

C & E BIODIESEL

The FUELMATIC

**The continuous production of
up to 5,000 gallons of biodiesel per day**



FUELMATIC OVERVIEW

Continuous production of 5000 gallons of biodiesel per day

The Green Fuels FuelMatic™ biodiesel processing system uses innovative technology scaled down from our larger continuous flow range of plants. We also take advantage of advanced sensors to monitor the fuel production to ensure quality is maintained with flexible feed stocks, including used cooking oil.

The whole system is delivered as a turn-key-project. The customer just has one partner for construction, installation and start-up of the innovative technology. The main components of the plant can be installed within a 40 foot high-top ISO container. However, the plant can also be installed within a new or existing building on bespoke skids. As the plant is compact in size, it is easy to move the whole module, if required. Multiple systems may be tied to one Program Logic Control (PLC) center if desired.



Manufactures 5000 gallons of commercial grade biodiesel per day

The biodiesel system is able to use different cold and hot pressed fresh vegetable oils, as well as pre-treated used vegetable oils. In all cases, if the operator of the plant follows the required qualities of the input materials and ensures a constant process operation, the product quality will comply with the requirements of the ASTM 6751 standard. It has to be pointed out that used vegetable oils and certain fresh oils like palm oil only can be used for the production of so-called “summer-biodiesel” because the winter-stability can not be ensured. For all different raw materials, a transesterification grade of > 98% and constant product quality will be reached. Green Fuels recommends and distributes Cold Flo 350 to enable summer biodiesel to meet cold flow fuel specifications.

The system requires no water as the final purification is undertaken through Amberlite™ BD10 DRY™ ion exchange resin developed by Rohm and Haas. The system produces only very small quantities of waste products as 1 lb. of resin will treat 200 gallons of raw biodiesel.

FUELMATIC FEATURES

Simple Program Logic Control System (PLC)

"Set it and forget it."

We recommend hourly basic methyl-ester tests to monitor fuel quality. Otherwise, the PLC allows the operator to set the system for continuous flow without further intervention.

Pre-filter/Pre-heat Station

Robust components allow great flexibility on input feed stocks - up to 2% water, 5% FFA, and 2l MIU. Variable Residence Reactors Small intense piston reaction ensures consistent, complete reactions.



**Green Fuels
Biodiesel Purification
Module**

Fast-Flow Glycerin Separator

The patented Fast-Flow process provided nearly complete glycerin, soap, and unreacted particle removal. The fuel contaminants are removed through the polishing step.

Buffer and Methanol Recovery System

Residual methanol is removed while the buffer system automatically regulates process flow.

Waterless Polishing

Final step removes any remaining contaminants to make ASTM-6751 quality biodiesel fuel.

FUELMATIC BENEFITS

High Flexibility

A variety of input oils is possible.

High Product Yields

1 gallon biodiesel per 1 gallon input oil

Low Energy Demand

The plant system uses less than 50kWh per ton

Space-saving plant design

Modular design for flexible plant layout.



Systems are designed to meet the requirements of each customer

Custom Design

System is designed to meet the particular requirements of each customer.

Commercial Grade Fuel

The finished biodiesel quality is in conformity with ASTM-6751 standard.

Minimal Waste or Waste Water

The glycerin phase can be used for biogas processes or can be further processed, Methanol is recycled and can be re-used within the process, spent resin forms minimal volumes of inert waste.

FUELMATIC SPECIFICATIONS

Input parameters and requirements

The following requirements are necessary for an effective operation of the FuelMatic™ biodiesel production system.

Parameter*	Unit
Input fresh oil	Customer defined tonnage
Amount of Sodium or Potassium Methylate (30% solution in Methanol)	2% of input oil
Amount of Methanol	13.5% of input oil
Amount of Amberlite™ BD10DRY™	0.1% of input oil

*The addition of an oxidation stabilizer to ensure a longer storage ability of the biodiesel as well as the addition of an additive for the winter stability during the winter months has not been considered for this overview. Green Fuels recommends and supplies Cold Flo 350 as a winter additive.

For the quality of the fresh oil, pure rape seed oil used as vehicle fuel is used as basis.

Product parameters

The quality of the produced biodiesel will be in correspondence with the USA ASTM 6751, if the requirements are met.

Parameter	Unit
Biodiesel Production	
Amount	100% of the input oil
Density	0.87 – 0.9 g/cm ³
Water content	< 500 ppm
Flame point	> 120 °C
CCR	< 0.30%
Neutralization number	< 0.5 mg KOH/g
Free glycerin	< 0.02%
Triglycerides	< 0.20%

Methanol	< 0.20%
Glycerin Phase	
Average composition:	~18% of the input oil
Glycerin	60-70%
Na or KOH Soaps	10-20%
Methanol	10-15%
Impurities	5-10%

Some of the parameters defined in the standard ASTM 6751 are determined by the type and quality of the input materials used. They can not be influenced by the transesterification process itself. It has to be mentioned that it is not possible to reach the required CFPP value for biodiesel from used vegetable oils and certain types of fresh oil (e.g. palm oil) without prior pre-processing of these oils. Therefore the winter stability of biodiesel from used vegetable oils cannot be assured and may require a post-process and/or additive.

Operation parameters

Data per ton biodiesel production, values based on the usage of rape seed oil.

Parameter	Unit
Fresh oil	approx. 988 kg/t
Methanol	approx. 135 kg/t
Sodium or Potassium Methylate (30% solution)	approx. 19 kg/t
Amberlite™ BD10DRY™	approx. 0.9 kg/t
Plant System	
Electric energy of transesterification (without heating for building, storage tanks and ventilation)	approx. 59 kWh/t

The data are average values (tolerance +/- 5 %, dependent on input oil chosen) for a continuous operation of 8,200 hours per year with constant input material quality and quantity.