Filtertechnik
Filtration, Purification &
Separation Solutions

Filtration systems for waste vegetable oil & virgin feedstocks

Please contact for information on our range of filtration systems for tallow, chicken & animal fats

WVO filtration systems

Uses: Biodiesel production Straight usage Power Generation

Pre-filtration prior to Biodiesel Production

Pre-treatment of WVO prior to the transesterification process is important. Free Fatty Acids (FFA), oil contaminants and moisture need to be effectively removed in order to ensure a clean, irreversible reaction.

The need for effective filtration & pre treatment

Most biodiesel is made from waste vegetable oil (WVO) collected from catering and food production facilities, or from virgin feedstocks.

The WVO often contains high levels of Free Fatty Acids, moisture as well as solids, other impurities and contaminants. The solids can be filtered out using correct filtration procedures. The water must be removed by heating the oil to above 212°F (100°C) for an extended period to drive the water from the oil.

WVO typically contains from 2-5% free fatty acids. If the free fatty acids are above this amount, it is very difficult to produce biodiesel without an acid esterification process. The free fatty acid number is determined by a titration process. A full description of this process is available on request.

A common problem with biodiesel producers is instead of a clear separation between the biodiesel and the glycerine after the reaction and settling process, they end up with a semi-solid, gelatinous mixture that cannot be purified and used as fuel. This is an indication that the oil contained excessive free fatty acids and/or water.

Raw vegetable oils that are produced by pressing oilseeds such as rape (canola), mustard or soybeans can be converted to biodiesel. The free fatty acid level of these raw oils is usually 0.5% or less, which is low enough not to pose a problem. However, the oil may contain gum compounds that can create sludge deposits in the processing equipment and can make it difficult to separate the glycerine at the end of the reaction.

Fundamentals of Filtertechnik vegetable oil filtration

Making vegetable oil based fuels is a simple and straight forward process, but it needs to be done correctly in order to achieve any recognised standard of quality. This means pre-treatment of the vegetable oil feedstock - whether its from a Virgin or Waste supply chain.

Waste Vegetable Oil / Used Cooking Oil - WVO

The usage of WVO as a fuel feedstock makes commercial and environmental sense for many reasons, mainly because the food producer saves on disposal costs and recycling charges, and the fuel producer obtains a low cost, zero cost or even negative cost biofuel feedstock. Referred to as “Yellow Grease”, WVO consists of 3 principal feedstocks Vegetable oils such as Sunflower, Oilseed Rape, Linseed etc.

Hydrogenated or Semi Hydrogenated vegetable oils. Rendered tallow and animal fats (Aka Brown Grease) Due to a lack of labelling requirements many waste oil processors give the name “Waste Veggie Oil” to a multitude of food waste derived feedstocks which can cause problems for biodiesel producers, because the waste products contain a variable amount of solids, fat and water which can be of a particular hazard to those who are most likely to run a high blend of rough biodiesel in their motor vehicle which may result in problems with the fuel delivery system.

