psid before changing the clay, the clay has long ago lost its surfactant removal ability, and has become an expensive dirt remover.

If the fuel is “wet” upstream, with more than about 50 ppm of water, then an upstream coarse water remover, such as a “haypak” or coarse filter/separator vessel should be installed to remove the coarse water. 50 ppm or more of water can coat the clay particles and reduce the surfactant capacity.

Filter manufacturers use conductivity readings to monitor their clay performance, but there is no data available to recommend this procedure for use in the field.



WhatAGreatIdea.

## **AS<sup>3</sup> Show in Tampa**

Velcon Filters and many of our distributors will be attending the third annual AS<sup>3</sup> show coming up in May. This year’s show will be held at the Tampa Convention Center in Tampa, Florida, on May 9, 10, & 11. AS<sup>3</sup>, (Aviation Services and Suppliers Supershow) is sponsored by the National Air Transportation Association (NATA), the Professional Aviation Maintenance Association (PAMA), and the National Petroleum Management Association (NPMA). Please stop by the Velcon Exhibit and say hello.

## New Needle Assembly for Hydrokits Will Prevent Improper Needle Insertion

We have found that some Hydrokit users are installing the needle assembly in the Hydrokit sample jar upside-down and are not getting a sufficient quantity of test fuel into the sample tube. However, Velcon's Engineering Department has developed an improved needle body for use in the sample jar provided with Hydrokit products.

The old tubes had been made in-house by sawing plastic tubes at an angle in a custom fixture with a small bandsaw. After cutting, the tube needed its ends de-burred by hand, one at a time. This process was uncomfortable for the operator, as well as time-consuming and expensive. With the old style needle assemblies, the angled end of the plastic needle was to be at the bottom of the sample jar. The "ears" of the plastic needle assembly were at the top of the sample jar.

The design of the new tube is cylindrical, with flat ends and a slot partially up one side of the cylinder. This design allows for needle submersion depth to

1" (up from 1/4" with the old assembly) and adds stability to the needle assembly during sampling. It is injection molded and purchased as a finished part, ready to assemble to the needle body. The new plastic needle assembly is included in Hydrokits beginning with November, 1998 production batches. This needle assembly is also installed with the "ears" at the top of the sample jar, with the slotted part of the plastic tube at the bottom of the sample jar. The diagram below shows the correct orientation of both the "old" and "new" Hydrokit needle assemblies in the sample jar.



## Coalescers in Pre-Mixed Fuel

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There were some coalescers which coalesced acceptably, but the IFT readings were below 30 dynes/cm. We advised the customers submitting these coalescers to change out the coalescers, as it would only be a short time before the coalescers were completely disarmed.

We also saw a few coalescers which coalesced unacceptably (haze and or predominately pin-point water drop size). These coalescers had IFT readings of 12 dynes/cm. or below.

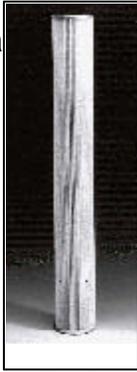
Our feedback from the customers of the coalescers in the above two paragraphs (where IFT readings were below 30) was that the anti-icing additive was probably not being injected properly upstream. Either the fuel was too wet (too much free water) or the anti-icing additive had been contaminated by too

much water before injection into the fuel. Dessicant dryers are needed to remove the water from the air entering the drum or container of Di-EGME (anti-icing additive). If a dessicant dryer is not used, moist air entering the Di-EGME container will transfer the water into the Di-EGME, and the Di-EGME won't go into solution properly into the fuel.

As with water absorbing cartridges, we recommend draining all storage tanks and F/S vessel sumps DAILY. Water bottoms will increase in Di-EGME concentration if let sit too long, and then downstream coalescers could be disarmed. Check the filter/separator sump drainings daily to see if any water removed is discolored, or if the fuel appearance above the fuel/water interface is cloudy. Discolored water and/or cloudy fuel coming from the filter/separator sump is a sign of disarmed coalescers. Drain DAILY!

## Velcon Introduces New Products

Velcon is now offering DC Series cartridges, a line of cartridges that are disposable, crushable and incinerable, and do not have a center tube. These filters are made of pleated paper media and are suitable for a broad range of fluids. They are recommended for applications where the contaminant is granular (non-colloidal), allowing maximum utilization of the high surface area. These cartridges are lightweight,



making them easy to handle during installation and change-outs. Combined with Velcon's FILCare Recycling Program, their light weight reduces shipping costs associated with returning them. And recycling offers convenient, legal, cost-effective and environmentally responsible method for disposing of your used filter cartridges!

Also available is a permanent filter center tube kit that mounts easily into your vessel to provide support for the DC series disposable elements. The cores are a simple one-



piece design that can be installed directly into the vessel. Velcon's permanent cores have high quality, all aluminum construction and are qualified to

175 psi collapse strength. The one-piece design and smooth outer surface allow for easy installation and removal of the DC series elements. For additional information, please contact your Authorized Velcon Distributor.

If you know anyone who would like to receive *The Clarifier*, fax their name, company and address to:



We also welcome your comments and suggestions on topics covered in *The Clarifier*.

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