

*Liquids to Value*



Separators and Decanters  
from GEA Westfalia Separator  
in the Biodiesel Process



# The Use of Biodiesel is Booming – and That’s Just the Start

Biodiesel has established itself as an alternative fuel. Oil crises and increasing environmental awareness will accelerate the current boom globally.

The use of alternative fuels is booming. Apart from bioethanol for adding to petrol, this development is due mainly to biodiesel. There are a number of reasons for biodiesel’s success: rising world market prices for oil, the high taxation of conventional fuels, and an international environmental policy that specifically promotes fuels from renewable resources. In addition, the quality of biodiesel is now equal to that of conventional diesel.

## One product – many sources

Biodiesel can be extracted from virtually all vegetable oils. While rape is the most productive plant in Europe, soy bean oil or palm oil are extremely important in other regions of the world. Unlike fossil fuels, whose sources are slowly but surely running out, renewable resources guarantee ‘replenishment’ with each harvest.

And irrespective of the oilseed used, all the by-products, such as bruised grain or glycerine, can be used – so ecology and the economy are in perfect harmony.

## Biodiesel is the fuel of the future

- Renewable raw materials safeguard resources
- Practically every oilseed is suitable for use
- Combustion quality equal to that of conventional diesel
- Less hazardous to water in the event of leaks
- No waste products in the production process
- Promotion by international environmental policy





# Absolute Efficiency – Even at the Pre-Treatment Stage

Crude oils must be pre-treated before the actual biodiesel process starts. GEA Westfalia Separator's complete process lines also set standards here in terms of quality and efficiency.

A key criterion of success for biodiesel is combustion properties that can compete with conventional diesel. To this end, it is essential to comply with national standards of quality, e.g. EN 14214. To realize these properties, the crude oils, which are to be transesterified into biodiesel initially, have to be subjected to a special refining process. During this pre-treatment the substances that are undesirable in the biodiesel and in the by-product glycerine are removed.

Benefits of pre-treatment for the transesterification of oils and fats

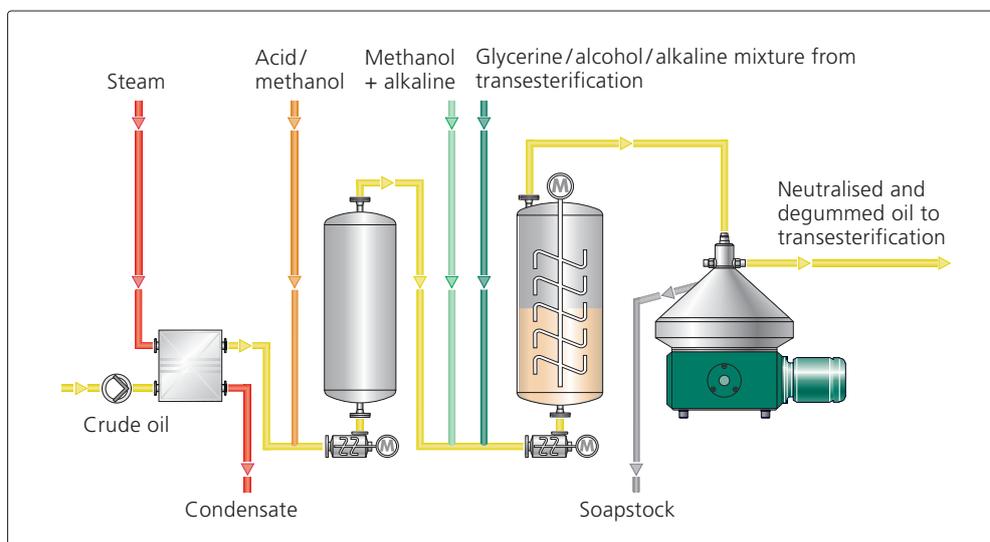
- No contamination – better glycerine quality
- No gums which might result in caking in the thermal glycerine process
- No phosphates in the waste water – reduced disposal costs
- Reduction of the MONG proportion in the glycerine (Matter Organic Not Glycerine)

Alcohol refining  
as the optimum solution

GEA Westfalia Separator offers all of the current pre-treatment processes, ranging from alkaline refining to physical and alcohol refining: with alcohol refining being particularly advantageous from an economic point of view.

Integrated process lines  
for all pre-treatment variants

- Alkaline refining (standard process, e.g. 2-stage neutralisation)
- Single-stage alcohol refining
- 2-stage alcohol refining
- Various acid degumming processes, e.g. TOP degumming



Alcohol refining – example of optimum pre-treatment



Soapstock, which is very costly to dispose of, is no longer produced during the integrated pre-treatment process of alcohol refining. Instead, free fatty acids can be recovered as a saleable by-product.