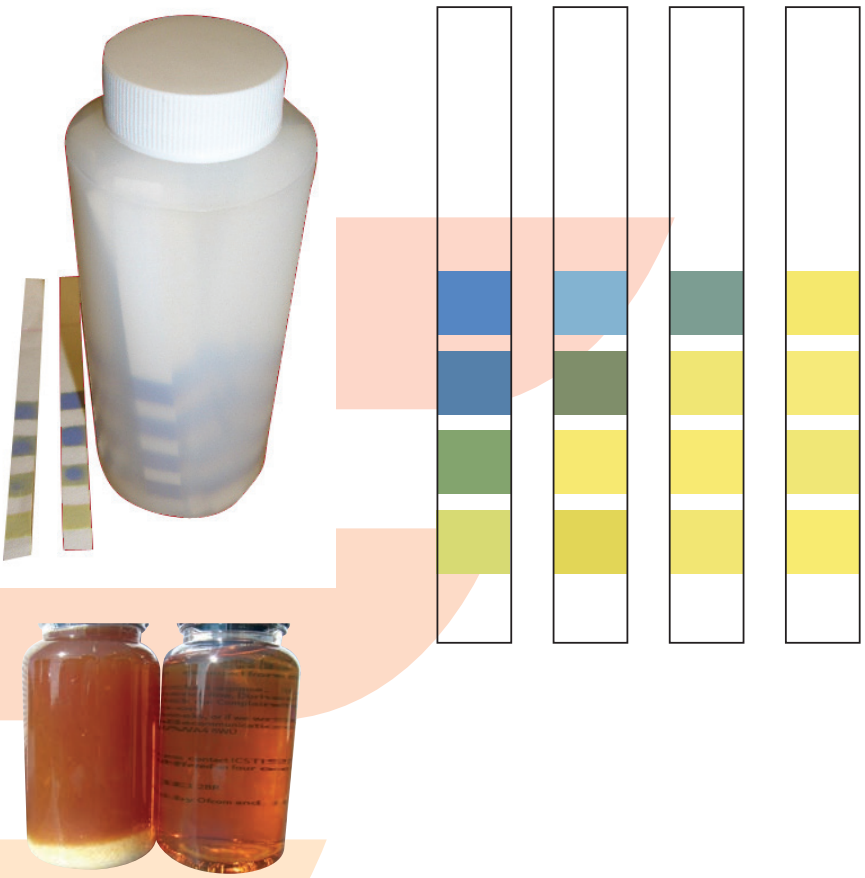
Free Fatty Acid Monitoring Strips

Ensuring adequate quality base feed stock is the key to successful biodiesel production.

By collecting or taking delivery of poor quality oil, there will be an element of shrinkage once the Free Fatty Acids (FFA) have been removed. Most biodiesel producers purchase WVO by weight, so if there is a high FFA level it is not in your best interests to take delivery.

Any biodiesel above 5% FFA content may be difficult to process into biodiesel. These test strips will allow you gauge the FFA level of incoming feedstocks.

Simply dip the test strip into your oil and submerge for 2 seconds. Remove the strip and count the number of bands without any blue colour. A band with blue patches is considered a blue band.



- Essential for monitoring incoming feedstocks
- Enable you to negotiate WVO prices accordingly

WVO, SVO, tallow, chicken & animal fat filtration systems

Choose from our range of filter cartridges (reusable or disposable) and a range of filter housings to suit all budgets and production levels.
Filtertechnik can supply individual components as well as the complete filtration systems. Skid mounted units are available in varying sizes. Rugged pump specifications allow for transfer of viscous liquids.
Choose from a range of high performance filtration elements in different materials and pore sizes: low cost polyprop, nylon recleanable and mesh screen are available.
Irrespective of your budget and production levels, Filtertechnik have a WVO filtration to suit your operation.

Low Cost filter housings

Ideal for economical WVO filtration. Rugged poly-prop housings are available with varying cartridge designs and element choice.

Part code	Description
280120XV07BPNV	20" Blue Polypropylene filter housing 3/4" BSP ported, 45°C max temp
280120XV07BCNV	20" Clear Polypropylene filter housing 3/4" BSP ported, 45°C max temp

Stainless Steel filter housings

High quality stainless steel housings are available with varying cartridge designs and element choice. Ideal for WVO transfer and filtration requirements. Wide range of replacement element micron ratings to choose from.

Part code	Description
510130VN10B1CE	30" long stainless cartridge filter body 1" BSP ported, 80°C max temp
84012VAA20A2AVE1	32" long stainless bag housing 2" BSP ported, 80°C max temp

Staged filter rigs

Rugged screw pump & 51013 series housings in mobile upright steel frame ideal for WVO transfer and filtration. Stage filtration from 400 to 1 micron elements.

