VAE CONTROLS OSTRAVA

CONTROL SYSTEMS AND TECHNOLOGY FOR PETROCHEMICAL AND WATER INDUSTRY AND POWER GENERATION

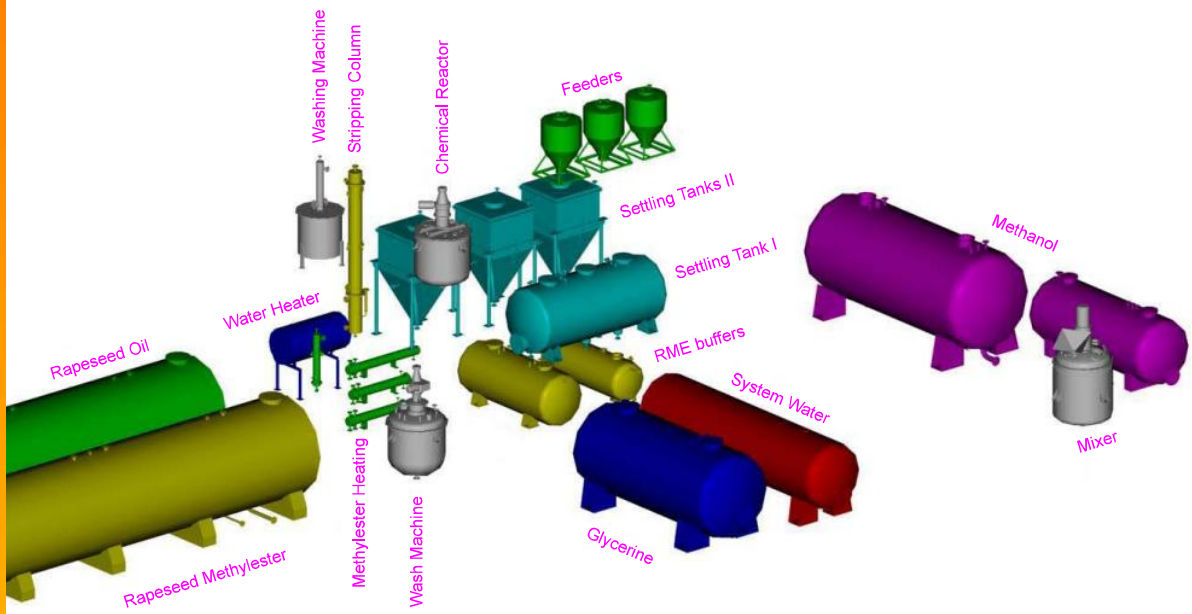
COMPANY OF THE YEAR '99

ISO 9001 KEMA

# Biodiesel Plant Construction

## Features:

- Batch processing unit with a capacity of 6.000 or 12.000 t/year
- Low investment costs
- Top production quality
- Ease of operation
- Capacity can be raced quickly and easily

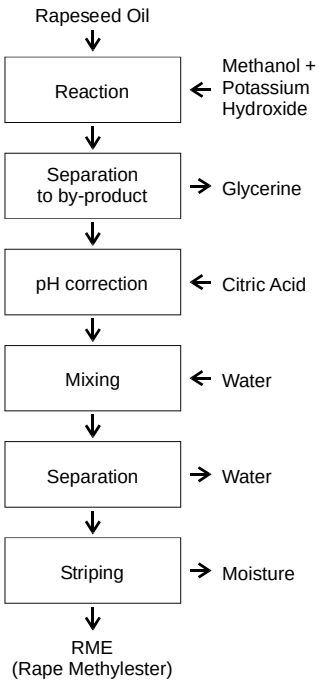



## How is biodiesel made?

Rapeseed oil chemically reacts with methanol in the presence of a catalyst (potassium hydroxide). The process is called transesterification The oil's triglycerides react to form esters and glycerol, which are then separated from each other and purified.

The ester product varies by name (Biodiesel; RME - rape methyl ester, etc) but very little by nature - carbon plus hydrogen plus oxygen. Biodiesel is very similar to diesel fuel. Its viscosity is only twice that of diesel fuel and its molecular weight is roughly 1/3 that of vegetable oil. Because of its oxygen content it is a very clean fuel, producing 50% less carbon waste than petrodiesel, together with less nitrogen and carbon monoxides.

