

FILTRATION SOLUTIONS FOR HYDROTREATED VEGETABLE OIL (HVO)

Making the world safer, healthier
and more productive®



Hydrotreated Vegetable Oil Production



Hydrotreated Vegetable Oil (HVO) is transforming the way we think about sustainable energy. Derived from renewable resources like plant oils and animal fats, HVO offers a cleaner, more efficient alternative to traditional fossil fuels. Unlike conventional biodiesel, HVO undergoes a hydrotreatment process that significantly improves its properties, making it compatible with all diesel engines without the need for modifications.

Why filtration is important in this application?

Filtering Hydrotreated Vegetable Oil (HVO) can present several challenges that are crucial to address for optimal performance and sustainability. One of the primary issues is the presence of impurities, such as trace metals and sediment, which can clog filters and reduce the efficiency of fuel systems. These contaminants can lead to increased maintenance costs and potential engine damage over time. Additionally, the varying chemical compositions of different batches of HVO can complicate the filtration process, requiring more sophisticated and adaptable filtering technologies.

Challenges in HVO filtration

- **Product Loss:** Using improper filtration equipment can result in significant product loss, decreasing overall yield and negatively affecting production efficiency and profitability.
- **System Blockages:** Unfiltered product can flow downstream and obstruct the system, leading to costly downtime and operational disruptions.
- **Removal of Fine Impurities:** Achieving the removal of small micron-sized impurities can be challenging, requiring specialized filtration solutions for effective separation.
- **Variable Viscosities and Flow Rates:** HVO feedstocks often exhibit a broad and variable range of viscosities and flow rates, demanding adaptable filtration equipment to handle these fluctuations.
- **Fine Particles in Feedstock:** Depending on the source, feedstocks may contain very fine particles that, if not filtered efficiently, can block the filter cake and reduce filtration performance.
- **Slow Filtration Due to High Impurity Levels:** Certain feedstocks contain higher concentrations of particulates, waxes, gums, and other impurities, which can quickly clog standard filters. Cross-flow filtration is often required in these cases to maintain efficiency and prevent blockages.
- **High Temperature Requirements:** HVO filtration may involve high temperatures, necessitating filters that can handle up to 250°C. This capability reduces the need for cooling and reheating, improving both energy efficiency and process flow.
- **Corrosive Feedstocks:** For acidic feedstocks, filters must be made from corrosion-resistant stainless steel, such as 304L (1.4306), 316L (1.4404), or Duplex 2205 (1.4462), to ensure durability and long-term performance in demanding environments.

Filtration

Why is the Amafilter® Cricketfilter® the perfect filtration solution for HVO applications

The Amafilter® Cricketfilter® is an ideal filtration solution for Hydrotreated Vegetable Oil (HVO) applications as it provides high filtration efficiency, removing impurities and particles effectively, which is crucial for the purity and quality of HVO products.

Low Maintenance Requirements: Its static design has no moving parts, significantly reducing maintenance needs and minimizing downtime. This reliability is essential in the continuous processes often required for HVO production.

Extended Catalyst Life: By consistently providing cleaner feedstock, the Cricketfilter® helps extend catalyst life in downstream processes, reducing catalyst consumption and enhancing cost-effectiveness.

Eco-Friendly and Sustainable: The Cricketfilter® supports the renewable energy sector's goals by reducing waste, lowering energy usage, and enhancing the efficiency of biofuel production.

Benefits of the Cricketfilter® automated filtration system:

Higher Flux

- 40% greater filtration area
- 40% more cake holding capacity than traditional shaped element

Maximises Installation Footprint

- Up to 20% reduction in footprint

High Quality and Reliability

- The Cricketfilter® stainless steel elements lifespan can extend up to 30 years before being replaced

Excels in Polishing Applications

- Ideal for solid content applications in comparison to existing pressure leaf filter systems

Reduced Operating Costs

- The Cricketfilter® filter cloths can have up to 2 years spare parts replacement cycles

Easy to Clean, Low Maintenance Interventions

- The Cricketfilter® uses air or gas pulses to efficiently clean the elements section by section

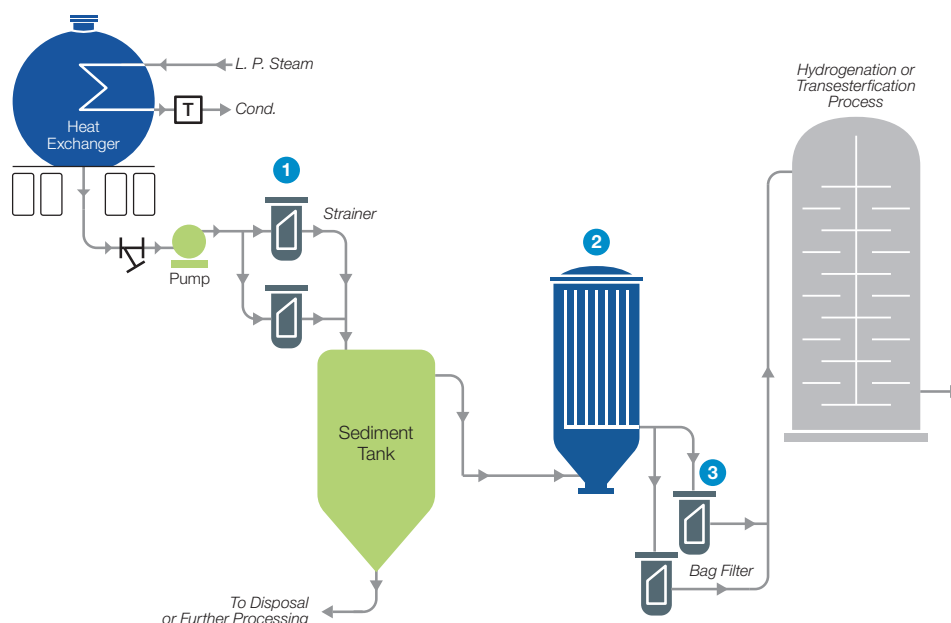
Optimal Drainability

- The Cricketfilter® elements are engineeringly designed to provide minimum fluid retention during regeneration ensuring optimal cleanness