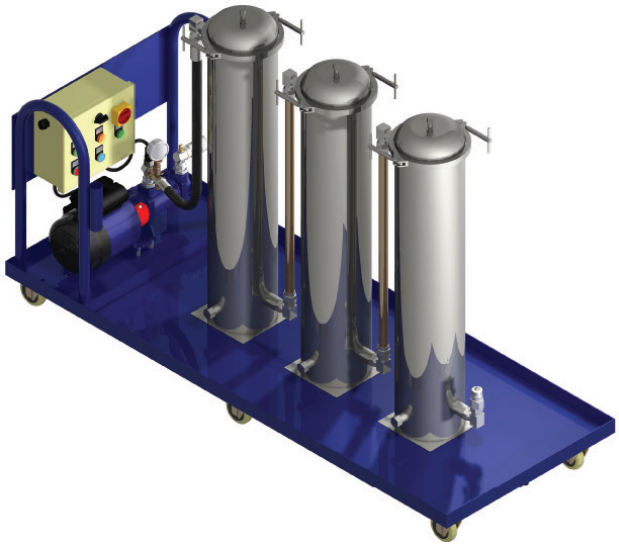
Part code	Description
SFC-2-240	Double staged filter rig 240 VAC 50 Hz
SFC-2-110	Double staged filter rig 110 VAC 50 Hz
SFC-3-240	Triple staged filter rig 240 VAC 50 Hz
SFC-3-110	Triple staged filter rig 110 VAC 50 Hz

High Volume staged filter rigs

Irrespective of your volume requirements, Filtertechnik can design and build a system to complement your production process.
Rugged screw pump & 84012 series housings in mobile flat bed steel frame ideal for WVO transfer and filtration. Stage filtration from 800 to 1 micron elements.

Part code	Description
WVO-2L-240	WVO filtration system, high performance filtration capacity 240 VAC 50 Hz
WVO-2L-110	WVO filtration system, high performance filtration capacity 110 VAC 50 Hz

WVO, SVO, tallow, chicken & animal fat filtration systems



WVO-3L-XX (Power supply options: Electric or air-drive)

- High performance, high flow WVO or virgin oil filtration systems
- Specialised Filtertechnik staged Filtration process
- Flow rates 7,200-14,400 l/hr (air drive) or to customer specification
- Removes solid contaminats and residual Free Fatty Acids following initial pre-treatment process
- Rugged stainless steel filter housings to allow for hot oil transfer
- Portable skid mounted rig
- Wide range of filter micron sizes to suit every application

Heavy industrial versions

Suitable for Used and Virgin Feedstocks

- Essential part of the biodiesel production process
- High performance stage filtration
- High surface area
- Wide range of replacement cartridges
- Removes impurities from base feed stocks that may upset the process
- Ideal for UCO/WVO filtration for Power Generation
- Wide range of models to choose from
- Anti Bacterial Systems available
- Basket strainer options

WVO, SVO, tallow, chicken & animal fat filtration systems

When using WVO or used oil in power generation applications, exceedingly high levels of cleanliness need to be achieved, Our range of high performance filtration systems incorporate anti bacterial conditioning systems, strainers pre filters and polishing filters.

These units are designed to purify the oil in a single passage of flow thereby effectively removing solid contamination to desired cleanliness levels.

These cleanliness levels can be achieved at a very low pence pre litre (cents per gallon) cost.

Please contact us for more information.

WVO, SVO, tallow, chicken & animal fat filtration systems

As many sources of WVO are stored away from food preparation areas, the ingression of water and the mixing of free running and solid wastes can cause a multitude of problems for biodiesel producers, as can the Free Fatty Acid Content of WVO which has degraded due to over usage. This can cause downstream problems with transesterification and increases the likelihood of creating high levels of soaps and getting a poor transesterification reaction.
Please turn to page 02 for further information on Free Fatty Acid Indicator Strips.

Vegetable Oils
For best results when working with vegetable oils as biofuel feedstocks, is it advisable (particularly in cooler climates) to use oils which are free running at ambient temperature. The reason for this is even after biodiesel has been re-filtered, reacted and purified, the cold filter plugging point, cloud and pour point of the finished biodiesel will be similar to the base feedstock from which the biodiesel was produced.

Hydrogenated / Semi - hydrogenated vegetable oils
Hydrogenation is a process whereby hydrogen is injected into vegetable oils which causes the oils to solidify; whilst this is key to manufacturing margarine, it creates downstream problems when using hydrogenated or semi hydrogenated oils as feedstocks for biodiesel production and they are best avoided if at all possible.

Tallow and Rendered Fats
Animal fats as feedstocks produce biodiesel with very low tolerance to cold weather issues such as cloud point, pour point and cold filter plugging point. This is because of the increased levels of saturated fatty acids which will ultimately lead to a viscous biodiesel which will plug filters, pumps and injectors.