# Full Support – for a Stable Biodiesel Process

GEA Westfalia Separator supplies the Connemann – ADM System CD Process, which has been successful across-the-board in biodiesel manufacture, in all stages.

The manufacture of biodiesel from oils and fats is based on transesterification, with methanol being added in the presence of an alkaline catalyst. Glycerine is produced as a by-product.

The so-called Connemann – ADM System CD Process was developed, mainly, for this purpose. GEA Westfalia Separator has a license for selling this process and for awarding sublicenses to other engineering companies. Separators are also key components in other processes.

Centrifuges can be used in the following process stages in virtually all of the following:

- Separation of methyl ester and glycerine/catalyst/soap/methanol
- Washing of methyl ester
- Separation of fatty acids from glycerine
- Separation of salts from glycerine

The ideal solution is a complete line in fully-continuous operation. Not only does it reliably guarantee the desired quality, but it does so with maximum yield, simple operation and minimum production costs.

Benefits of complete process lines:

- Fully continuous operation
- Outputs of 100 to 1600 tonnes per day
- Biodiesel of the highest quality
- Simple process management
- Low operating costs

Biodiesel is obtained by means of the so-called transesterification process. This is a chemical reaction, which replaces one type of alcohol in a given ester with another using methanol. As a result of this transesterification, the end product has a clearly lower viscosity than the untreated oil and can therefore be used as a fuel, with only minor adjustments to the engine. Biodiesel can be mixed in any ratio with mineral oil diesel.

# RSE Separators – Efficiency for the Entire Line

RSE series separators are made for the biodiesel process. Their innovative features guarantee optimum quality and high economic efficiency from beginning to end.

GEA Westfalia Separator has specially adapted the RSE series separators for the biodiesel process. Their various separation tasks range from separating catalysts and glycerine to the final washing of the biodiesel. With a capacity range of 60 to 1600 tonnes per day, they are designed for both small and large installations. They require a very small amount of floor space, operate extremely quietly and guarantee maximum yield and excellent product quality.

## Hydrohermetic feed as standard

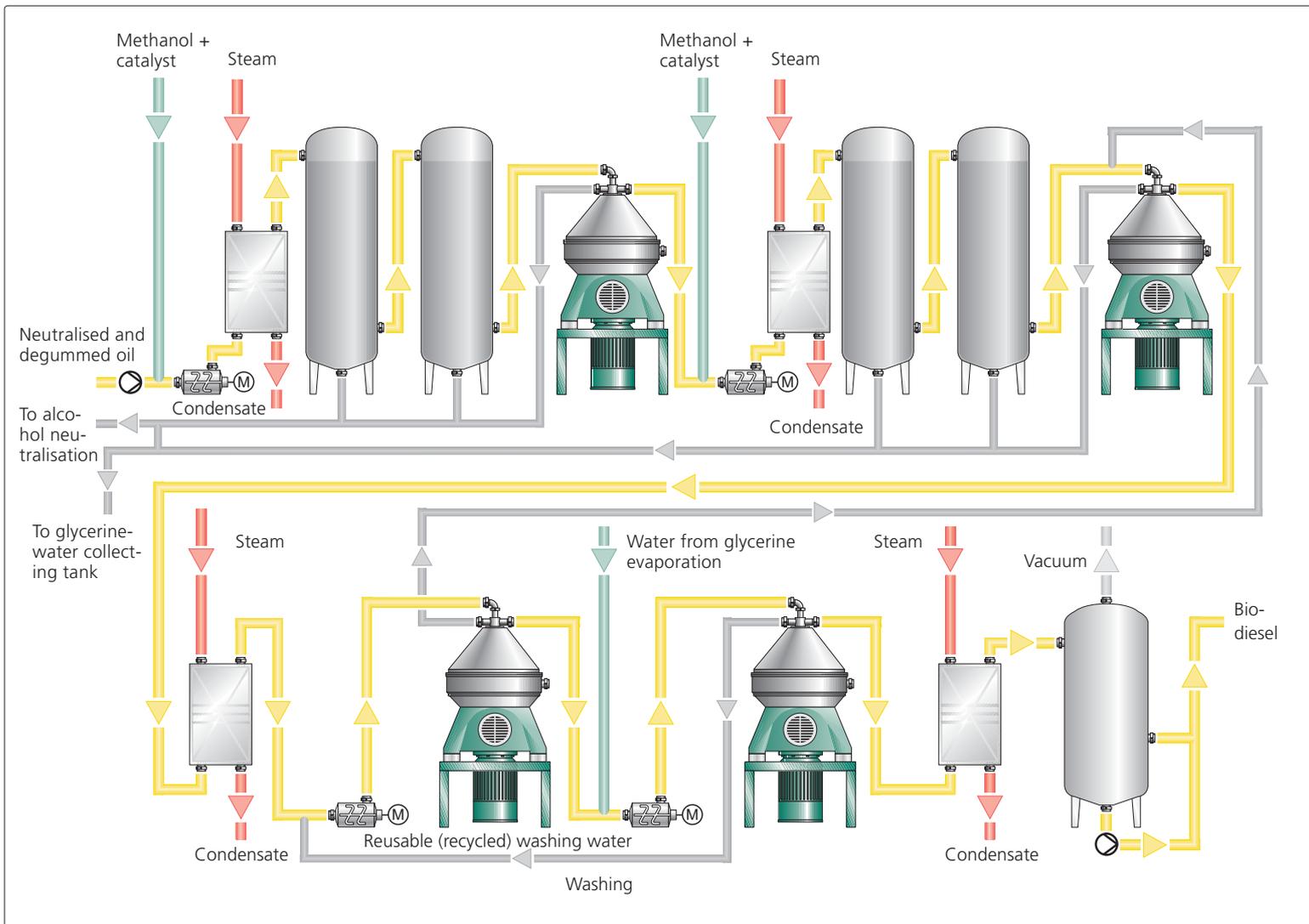
Innovative features include the hydrohermetic feed which has been patented in many countries. This minimises the negative effect of shearing forces and guarantees optimum separating efficiency. Gas-tight design and nitrogen blanketing fulfil all the demands of explosion protection (ATEX).

