

*Liquids to Value*



## Pretreatment of Oils and Fats for Biodiesel Production with GEA Westfalia Separator



# Together We Start the Engine of Progress

The pretreatment of oils and fats is one of the most important criteria for the production of high-quality biodiesel. GEA Westfalia Separator offers you complete process lines for achieving optimum quality in your chemical or physical refining processes.

Biodiesel is one of the industrial products with a significant potential prospect. However, a key criterion of success is combustion properties which can compete with conventional diesel. In order to realize these properties, oils and fats which are to be transesterified into biodiesel initially have to be subjected to a special refining process. Only such pretreatment is able to remove the substances that are undesirable in the subsequent products biodiesel and glycerin.

## Maximum efficiency

Chemical and physical refining processes, in which separators play a key role, have become established for this purpose. GEA Westfalia Separator offers you not only stand-alone machines but also complete process lines for maximum efficiency. These process lines set standards in terms of quality and efficiency, irrespective of the method which you use in your operation.

## Benefits of pretreatment:

- Highest glycerin quality through reduction of the impurities
- Improvement of the availability of the plant through reduction of the gums and the resulting caking in the thermal glycerin process
- Higher economy of the plant through discharging less phosphate into the waste water
- Higher glycerin yield due to a lower MONG content (Material Organic Non-Glycerol) through lowest free fatty acid content
- Optimum cold stability of the biodiesel through reduction of the wax content

## Advantages of complete process lines:

- Fully continuous operation
- Outputs of 50 to 1,600 tonnes per day
- Biodiesel of the highest quality
- Simple process management
- Low operating costs

Self-cleaning RSE separator in  
explosion-proof design in  
conformity with ATEX regulations



# Alkaline Refining: Traditional Process for all Kinds of Oils and Fats

Alkaline refining is a tried-and-tested method which yields a top-quality starting product for the production of biodiesel with very low upfront costs: even in the case of lower-grade oils and fats. The fatty acids in the so-called soapstock can be recovered using a soap splitting method.

An operator who uses alkaline refining enjoys the advantages of a tried-and-tested method which removes free fatty acids, gums and impurities. Two different process alternatives have become established:

- Standard neutralization with which virtually all oil and fat types can be treated, with the exception of castor oil
- Cold neutralization with which oils containing wax (e.g. sunflower oil) can also be winterized at the same time as being neutralized. This process prevents precipitations of waxes in the biodiesel at low temperatures.

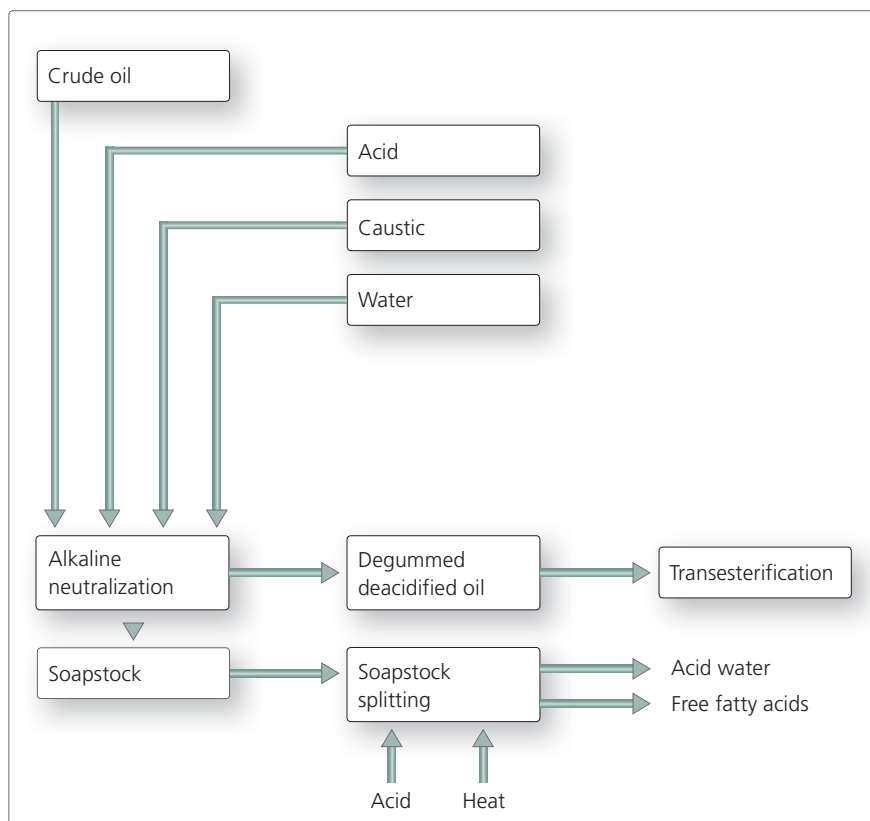
The process lines of GEA Westfalia Separator can be configured to handle every crude oil quality. Even if

