



ColdClear™



Cold Weather. Clear Biodiesel. The Clear Solution.

The new ASTM D6751 Cold Soak Filtration test is leaving many biodiesel producers and consumers “out in the cold”. In response, Schroeder Biofuels is proud to present ColdClear™, a new proprietary multi-stage separation technology designed specifically to ensure that biodiesel products conform to this ASTM standard for cold flow properties. The ColdClear™ system consists of a three-stage bank of housings using a combination of filtration and adsorption principles to capture compounds that could cause plugging or crystallization in biodiesel fluids. Notably, ColdClear™ is the premiere multi-stage treatment system for solving the cold soak filtration dilemma in B100 biodiesel and biodiesel blends in a single pass while resulting in a negligible yield loss.

Fast Facts:

- ColdClear™ is a three stage system with all housings mounted in series on a single skid
- The first stage serves as a pre-filter and captures solid particulates down to three microns using high efficiency Excellement® cartridges
- Stages 2 and 3 utilize cartridges that combine adsorption technologies with the proven effectiveness of Schroeder's high efficiency Excellement® synthetic media
- The standard ColdClear™ system is equipped with 1" NPT or SAE flange ports and is designed to handle a maximum flow of 5 gpm for an estimated 15,000 gallons
- Multiple units can be employed to meet higher flow requirements
- The ColdClear™ system can be easily integrated into existing plant piping environments
- If multiple units are required, Schroeder Biofuels offers a range of flow & system monitoring options to ensure proper operation
- The essence of the ColdClear™ technology is the removal of crystallization precursors from the biodiesel or biodiesel blends. Therefore knowing the exact flow rate of your system is essential for the ColdClear™ system to be properly sized and configured for a specific application.

Typical Applications

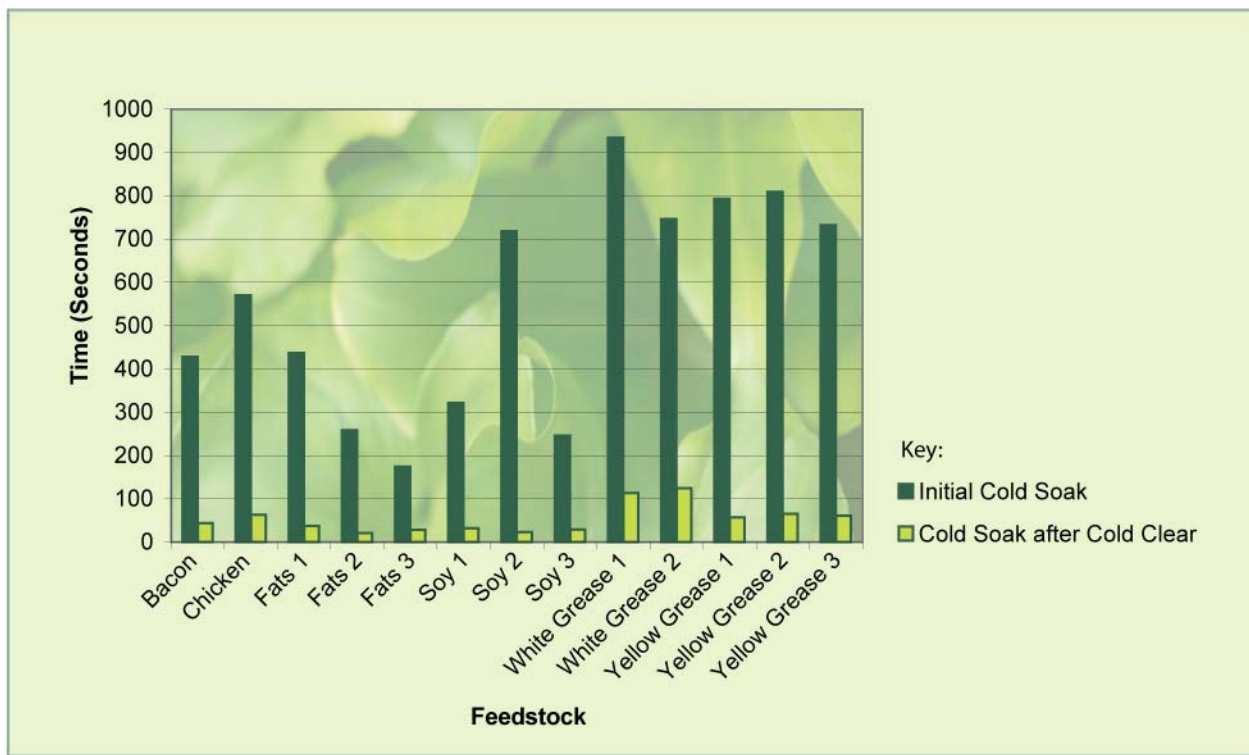
- In-plant treatment of biodiesel (B100) prior to conform to ASTM standards prior to blending or shipment
- In-plant treatment of biodiesel blends (ex. B5, B10, etc) to ensure blended biodiesel meets or exceeds cold flow specifications
- For use in diesel fuel storage and distribution systems where B100 or biodiesel blends are stored and distributed to ensure shipped blends conform to ASTM specifications
- Large fleet terminals that have on-site diesel (and biodiesel blend) storage to ensure tight adherence to cold flow standards
- Pre-treatment of fats and oils prior to processing

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How Efficient is ColdClear™?