## Benefits of RSE separators:

- Maximum yield with excellent product quality
- Quiet mode of operation
- Integration in automatic processes thanks to freely programmable control system
- Rapid amortisation
- Low-cost operation, service and maintenance

The Fine Tuner can handle any product. To ensure optimum separation of the two product phases, the separation zone must be located in the rising channel. Changes in the incoming product (e.g. as a result of various oil grades) may displace the separation zone. The separation zone can be re-adjusted to the optimum during operation with the aid of the Fine Tuner – it couldn't be simpler!





Washing

Capacity ranges of the RSE series:

Separator	Capacity range
RSE 60	60–150 t/d
RSE 90	12–240 t/d
RSE 110	120–300 t/d
RSE 150	200–420 t/d
RSE 220	400–800 t/d
RSE 300	500–1200 t/d
RSE 450	800–1600 t/d



RSE Separators operate with absolute safety, even in hazardous areas. The new explosion protection with inert gas blanketing operates on the principle of 'keep it simple' and protects both man and machine as reliably as possible.



## Full Speed – Direct Drive Increases Availability

The RSE 300 separator displays its full potential in continuous operation: high throughput and simultaneous conservation of the product thanks to the hydrohermetic feed provide biodiesel manufacturers with even more power.

### RSE 300 with direct drive – less wear and higher availability

Larger installations producing 300 tonnes or more of biodiesel per day operate particularly efficiently with high-performance separators fitted with the innovative direct drive. In addition to dispensing with a gear, the new development also has fewer bearings, which means less wear and tear and correspondingly higher availability – a weighty argument, particularly in operations of this scale.

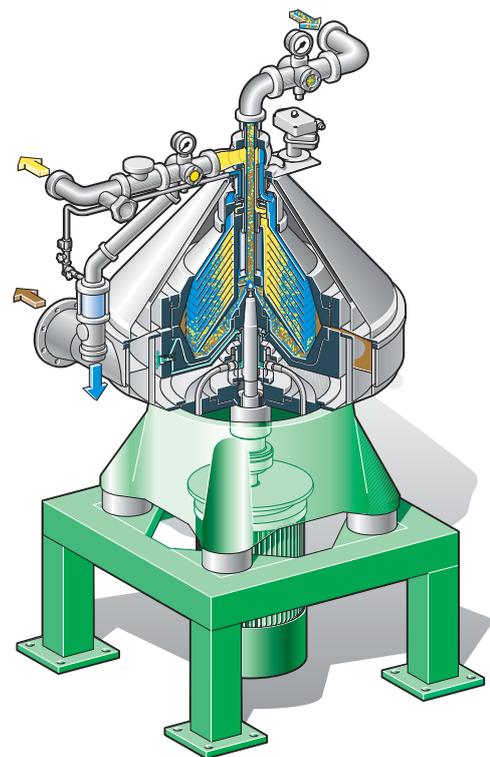
### Safety first – including explosion protection

The explosion protection guidelines state that belt-driven machines must not be used in biodiesel operations. The RSE series can be supplied in an explosion-proof design for hazardous areas. The electric motors for these machines are equipped in accordance with the guidelines of ATEX.