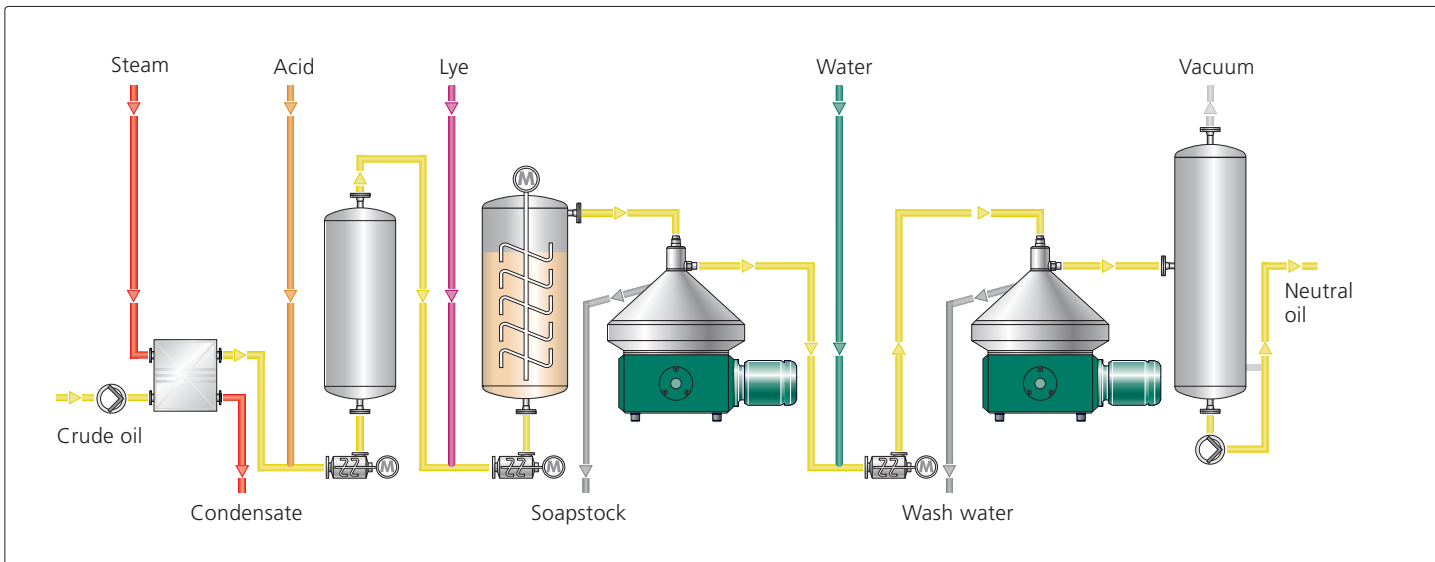
lower quality oil is processed, the individual acid and lye-treatment can be adapted to the crude oil quality.

However, soapstock cannot be avoided in this process; this is a by-product which has to be disposed of. Soap splitting enables the fatty acids in the soapstock to be recovered.

