



Biodiesel production unit BB1000-CSR

Biodiesel is a methyl ester resultant from the reaction between the organic oils and an alcohol (usually the methanol) in alkali environment. To guarantee total reaction, heat and strong agitation must be provided.

The BB1000-CSR is a complete high quality biodiesel production unit, capable to process the transesterification, glycerine separation and biodiesel purification steps. The produced biodiesel complies the EN14214 standards, except for the methanol contents.

This unit composed of one 316 SS methoxide reactor, one insulated 304 SS double wall transesterification reactor and one 304 SS ion exchange resin column. All the parts are skid mounted. The biodiesel production steps are PLC controlled.

The biodiesel purification is made by passing the crude biodiesel through a ion exchange resin column.

The BB1000-CSR unit has 18KW electric heating power; advanced three level mixing system and two filtering levels. Built confirm CE regulations, all electric parts, like pumps, heaters, probes, etc., are ATEX IIG certified and methoxide contact parts are pneumatic actuated for ambient and industrial safety.

Características de funcionamento da unidade de produção de biodiesel BB1000-CRA:

- Double wall insulated transesterification reactor;
- Semi-automatic oil admission;
- Automatic oil heating;
- Semi-automatic methoxide admission;
- Automatic transesterification;
- Semi-automatic glycerine separation;
- Ion exchange resins biodiesel purification;
- Temporização de funcionamento;
- PLC controlled;
- Step by step PLC messages;
- Independent control panel;
- All ATEX certified electric components;
- Built confirm CE regulations;
- Electronic and mechanical safety systems that prevents operating fails;



BB1000-CSR

- Batch reaction process;
- Skid mounted unit;
- All components are standard and easily replaceable;
- Turn-key plant – No assembling needed.

Products:

BB1000-CSR - Products	
Biodiesel	1000 Litres
Glycerine with methanol per batch	225 Litres

Feedstock consumption:

BB1000-CSR – Feedstock consumption	
Oil	1000 Litres
Methanol	230 Litres
NaOH	3500g a 6500g (depending on titration)
Ion Exchange resins	1 Kg
Nitrogen	1460 Litres (gas)
Compressed air	12500 Litres

Energy:

BB1000-CSR – energy	Values per 1000L of produced biodiesel
Oil admission	75W
Oil heating	17900W (heating and pumps)
Transesterification	1100W
Control panel and electrovalves	105W
Total electric energy consumption	19180W
Electric power	25KW



BB1000-CSR

Efficiency:

BB1000-CSR - Efficiency	
Biodiesel per batch	1000 Litres
Oil heating (20°C – 60°C)	55 minutes
Transesterification	60 minutes
Fill time	5 minutes
Glycerine separation	5,0 hours
Biodiesel purification	120 minutes
Total time	9,0 hours

Workmanship time:

BB1000-CSR – workmanship	Values per 1000L of produced biodiesel
Oil fill	5 minutes
Methoxide	55 minutes
Methoxide fill	10 minutes
Valves and PLC acting	5 minutes
Total workmanship	75 minutes

Todos os comandos do processo são montados num painel de controlo; possui programador analógico de comando de processo com avanços por mensagens 'step by step'; possui termostato e termómetro.

Used materials

Stainless steel 304 e 316
Stainless steel 304, 316 and PTFE piping
Built confirm CE regulations
ATEX certified electric components



BB1000-CSR

BB1000-CSR specifications:

Specifications	BB1000-CSR
High performance 1500 Litres reactor. built in 304 SS insulated double wall	1 x
High performance de 300 Litres methoxide reactor, AISI 316	1 x
500L/hour resin Exchange dry wash system	1 x
ATEX certified 1,1 KW / 300 litres per minute pump	1 x
45 L/min; 12 m ³ air / hr pneumatic pump	1 x
ATEX certified electric heating units	2 x
PLC controlled	Yes
ATEX certified temperature probes	Yes
ATEX certified level probes	Yes
Pneumatic valves	Yes
Bag filter	Yes
Final polishing filter	Yes
All welds and fits in 316 SS	Yes
Electric Power 380/415 Volt – 50Hz, 30A	Yes
Independent control panel	Yes
Automated oil fill	Yes
Automated transesterification reaction	Yes
Calorific insulation	Yes
Step by step PLC messages	Yes
Sound and light alarms	Yes
Ion exchange resin biodiesel purification unit included	Yes
Filtration system included	Yes
Storage tanks included	No
Air compressor included	No
Turn key unit – no assembling needed	Yes
Two year warranty for electric parts	Yes
5 Year warranty for stainless steel parts	Yes
Built confirm CE regulations	Yes
Operation manual included	Yes



Process description

The used cooking oil (UCO) must be pre-filtered and stored in conic-bottom tanks for 24 hours. After this period, the UCO is filtered by 100 to 60 micra filter media before filling the transesterification reactor. After the oil is heated up to 60°C, the pre-prepared methoxide is added to the oil and the transesterification operation begins. When the reaction is over, the BB1000-CSR command unit stops all the agitation devices and the countdown process will be remain during the glycerine separation step. When glycerine separation is over, a beep is sound and the glycerine can be removed opening the bottom valve. After the glycerine is removed, the biodiesel purification step will take place by passing the biodiesel trough the ion exchange resin column. The oil filling, transesterification, glycerine separation and biodiesel wash steps are automated operations; methoxide preparation is a semi-automated step. All steps are PLC controlled.

The biodiesel purification is made by circulating the crude biodiesel through the ion exchange column in a single pass at constant flow. The resin column fits 160Kg of Amberlite BD10Dry™ which allows wash 160,000 Litre of biodiesel before the resin replace is needed.

The biodiesel quality is dependent of the reactants quality. Please use good feedstock, 99.8% purity grade methanol and pearl form NaHO with 99.9% of purity grade. In order to save operation time, the methoxide must be pre-prepared during the oil heating process, this procedure allows ready to use methoxidel when the oil is heated.

The methoxide reactor should be placed in a well ventilated and cool room. Is highly recommended the use of mask and gloves during the methoxide preparation.

Biodiesel should be stored in constant temperature places to avoid condensation. When biodiesel is stored for long periods, should be provided nitrogen or argon atmosphere.

Thank you for your time reading this paper,

BB-DIESEL

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