Settling WVO feedstocks
Since many biodiesel producers have municipal holding tanks for WVO; it is common practice to allow the white skins to settle to the bottom of the tank. By extracting from the top of the tank through a filter system into the reactor the quality of the downstream biodiesel can be improved at this stage of production by removing FFA's and impurities from the base feedstock

Virgin Vegetable Oils/Pressed Rape Oil - SVO
Where a virgin oil (such as rapeseed) is used for biodiesel, it is may still be necessary to pre-filter the feedstock. This is done to remove any deposits of kernal and other residual impurities. In addition; the micron rating of the filtration means a uniform particle size ,which will minimise the risk of making sub-standard biodiesel as a result of poor and untreated base feedstocks.

Free Fatty Acids and FFA Indication Strips / TAN Testing
When making biodiesel, it is preferable to have a Free Fatty Acid content which is lower than 5%, most virgin oils will be less than 2% FFA by content. The problems come (generally but not exclusively) from WVO. As the oil is cooked and food deposits find their way into the cooking oil the acidity of the oil increases. A general rule is: the more used the oil, the higher the FFA content.

How effective pre-filtration can improve your process
Why is that a problem?
The Free Fatty Acids are chemically known as a triglyceride. It's a glyceride with three legs; that means that the blue circle is the glycerine backbone (of the molecule) and the green legs are the glycerides. Excess free fatty acids means excess glycerides so when the methanol and catalyst are added to neutralise the glycerine backbone, there are enough glycerides not only to recombine with the methanol (red circles) to make methyl esters, there is also enough glycerides (green legs) to recombine with the catalyst (yellow circles) and that makes ... SOAP.

Filtertechnik have long since been able to purify high soap content in biodiesel by using Magnesol during the purification stage of production. However, it is better to pretreat the feedstock upstream and ensure a solid transesterification reaction than to make to then remove high soap content due to excess FFA's.

What Can I do to prevent high FFA content in my feedstock ?
The Free Fatty Acid Indicator Strips are a foolproof way to determine whether or not to take delivery of a batch of WVO, or at least whether to renegotiate that price ! The blue strips on the dipping strips turn yellow depending on the percentage of Free Fatty Acids by content. By measuring and quantifying the FFA content of your waste vegetable oil you are beginning to monitor the nature of your biodiesel from as far upstream as possible, by measuring and mixing batches to achieve equilibrium FFA contents. FFA Indicator Strips may even be given to chefs who can then precondition the oil enough to get it as waste - but you can let them know that after a given quality it simply cannot command a premium price.

TAN Testing
In order to perform a solid transesterification reaction it is important to remember that it is a chemical process that is aided by machinery. The prefilter serves a very significant function; as does the reactor, as does the purification equipment, but the process of transesterification is one which is definitely chemical, not mechanical.

In order to transesterify, it is important to measure the Total Acid Number by means of a titration. To titrate the oil gives a true indication of the specific quantities of catalyst required to neutralise the acidity of the feedstock and to perform the chemical cracking process of tranesterifcation. Not only will your reaction result in a cleaner break, your downstream purification will be simplified and the quality of your biodiesel will have increased.

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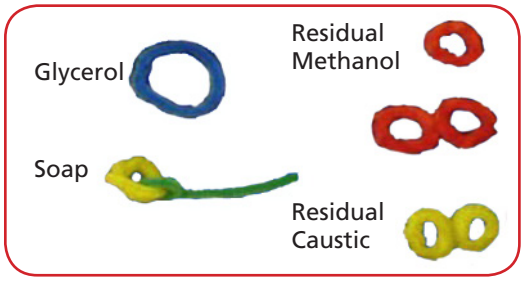
Caustic used as catalyst
(Sodium or Potassiun Hydroxide)

Methyl Ester - Biodiesel



Production residues and soaps that
need to be removed in the wash

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It is recommendable that a separate titration be done of each individual batch as the Total Acid Number will vary per batch which will reduce consistency and quality in the end product of the biodiesel.