Hydrotreated Vegetable Oil Filtration Process

Pre-treatment flow diagram for non-edible crude oil and UCO and animal fat



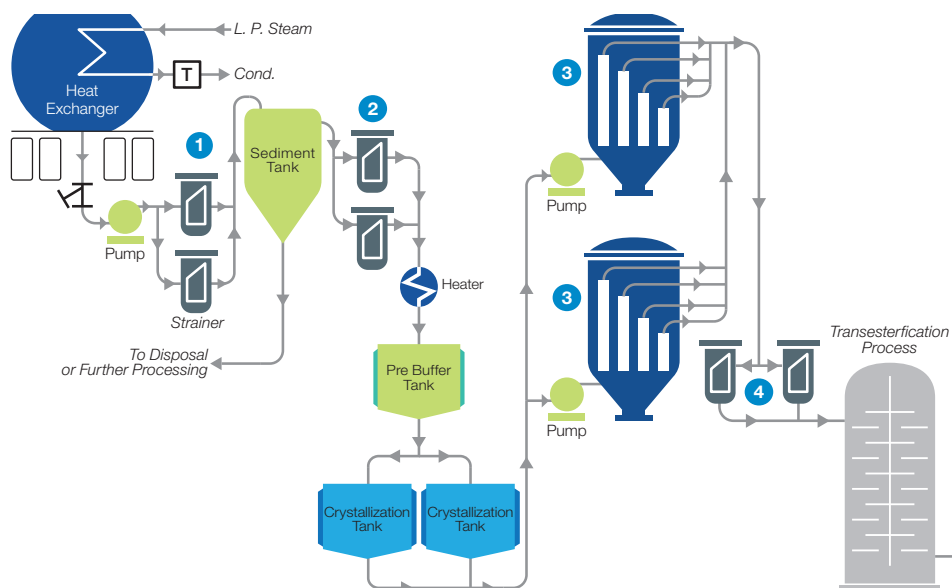
FILTER TYPE	FILTER PURPOSE	FILTER BENEFIT
1. Strainer, AFZ-180 or AFZ-C-180 or Multi bag Filter, up to 14 strainers in one body	Filtering out the larger particles from the feed	Reduced number of large solids in the sediment pump and tank ensures more efficient processing and protects downstream equipment from potential blockages or damage. By effectively capturing these larger contaminants early in the filtration process, you maintain system flow, enhance product quality, and reduce the frequency of maintenance or downtime.
2. Versis® Vertical Pressure Leaf Filter	Removing fine particles from the feed stream before it enters the main process is possible, with or without the use of precoat and body aid, depending on the solid load and particle size distribution.	A reliable filter system that operates fully automatically without operator interaction. It provides clean filtrate and reduces maintenance costs in the downstream process.
3. Bag Filter, AFZ-180 or AFZ-C-180 or Multi bag Filter, up to 14 bags in one body.	Safety filter and polish filter.	This dependable, static equipment operates without any moving parts, eliminating the need for maintenance or overhauls. By delivering a cleaner feed, it helps extend catalyst life and minimizes the frequency of cleaning for heat exchangers and other process equipment.

Aftermarket

FILTER TYPE	FILTER PURPOSE	FILTER BENEFIT
Top cloth - Available in various pore sizes	The top filter cloth effectively removes solid impurities, thereby enhancing the clarity and purity of the hydrotreated vegetable oil (HVO).	Due to its high quality, the top filter cloth offers an average lifespan of 6 to 12 months, resulting in fewer maintenance interventions, reduced downtime, and lower overall costs. This process ensures the final product maintains consistent quality and purity. The filter cloths contribute to extending the lifespan of the catalyst bed which in turn reduces downtime.
Drain cloth - Available in various materials.	The drain cloth plays a crucial role by providing support and enhancing liquid flow. The drain cloth also provides a more efficient cake release.	The design and quality of the drain cloths optimize flux capacity, safeguard the top cloth, prevent clogging, improve filtrate collection, and preserve the integrity of the filter cake. Working together with the top cloth, the drain cloth ensures a more efficient filtration process, resulting in a higher quality and purity of the filtered end product.

Filtration equipment features and benefits

Pre-treatment of removal of plastics (PE) from animal fat



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2. Strainer	Filters out larger particles from the feed.	Protecting the pre-buffertank and the downstream system from collecting dirt, reducing maintenance and down time.
3. Cricketfilter®	Removing fine particles from the feed stream before it enters the main process.	The filter effectively captures even the smallest particles that pass through the sedimentation tank, ensuring a clean feed to the main process. Additionally, a soft bleaching process can be performed within the filter, helping to reduce phosphorous, trace metals, chlorides, polyethylene, and other impurities, or to adjust acidity as required. The Cricketfilter(R)'s design enables the formation of a dry cake, with automatic cake release, minimizing operator involvement.
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