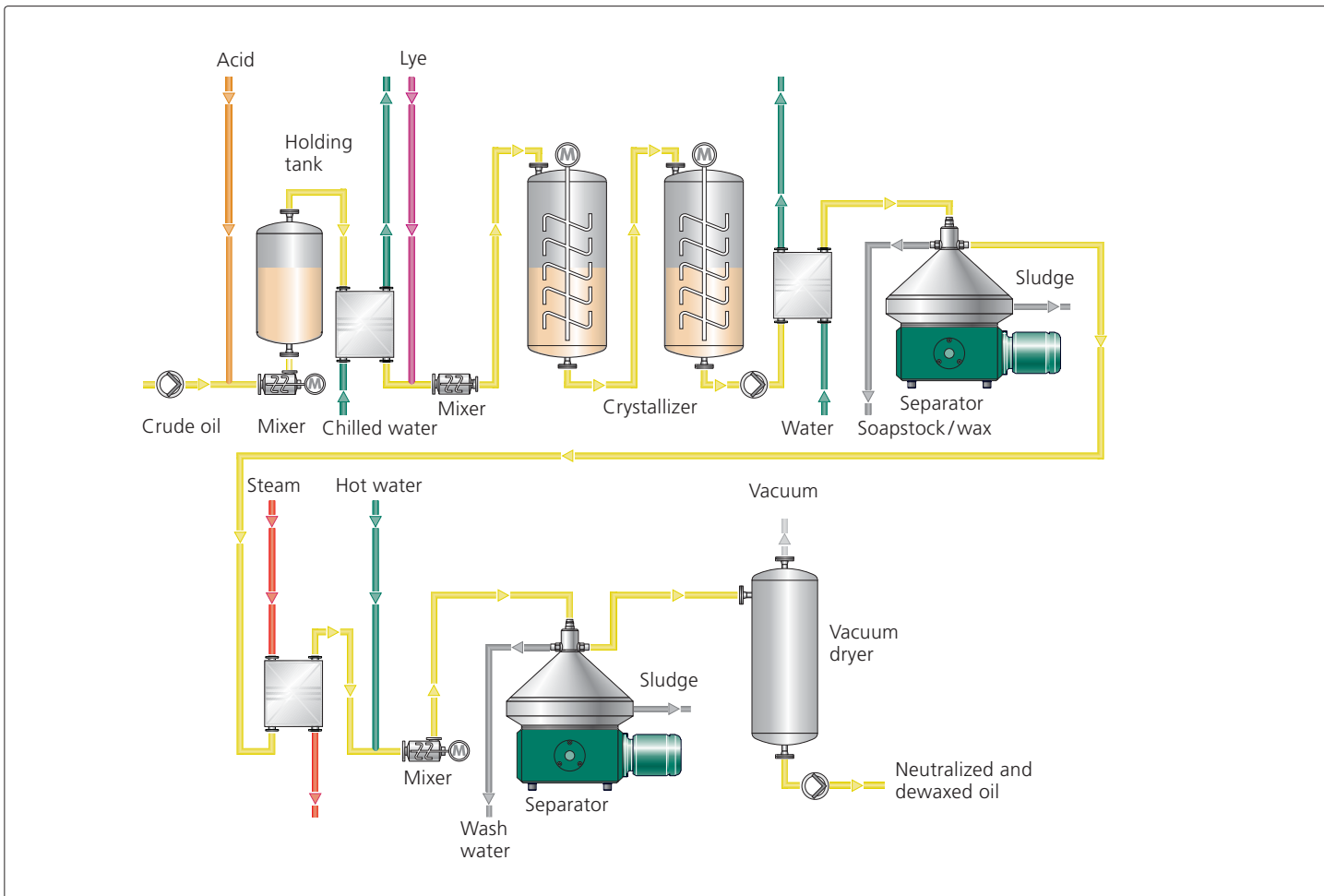
The process – an overview:

- High product quality
- Also processes lower quality oils and fats reliably (with the exception of castor oil)
- Low investment costs
- Ease of operation
- Can also be used for production of edible oil
- Disposal of soapstock is necessary





2-stage neutralization



Cold refining



## Physical Refining: Proven Technology for High FFA Oils

With physical refining, the content of free fatty acids can be removed by distillation. The advantage is fewer losses and direct production of free fatty acid without an additional process stage (soapstock splitting). The basic requirement in this respect is prior optimum degumming. GEA Westfalia Separator offers process lines for such degumming, for every desired processing capacity.