Please contact for information on our range of filtration systems for tallow, chicken & animal fats

Quality Control Product Overview

FT-Aquamax Moisture Sensor

- Portable & Rugged
- Obtain instant moisture level readings of oils & fuels (PPM counts)
- Ticket tape print off
- Easy to operate
- Wide viscosity range
- Highly accurate & reliable

Patch Test Kit

Patch Test Kits allow for immediate identification and monitoring of the types and levels of contamination in fluid power and fuel systems.

Instant visual analysis is possible through an optical microscope, highlighting the major types of system wear including bright and black metals, silica, fibres, elastomers and plastics.

A sample of the test fluid is passed through a filter membrane via the vacuum pump, dried and mounted in a membrane holder ready for visual assessment. Comparitor slides are supplied to help establish and identify cleanliness levels etc of the fluid sample.

Oil Sampling products and kits

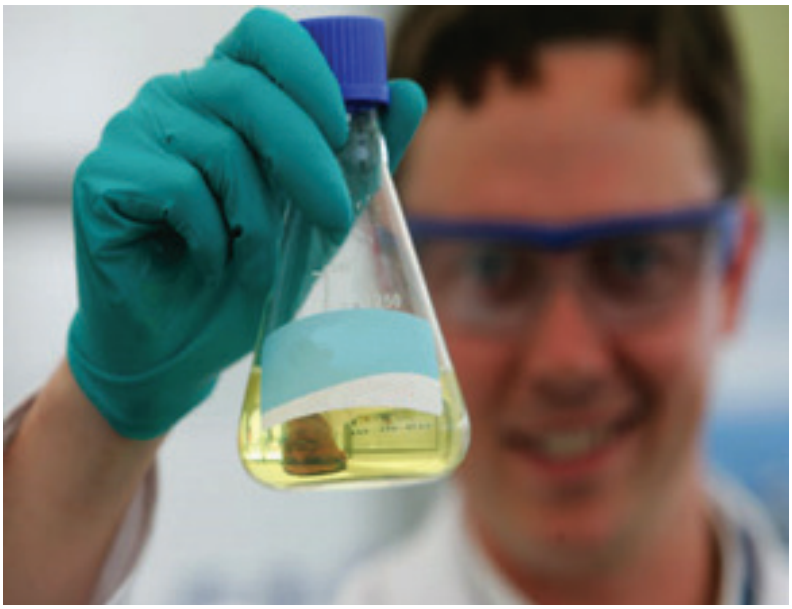
Sample hoses

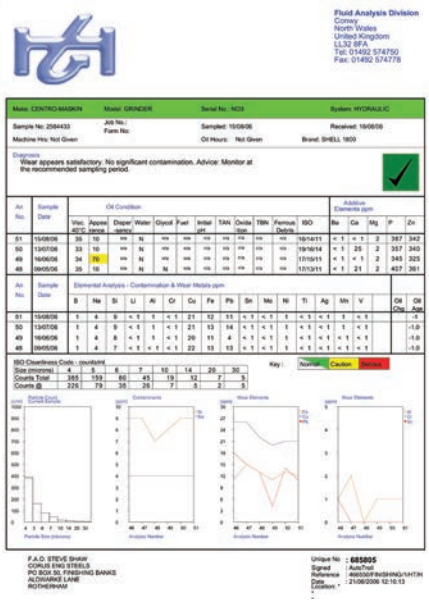
Inline Oil Fuel Sample points

Sample test kit

Sample thief pumps & tubing

Laboratory Analysis Services



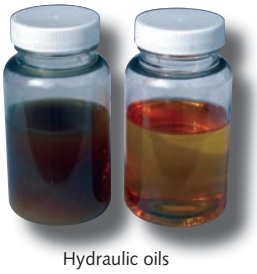


Not sure if your oil is of an acceptable quality?

FIltertechnik's Laboratory Analysis service provides fast turnaround of oil samples. Reports can be e-mailed to you or less then 48 hours.

• OILS • WATER GLYCOLS • FUELS • PROCESS FLUIDS

Gear oils


Hydraulic oils


Water glycol


Process fluids


Fuels

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Customer Hotline

- Technical support
- Sales & service
- Oil/fuel sample analysis
- Filtration system rental
- Site surveys

0800 068 4134

Filtertechnik

Filtration, Purification &
Separation Solutions

"Your Partner in Contamination Control"