Glycerine (also used in pharmaceuticals and cosmetics, and in other products) is a by-product.

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## What is biodiesel?

Biodiesel is a renewable diesel fuel substitute that is made by chemically combining rapeseed oil with methanol. Biodiesel is available in both its pure form (100% biodiesel, also known as B100) and in blends with petroleum diesel fuel. Biodiesel properties are very similar to conventional diesel. Emission properties, however, are better with biodiesel than with conventional diesel fuel.

## Biodiesel specifications:

| | Country | Austria | Czech Republic | France | Germany | USA | VAE Plant |
|---|---|---|---|---|---|---|---|
| | Norm / Unit | ON C1191 | CSN 65 6507 | Journal Officiel | DIN E 51606 | ASTM PS121-99 | |
| Density @ 15C | g/cm$^3$ | 0.85-0.89 | 0.87-0.89 | 0.87-0.90 | 0.875-0.9 | - | 0.875-0.9 |
| Viscosity @ 40C | mm$^2$/s | 3.5-5.0 | 3.5-5.0 | 3.5-5.0 | 3.5-5.0 | 1.9-6.0 | 3.5-5.0 |
| Distillation 95% | C | - | - | < 360 | - | - | - |
| Flashpoint | C | > 100 | > 110 | > 100 | > 110 | > 100 | > 110 |
| CFPP | C | 0/-15 | -5 | - | 0/-10/-20 | - | 0/-15 |
| Pourpoint | C | - | - | < -10 | - | - | - |
| Sulfur | % mass | < 0.02 | < 0.02 | - | < 0.01 | < 0.05 | < 0.01 |
| CCR 100% | % mass | < 0.05 | < 0.05 | | < 0.05 | < 0.05 | < 0.05 |
| Sulfated ash | % mass | < 0.02 | < 0.02 | - | < 0.03 | < 0.02 | < 0.02 |
| (Oxid) Ash | % mass | - | - | - | - | - | - |
| Water | mg/kg | - | < 500 | < 200 | < 300 | < 0.05% | < 300 |
| Total contam. | mg/kg | - | < 24 | - | < 20 | - | - |
| Cu-Corros. 3h/50C | - | - | 1 | - | 1 | < No.3 | 1 |
| Cetane No. | - | > 49 | > 48 | > 49 | > 49 | >40 | > 49 |
| Neutral. No. | mgKOH/g | < 0.8 | < 0.5 | < 0.5 | < 0.5 | < 0.8 | < 0.5 |
| Methanol | % mass | < 0.20 | - | < 0.1 | < 0.3 | - | < 0.20 |
| Ester content | % mass | - | - | > 96.5 | - | - | - |
| Monoglycides | % mass | - | - | < 0.8 | < 0.8 | - | < 0.8 |
| Diglyceride | % mass | - | - | < 0.2 | < 0.4 | - | < 0.4 |
| Triglyceride | % mass | - | - | < 0.2 | < 0.4 | - | < 0.4 |
| Free glycerol | % mass | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Total glycerol | % mass | < 0.24 | < 0.24 | < 0.25 | < 0.25 | < 0.24 | < 0.24 |
| Iodine No. | - | < 120 | - | < 115 | < 115 | - | < 115 |
| C18:3 and high. unsat. acids | % mass | < 15 | - | - | - | - | - |
| Phosphor | mg/kg | < 20 | < 20 | < 10 | < 10 | - | < 10 |
| Alcaline met. (Na, K) | mg/kg | - | < 10 | < 5 | < 5 | - | < 10 |

## VAE CONTROLS offers

Complete project implementation, including design, installation, plant startup, testing and training.

## VAE CONTROLS profile

VAE CONTROLS is an engineering, designing and software company focused on:

- technology, loading, measuring, electrical and control systems for fuel terminals
- telemetrical and SCADA systems for water networks, water treatment and sewage works
- equipment for powerplants etc..

Biodiesel plant in Sered, Slovak Republic

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