

# THE CLARIFIER

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## Why Do My Elements Plug Up So Fast?

Quite a few customers ask this question, when their filter elements, coalescer cartridges, or water absorbing cartridges plug up faster than they expect. The ideal filter element would be one that "costs nothing, removes all the unwanted contaminant, and lasts forever!" Certainly, filtration is one of life's compromises. Below is a list of various types of particulate matter and other substances that can plug different types of filter elements.

**Dirt** – This is the most obvious particulate matter removed. Where does it come from? From ships, barges, dust-laden air that displaces outgoing fuel in storage tanks, and possible slight carryover from the refinery process from the crude oil that can carry lots of dirt. Dirt can range from very fine particles (silt) which can plug up cartridges very fast in small quantities, to large granules, which generally do not plug up the cartridges too quickly.

**Rust** – Picked up from rusting storage tanks, pipelines, ships, barges. The rust can vary from very fine to coarse particle size to extremely large pipe scale. Sometimes, depending on the location of the filter elements, rust observed in the elements may indicate unusual problems upstream.

**Heavy Oil Products** – We cut open a coalescer years back that had plugged up fast. It appeared clean on the inside and outside. When we flushed the inner pleated fiberglass layer onto a filter membrane (millipore) pad, we saw a thick, tarry substance that looked and smelled like asphalt. We asked the customer if the tanker truck delivering Jet Fuel to their FBO location was possibly carrying heavy oil or other

viscous product on the preceding trip. Upon further investigation we discovered that the tanker truck was carrying # 6 oil on the trips before picking up Jet Fuel



to deliver to the FBO. No flushing or steam cleaning after the # 6 oil! It is important to let your fuel supplier know that you want the delivering tanker trucks to be dedicated to Jet Fuel or Avgas, if possible. Usually this ideal situation can't be offered. In that case, ask that the trucks be cleaned or flushed before loading with your Jet Fuel or Avgas. Even diesel fuel contains these heavy compounds, sometimes referred to as asphaltenes.

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**Water** – Water can come from a variety of sources. Moisture enters with the air into storage tanks. Water, dissolved in the fuel, can condense out of solution when fuel temperatures fall in underground pipelines, hydrants, or above ground piping and storage tanks. Water also finds its way in through leaking lines or cracked tanks. Water enters through floating roof tanks with no dome covers, and through leaking dome covers on refueler trucks, particularly when the water downspouts are plugged with debris (leaves, ice, bugs, etc.). Residual water is found in equipment that is gas-free by filling with water where all the water is not subsequently drained away.

**W**e have heard of other unusual situations where elements plug up unexpectedly. Does anyone have some experiences they'd like to share with us? Perhaps we can include it in the next edition of the Clarifier. The more we know about what is causing elements to plug up in the field, the better chance we at Velcon Filters have of making filters that will approach the ideal filter element!

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# **Velcon Service Awards**

## **Carl Brandt: 30 Years with Velcon**

Recently **Carl Brandt**, Industrial Products Manager, celebrated 30 years of service with Velcon Filters. We asked him to share some of his Velcon memories and experiences with us. Here are his comments.

I started work at Velcon in the test lab as a lab tech. The test lab was just a fenced in area tacked to the side of the building in San Jose, CA. We had two tank trailers parked on the street for fuel storage, in addition to two small underground tanks. When the lab supervisor left in 1972, I became the new supervisor. I then spent the next 20 years in this position before becoming Industrial Product Manager in 1992.

Qualification tests were always the most intense and challenging times. Years ago, we ran many military qual tests that included life tests that ran 24 hours per day.

One of my most memorable times at Velcon was during development of an oil/water separation system designed to be used on navy ships to get oil out of bilge water. I monitored

several successful tests of our unit while on navy ships at sea during actual combat exercises where they were firing their large guns.

Work here has been both interesting and challenging, and I have always enjoyed the people I work with. Maybe that is why I have been here so long.

## **Rick Waite Celebrates 25 Years with Velcon**

**Rick Waite**, Petroleum Products Manager (Aviation Products Manager) for the past 25 years, is also reminiscent of his time here at Velcon.

Some of Rick's highpoints:

- Working with Carl Brandt to draft the revised military monitor specification (MIL-M-81380C), having it published, and being the first company qualified with the CDFs. Carl, Jack Estabrook, Claudia Bell, Rip Taylor, and a lot of others were involved in the bringing of the CDFs to market.

- Flying over the glaciers and mountains of Alaska with Linda & Monte Parrish, listening to Enya on the intercom, and thinking, "This is as good as it gets!" Getting my Private Pilot License in '92 after coming back from Alaska. Journeying to the North Slope oil fields with Monte, John Thomas, and Larry Fleming. Alaska is a great place to visit!!!

- Visiting with our outlying manufacturing plants, customers, and Distributors, and working as a "family of friends" versus the more formal supplier-customer relationship.

Rick notes, "We have some great people in our 'Velcon family!' This is the reason for the 25 years, the relationships that have been formed."

## **Sky How: Another 25 Year Veteran**

**Sky How**, Industrial Engineer in our Alabama manufacturing plant, is also celebrating 25 years with Velcon.

Sky started with the company as an Industrial Engineer in California 25 years ago. When the decision was reached to build a plant in Alabama, Sky oversaw the construction and basically had hands-on experience in constructing Velcon Alabama, Inc. He maintained a position of Plant

Manager for several years. He also aided in the North Carolina plant start-up.

He advised that the high point of his career was and is his involvement with the plant and watching the Company expand over the years. Another high point has been

watching the Alabama plant start out with 5 production employees and expand to the current number of over 40 employees.

Sky attributes his longevity with the Company to the working relationships with the Plant and with his involvement in all aspects of the company over the years.