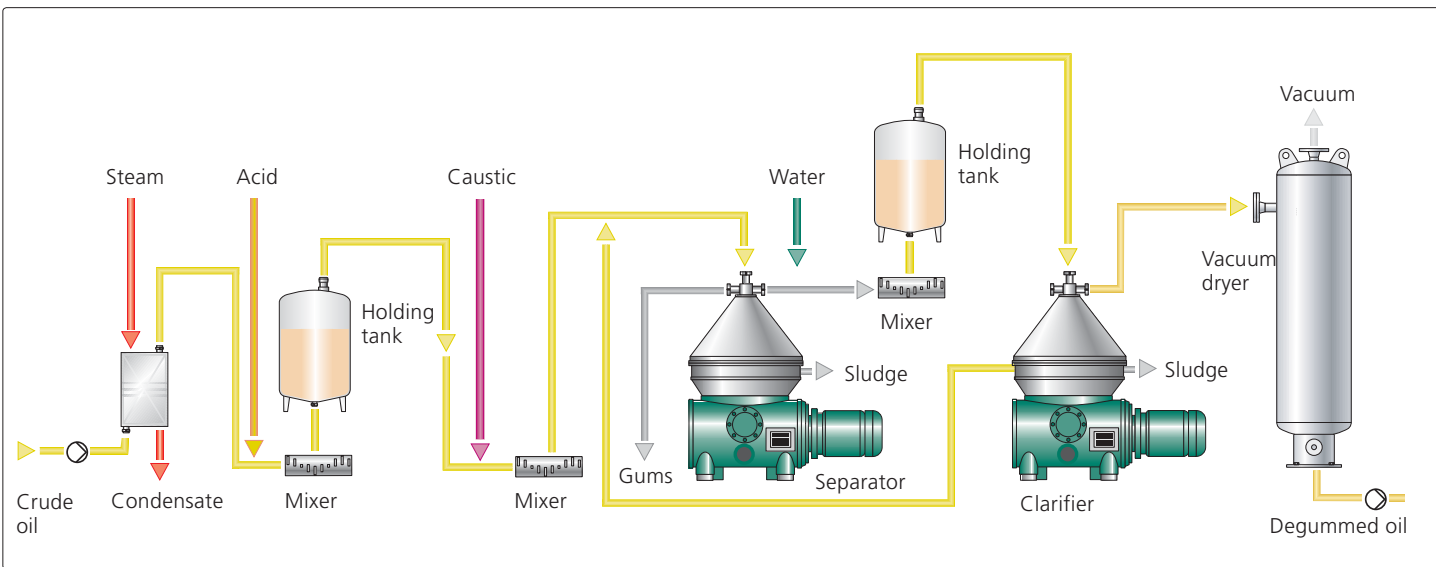
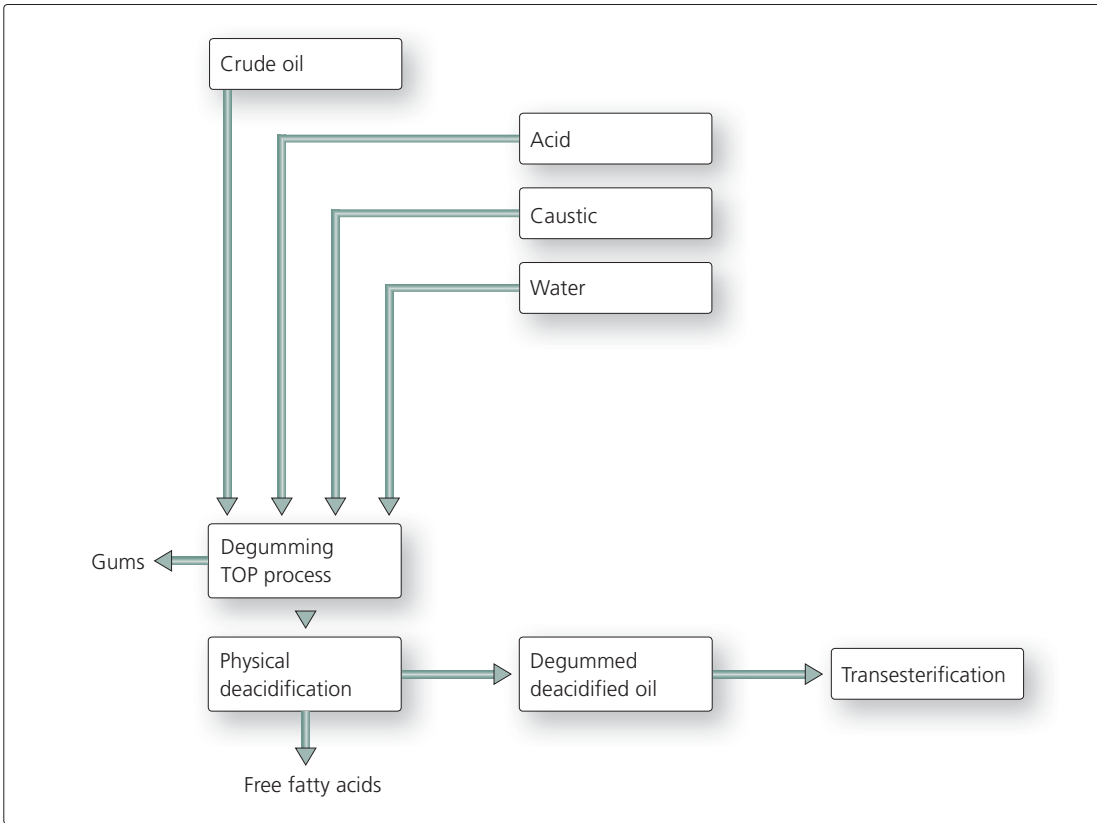
With so-called “TOP degumming”, GEA Westfalia Separator offers a special degumming process which provides significant advantages compared with conventional methods. The physical alternative however involves higher investment and energy costs.

The advantages in general:

- Good quality of fatty acids
- Can also be used in conjunction with a high content of free fatty acids
- Low losses with a high content of free fatty acids

Advantages of the TOP method:

- Low residual gum content (< 10 ppm) and phosphatide content
- Short reaction time – simple change of product
- No additional wash water discharge/low losses of oil
- Less emulsion in the transesterification process due to low P content
- Lower caustic consumption
- Small required space



TOP degumming



## Single-Stage Alcohol Neutralization: Consistent Process Integration

Alcohol refining from GEA Westfalia Separator is an alternative which achieves even greater efficiency. The process line in biodiesel technology uses a secondary stream of the transesterification stages for pretreating the oils. Completely effluent- and waste-free.

The main characteristic of this process is its logical consistency. By-products from the transesterification process are used for pretreating the crude oils. In this way, the consumption of chemicals and steam can be reduced, with the additional advantage of simultaneous recovery of by-products. All of these advantages are available at low investment costs.