Since biodiesel can be made from a variety of feedstock and processes, it is not possible to give a single efficiency rating. In October 2008, the cold soak filtration test was added to the ASTM standard in an attempt to assess a fuel's purity by measuring its fluidity in cold temperatures. The test consists of measuring the time in seconds required for cold soaked fuel to pass through a 0.7 micron patch. The chart below provides test results performed on a range of biodiesel samples based on feedstock and their resulting cold soak times per the ASTM procedures. Feedstocks tested include white grease, yellow grease, soy, chicken fat, food waste grease (referred to as "Fats" in the graph below), and purified bacon fat. The lower the number, the faster the fluid passed through the patch and the less likely the fuel will be adversely affected by cold temperatures. As is readily evident, ColdClear™ dramatically reduces filtration times for every feedstock tested.



Background Information: The Cold Flow Dilemma

Fuel filter plugging both in the ASTM procedure and in the field has been researched significantly with a range of answers to the single question. Most producers and consumers assumed poor cold flow performance was due to feedstock issues, or even poor biodiesel quality. When data started coming in from biodiesel producers across the USA, the answer became even more confusing. A wide range of cold soak results were found for biodiesel samples from a wide range of feedstock and an even wider range of producers. Obviously, the cold flow problem was not just quality or feedstock dependent.

Why Cold Soak Matters

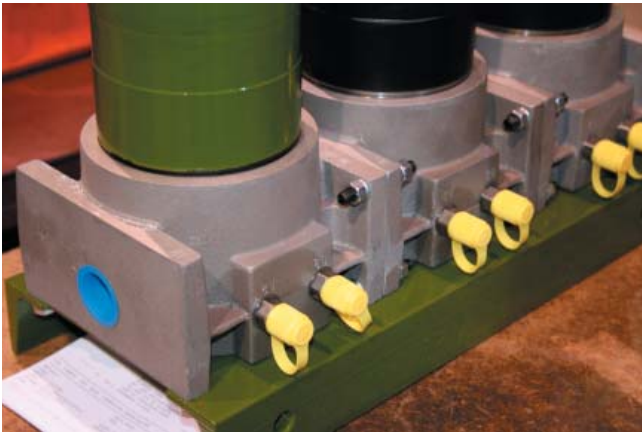
Cold flow problems can cripple entire fleets during winter months, as evidenced by widespread reports regarding plugged fuel filters, plugged tank filters and, in some instances, even gelling in storage situations. The new ASTM test is performance-based and designed to aid fleet managers in understanding the gelling potential of fuel during winter operation. Many researchers believed the key culprits were sterol glucosides and monoglycerides produced during the transesterification reaction. While these compounds were found to be in some samples, other biodiesel samples with low concentrations of these compounds were found to fail the cold soak test. In addition, many samples of biodiesel blends gathered due to plugging instances were found to have water and petroleum-based diesel contaminants on the filter.

Why ColdClear™ is the Solution

Schroeder Biofuels took this data into consideration in developing ColdClear™, a multi-stage filtration/adsorption system that ensures any potential factors that would initiate crystallization or plugging on the filter are dramatically reduced. By sequentially removing certain impurities that create a higher than normal likelihood of surface crystallization on the filter, our ColdClear™ technology ensures that your biodiesel can meet the ASTM specification for cold soak filtration. It also ensures that fleet customers are receiving the very highest quality biodiesel and will minimize system plugging quality issues. ColdClear™ is effective for B100 and a range of diesel blends meaning that producers, distributors or even fleet consumers of biodiesel blends can use it.

The cartridges are disposable and easy to remove from the housings. The cartridges can be changed in minutes meaning very little downtime between production runs. Each bank of cartridges is rated to treat a fixed volume of B100 biodiesel, while biodiesel blends are scaled by the blend percentage.

All housings have the option for test points installed in the base, as shown in photo at the left below. The first housing can be equipped with a visual or electrical differential pressure indicator. Because differential pressure is not a relevant indicator of life for the cartridges in the latter two housings, an indicator is not offered for stage 2 & 3 housings.



Proper Application and Maintenance of ColdClear™

ColdClear™ is designed to work in either a continuous or start-stop operation provided that the system is designed to have anti-syphon and backflow prevention to ensure that the ColdClear™ system stays “wetted” even when not in use. Allowing the elements to drain and/or dry out will reduce the effectiveness of the ColdClear™ elements. It is best to insert the ColdClear™ multi-stage system at the latest point in biodiesel production to ensure proper removal of crystallization precursor compounds. Too much methanol or glycerin in the biodiesel can result in reduced effectiveness of ColdClear™.

Because ColdClear™ works as both a mechanical filter and an adsorption system, contact time is a key factor in ensuring that your biodiesel continues to meet ASTM specifications. Over time, the adsorbents in the system will begin to exhaust; therefore, it is imperative to change cartridges when necessary. Schroeder suggests continuous monitoring of flow rate using either a flow meter or continuous flow totalizer - contact factory for more details. The following table represents “guidelines” for cartridge change-out based upon laboratory and field data; regular testing over the first few months of use is recommended to ensure proper change-out rates.

Influent Cold Soak in seconds	Expected element usage per 20,000 gallons treated	Comments
200 seconds or less	<6 cartridges or one complete change-out per ColdClear™ Series 100 unit	Even though 200 is in spec, we do recommend using Cold Clear to drop the Cold Soak result to below 50, which will ensure proper cold weather properties
200-300 seconds	6-12 cartridges, one to two complete change-out per ColdClear™ unit	Toward the lower end, often 6 elements will provide adequate protection but as the cold soak number rises over 250 we recommend a change-out every 10K gallons
300-500 seconds	12 cartridges or two complete change-outs per ColdClear™ unit	Rigorous testing at these levels indicate changing every 10K gallons brings cold soak results well within specification
> 500 seconds	2-18 cartridges or two to three complete change-outs per ColdClear™ unit	If the cold soak results are within this range, we recommend very close monitoring

ColdClear™ is only available through the Schroeder Biofuels network of authorized distributors and representatives.

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