# Effects of Additives on Filter Elements

Questions are occasionally received concerning the effects various additives have on coalescers, separators, monitor cartridges, etc. Based on experience with our laboratory testing, and experience in the field, here is a short summary:

**Static Dissipator** – The previous ASA-3 static dissipator was a mild surfactant and dirt disperser. In the normal dosages of 1 to 3 ppm, it was relatively easy on coalescers, but over a period of time we saw coalescers that were being disarmed between 1 to 2 years of life. We think this disarming was also associated with the dirt buildup in the coalescers. The ASA-3 would also disperse the Red Iron Oxide test dirt into smaller particles – this was one of the main reasons the coalescers evolved from all-fiberglass material to a combination pleated paper/fiberglass material.

The presently approved Stadis 450 static dissipator is very mild. We have not seen any obvious problems with dirt dispersion or decreases in coalescing ability due to Stadis 450 (the present new formulation). We have run tests with up to 6 ppm of Stadis 450 with excellent coalescing still occurring. When Stadis 450 is doped in Jet Fuel, the MSEP (WSIM) value is lowered when using the existing Alumicells. The new proposed M-Cells being evaluated by EMCEE and industry are not affected by the Stadis 450.

Clay treatment will easily remove Stadis 450. Industry is evaluating the use of Stadis 450 in the United States Jet-A fuel. One of the big considerations is that there are many clay vessels used downstream of the multi-product carrying pipelines. The clay vessels are needed to take out unwanted surfactants picked up in the pipelines from other fuels (diesel, Mogas, etc.). If Stadis 450 were added upstream of the pipelines, the clay vessels would remove it, and re-doping would be necessary downstream.

**CorrosionInhibitor** – There are a number of approved corrosion inhibitors used in the field. One of the most widely used is DCI-4A. This inhibitor is now specified in API-1581 4<sup>th</sup> Edition and the Institute of Petroleum Monitor Specifications. The previous inhibitor for API-1581 was Hitec E-580. Hitec E-580 did not have any noticeable effects on dirt dispersion or coalescing by itself, but in combination with ASA-3, it “challenged” the coalescing ability of the coalescers. As the API-1581 evolved from the 1<sup>st</sup> to the 3<sup>rd</sup> Edition, and fuel clean-up procedures and amounts of additive were revised, the qualification procedures became more stringent and the coalescers evolved into tighter elements, with much more fiberglass in the pleated paper block.

When DCI-4A was used in combination with Red Iron Oxide in a proposed military filter/separator specification , the DCI-4A dispersed the RIO finely enough so that too much oxide was pushed through the coalescers. The specification was revised from DCI-4A to Hitec E-580. We do not hear about excessive amounts of dirt downstream of API-1581 3<sup>rd</sup> Edition elements in the field. However, in combination with the other additives (Stadis 450 and Di-EGME) in JP-8 fuel, the DCI-4A is holding water and dirt in suspension in smaller size particles. The

normal rule of thumb for settling time in storage tanks of 1 hour per foot is not sufficient for the heavily doped, higher viscosity JP-8 fuel, as compared to the JP-4 fuel.

**Anti-Icing Additive** – also called FSII (Fuel System Icing Inhibitor), or by its formulation, Di-Ethylene Glycol Monomethyl Ether). Lately, industry and various laboratories have been finding out more effects on coalescers and water absorbing cartridges caused by FSII. In “normal” concentrations of 0.15% and lower, when **properly dispersed** in the Jet Fuel, FSII is relatively friendly to coalescers and water absorbing cartridges. However, at concentrations above 0.15%, or when not properly dispersed, or when water bottoms sit for too long and absorb FSII out of the fuel, the excess FSII will affect the water absorbing cartridges so that water can pass downstream. We have not seen it directly in our lab, but we hear from one other lab that excess FSII can also adversely affect the coalescing ability of coalescers.

**+100 Additive** – this additive is injected into JP-8 (then called JP-8+100) at a number of selected Air Force bases. It is injected into the fuel as the refueler truck is being filled. The normal filter/separator elements in the F/S vessels on the refuelers are removed and replaced with applicable water absorbing cartridges. The +100 additive does not affect the water absorbing cartridges. However, in early testing with the +100 additive, it was found that the +100 additive, which has dispersant and detergent type materials, could disarm coalescers and push fine dirt through. API-1581 4<sup>th</sup> Edition has a provision for testing F/S vessels with the +100 additive (the M100 portion) in the fuel, along with Stadis 450, DCI-4A, FSII, and Sulphonate. Filter companies advise that they will be able to qualify elements to this M100 portion of the Specification.

## Are Vessels Installed Correctly?

We received a report from one of our distributors that he found two VF-61EP1/2 vessels installed backwards on two different refuelers. Media from one of the elements (which was flowing backwards) migrated downstream into the fuel control of a plane.

We recommend that our customers and distributors check for proper installation of the VF-61EP1/2 vessels, and other filter vessels. Over the years, we have had reports of filter/separator (F/S) vessels installed backwards (for over 15 years!), plus separator elements wrongly installed on coalescer stools, etc.

There are various companies installing filter vessels. Not all these companies are knowledgeable about the importance of proper filtration of aviation fuel. It is worth a double check to insure the filter vessels are installed properly!

# **Velcon Holiday Closure Dates**

Clip & Save for  
future  
reference!

Velcon Filters, Inc. will be closed for the following dates due to Thanksgiving, Christmas, and New Year holidays. As always, we do have off-hours contacts should an emergency situation arise. Call 1-800-531-0180, dial extension 199, and we will do our best to take care of the problem!

**November 23 & 24  
December 22 & 25  
January 1, 2001**



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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