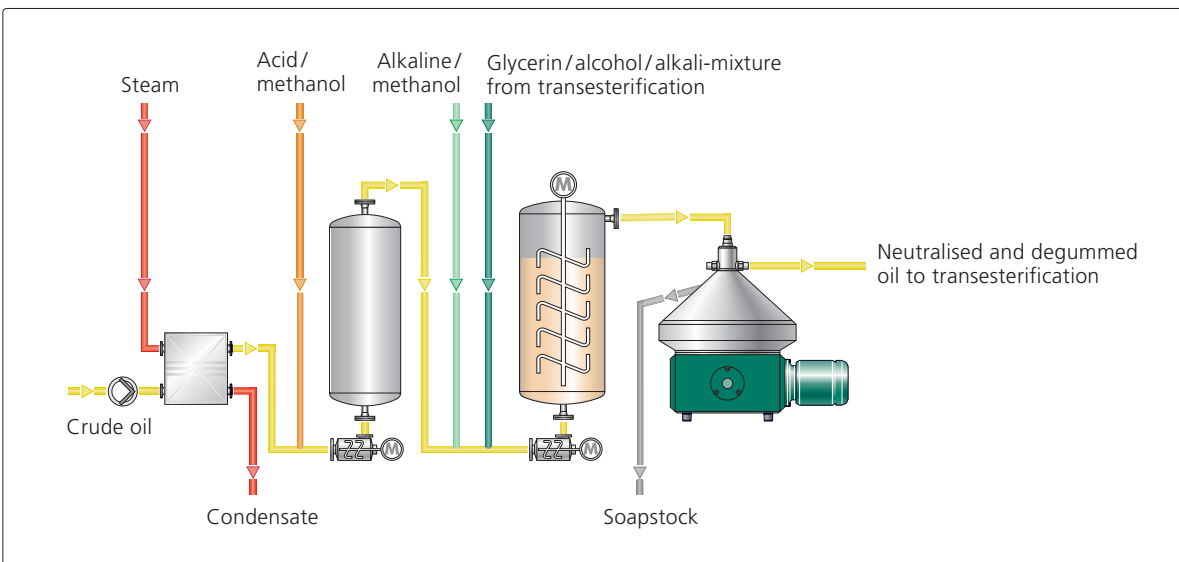
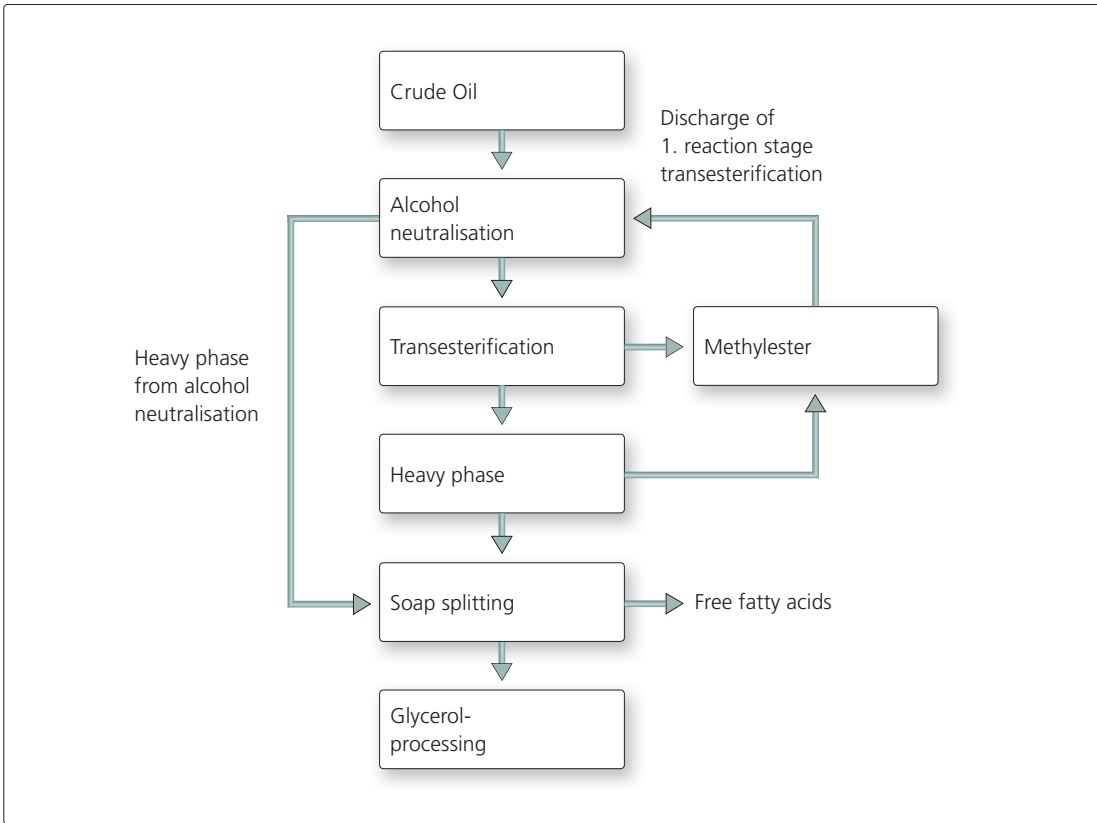
### Direct integration in your biodiesel installation

A further major advantage of alcohol refining is that the process line is completely integrated in your biodiesel installation. All components have been designed perfectly to meet the requirements of the

installation so that pretreatment of the oils and fats is combined directly with the actual production of biodiesel.