The machines are designed with pressure-capsulated frames and blanketed with inert gas for handling products with an alcohol content. These measures ensure that strict international guidelines such as ATEX are more than observed.

### Technical features of the RSE series:

- Hydrohermetic feed
- Fully continuous, fully automatic operation
- Low space requirement
- Capacity range from 60 to 1600 tonnes per day
- Design for hazardous production areas
- Design with Fine Tuner



# Solid-Wall Separators for Washing Biodiesel

Solid-wall separators from GEA Westfalia Separator are used for separating methanol and glycerine from biodiesel. By carefully washing the biodiesel, the separators reduce the volume of wash water used, biodiesel losses and operating costs.

Technical features:

- Hydrohermetic feed
- Fine Tuner (manual)
- Capacity range up to 420 tonnes per day
- Design for hazardous production areas



Separator RTC 150 with solid-wall bowl,  
Fine Tuner and hydrohermetic feed

# Decanters in the Biodiesel Process – Focus on Production Reliability

Specially developed 3-phase decanters with pressure-resistant housing and nitrogen blanketing are used for the biodiesel process to separate fatty acids, glycerine and salts in certain processes (if potassium hydroxide – KOH – is used as the catalyst).

Benefits of GEA Westfalia Separator's decanter technology:

- High efficiency combined with excellent product quality and availability
- Gas-tight design with sealing gas supply (monitoring) safeguards the processing of easily flammable solid material obtained by the centrifugal process
- 2-gear-drive guarantees infinitely variable torque-dependent differential speed control with high control accuracy for the best possible dewatering of solids
- Low-maintenance and environmentally friendly



Decanter type CC 458 with pressure-resistant housing and nitrogen blanketing



## Westfalia Separator® capital**care** – Maximum Process Efficiency, Installation Availability and Budget Security

Westfalia Separator® capital**care** combines decades of service experience for mechanical separation technology.

Wherever separating technology tasks have to be carried out, Westfalia Separator® capital**care** assures comprehensive services right from the very beginning. In close cooperation with the customer, solutions are identified to meet their needs.

The partners benefit not only from traditional services such as inspection, maintenance, original spare parts and repair work provided by the original manufacturer; they also benefit from pro-active solutions which avoid risk, e.g. online and offline monitoring with Westfalia Separator® **wewatch**®.

Accompanying modernisation or upgrading to state-of-the-art technology also offer the option of boosting performance as required.

Training provided on site or in the modern training centre of GEA Westfalia Separator ensures that the customer's employees receive training in the proper handling of the high-tech installations. This provides additional safety.

### Authorized workshops worldwide

And if problems occasionally occur or if a spare part is required at short notice, the specialists are able to attend to the customer quickly. This is ensured by a global network with more than 50 sales and service companies as well as 60 further sales partners. Authorized workshops are able to service every location in the world at short notice.



Westfalia Separator® capitalcare accordingly makes for maximum process efficiency and installation availability as well as budget security. And these benefits are provided throughout the entire life cycle of the entire installation.

#### Service from the original manufacturer:

- Service engineers quickly on site
- Extensive service network
- Risk avoided by service provided by the original manufacturer
- Pro-active solutions which avoid risk
- Upgrading to boost performance
- Staff training

Maximum availability  
Absolute budget reliability  
Permanent efficiency

In addition to traditional services such as maintenance or repair, Westfalia Separator® capitalcare also provides solutions which avoid risk and with which the installation availability can be pro-actively assured.

- Beverage Technology
- Dairy Technology
- Renewable Resources
- Chemical/Pharmaceutical Technology
- Marine
- Energy
- Oil & Gas
- Environmental Technology
- Engineering
- Second Hand Machinery
- Original Manufacturer Service

The information contained in this brochure merely serves as a non-binding description of our products and is without guarantee.

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Printed on chlorine-free bleached paper

9997-1279-020/0810 EN  
Printed in Germany  
Subject to modification



GEA Mechanical Equipment

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