### The advantages of this simple process:

- Optimum neutralization and degumming of oils and fats
- Low investment costs
- Recovery of free fatty acids
- Given a normal seed oil quality, no additional caustic soda is necessary for neutralization
- Low steam consumption as no drying required
- Perfect for crude oil with low gum content



Alcohol refining

# Two-Stage Alcohol Neutralization: Maximum Yield and Product Quality with Minimum Cost

Alcohol refining has even more advantages to offer in the 2-stage version.

Crude oils with a higher gum content ought to be degummed before alcohol refining. This avoids the phosphatides impairing the quality of the glycerine phase. Some crude oils, e.g. sunflower oil, also have long-chain fatty alcohols (waxes) which have a negative impact on the cold stability of biodiesel. The waxes can be removed by way of cold degumming.

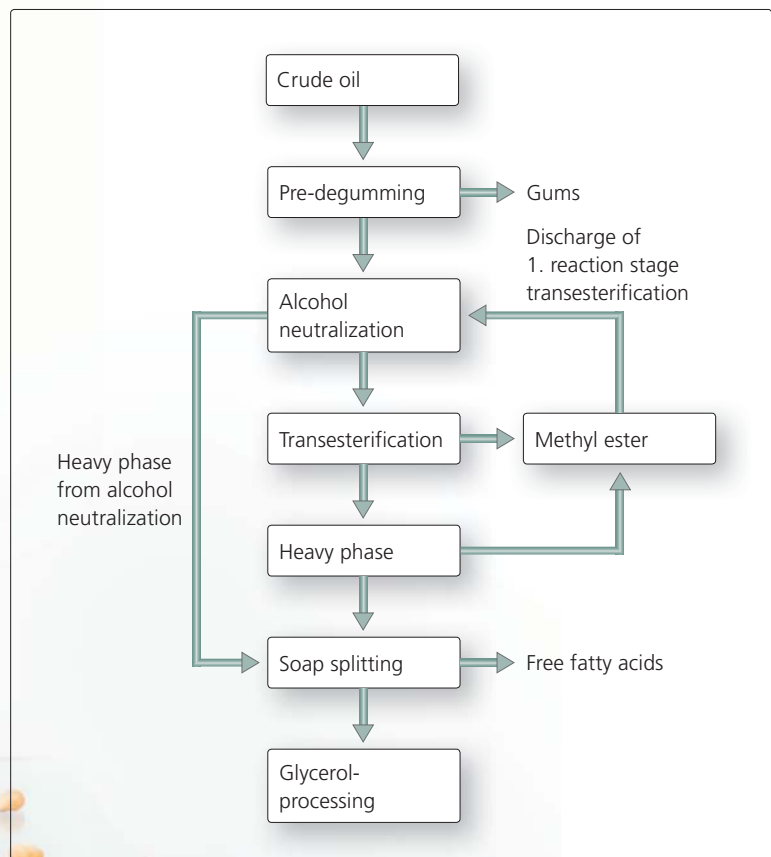
Advantages of the 2-stage version combined with pre-degumming:

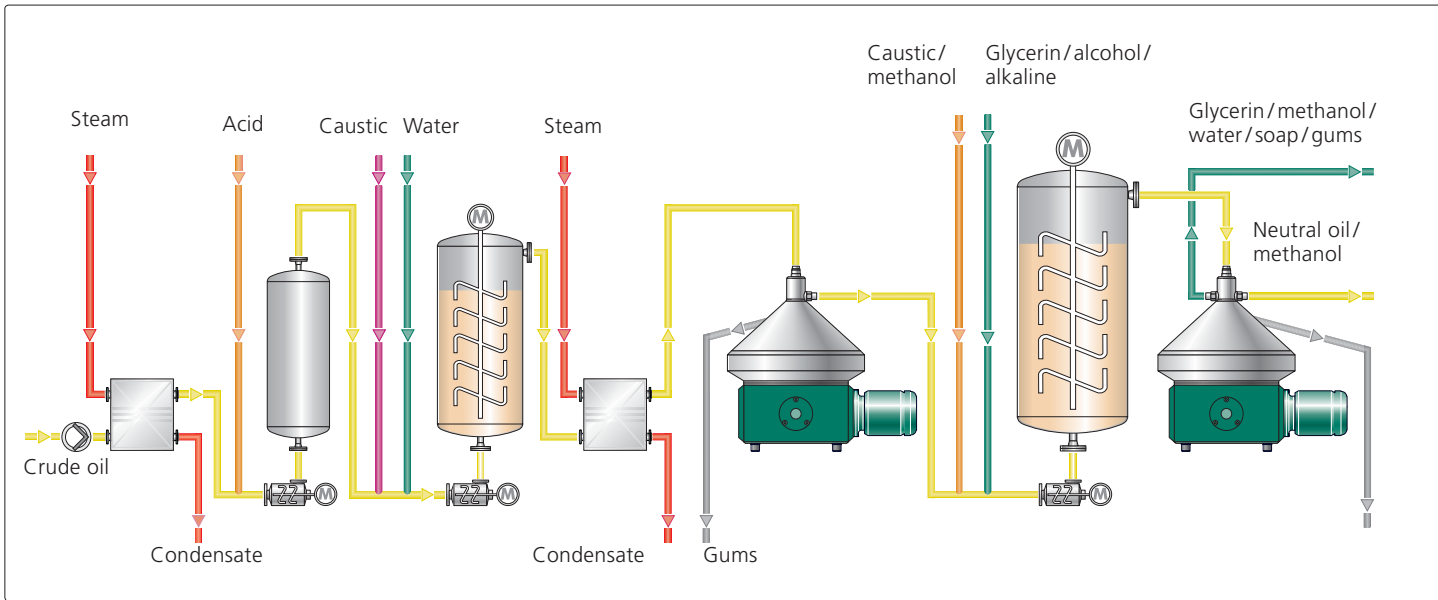
- Lower investment costs compared with traditional methods
- Lower steam consumption
- Good glycerin quality as the phosphatides are removed in pre-degumming

- No additional waste water and no additional soapstock splitting
- Easy processing of free fatty acids with excellent quality

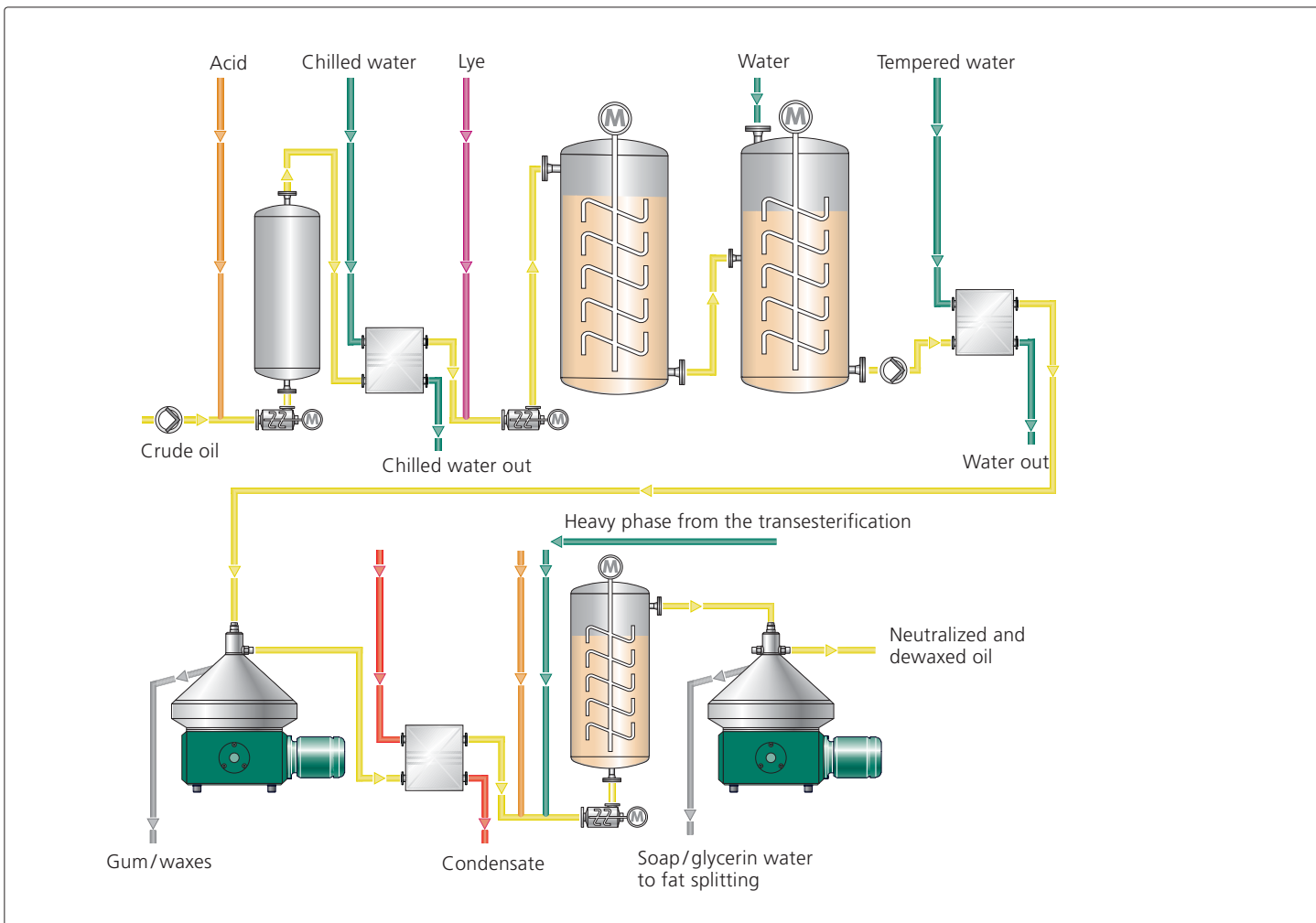
Everything argues in favour of process lines from GEA Westfalia Separator:

- Pretreatment is necessary in order to avoid problems in transesterification and in the production of glycerin
- The processes can be adapted flexibly to meet the specific requirements of the customer
- Special adjustment to the specific requirements of biodiesel production

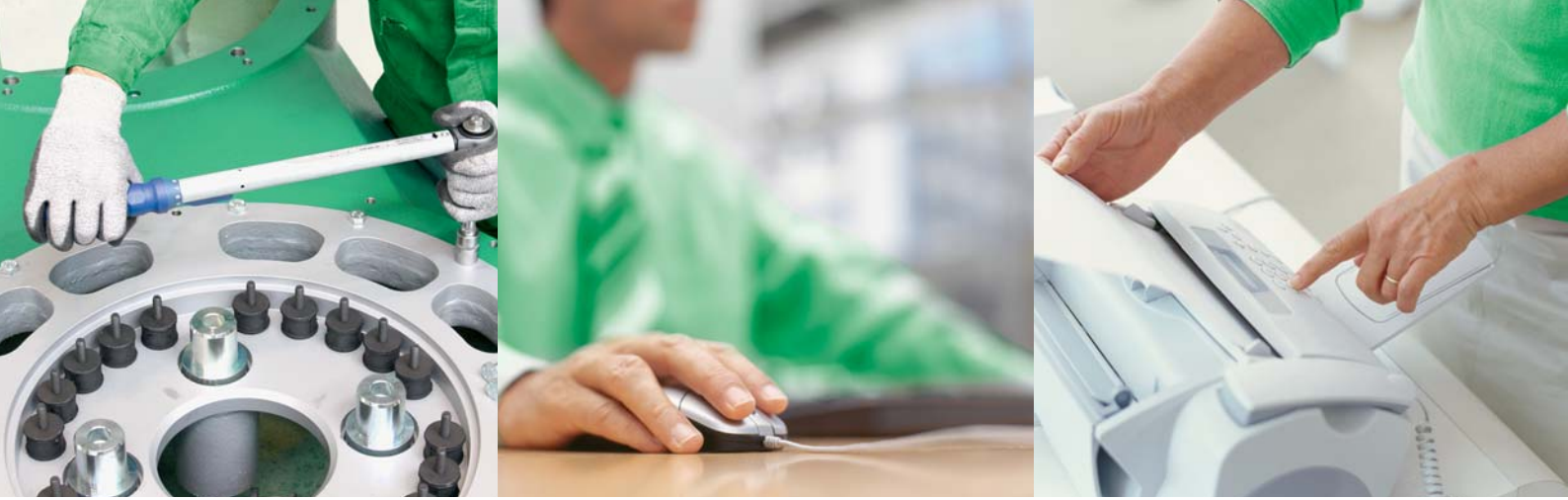




Special degumming plus alcohol neutralization



Cold degumming plus alcohol neutralization



## 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.



Call us now. The specialists from GEA Westfalia Separator will provide you with comprehensive information about pre-treatment of oils and fats for biodiesel production. The discussion does not commit you but will prove to be beneficial in terms of your decision to invest!

## For Good Cooperation: Claiming the TOP!

If you wish to permanently improve your added value with GEA Westfalia Separator, please talk to us about the current process lines available and their possibilities. You can take the first step by completing the fax form. We look forward to talking to you.

# Fax to: +49 2522 77-2384

## GEA Westfalia Separator

Simply make a copy of the form, complete it, and fax it through.

Company	
Contact	
Address	
Post code/city	
Telephone	
Fax	
E-mail	

Please call me to arrange a meeting concerning the subject  
of pretreatment of oils and fats for biodiesel production

We are interested in the following:

Alkaline refining

Physical refining

Alcohol refining

Or please send your request to [ws.process@geagroup.com](mailto:ws.process@geagroup.com)

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

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GEA Mechanical Equipment

**GEA Westfalia Separator**

Werner-Habig-Straße 1 · 59302 Oelde (Germany)  
Phone +49 2522 77-0 · Fax +49 2522 77-2089  
[www.westfalia-separator.com](http://www.westfalia-separator.com)