



## BB1000-NTA Neutralizer

The used cooking oils (WVO) are good feedstock to biodiesel production if are 0.5% of free fat acids (FFA) max value. The FFA are not converted in biodiesel at the transesterification process, creating soaps, making difficult the biodiesel washing and producing low quality biodiesel. The solution to this problem consists in neutralize the high FFA oil into a quality oil with 0.5% FFA content before the transesterification process.

The BB1000-NTA processor neutralizes 1000 Litre high FFA used cooking oil every two hours in neutralized cooking oil (NCO) with 0.2% FFA of max value. This high quality neutralization equipment operates in completely automated mode thanks to the industrial PLC control unit.

### BB1000-NTA characteristics:

- Automated oil admission;
- Automated heating;
- Automated NaOH dosing;
- Automated water dosing;
- Automated neutralized oil and water with soaps discharge;
- Number of operating cycles regulation;
- Automatic restart;
- Function timer;
- PLC synchronized operations;
- All instruments, valves and equipments are CE certified;
- Security electronic and mechanical devices to prevent all kind of failures;
- Batch process to allows different reagent concentration for different types of feedstock;
- All instruments are standard and easily replaceable.

### The BB1000-NTA units are composed by:

- Neutralizer processor;
- NaOH settling tank;
- Water settling tank;
- Control panel;
- Skid mounted.



**BB1000-NTA Neutralizer**

**Efficiency:**

<b>BB1000-NTA - efficiency</b>	
Neutralized oil per batch	1000 Litre
Max FFA in the WVO (inlet stream)	5%
Max FFA in the neutralized oil	< 0,2%

**Operation periods:**

<b>BB1000-NTA - time</b>	
Oil heating (20°C to 75°C)	60 min
Neutralization	50 min
Fill	5 min
Discharge	5 min
<b>Total time</b>	<b>120 min</b>

**Consumptions:**

<b>BB1000-NTA – consumptions</b>	
Oil per batch	1000 Litre
NaOH solution per batch	20L to 50L (depends on titration)
Water per batch	50L to 100L (depends on titration)

**Products:**

<b>BB1000-NTA – products</b>	
Neutralized oil per batch	1000 Litre
Water with soaps per batch	70L to 150L (depends on titration)



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**Electric consumption:**

BB1000-NTA – Energy	Values for 1000L neutralized oil
<b>Electric energy</b>	
Oil admission	110W
NaOH + water dosing	16W
Oil heating	21500W (heaters + mixer)
Neutralization	1500W
Electro-valves command	104W
<b>Total electric consumption</b>	<b>23230W</b>
<b>Electric power</b>	<b>22KW</b>

**BB1000-NTA Specifications:**

Specifications	BB1000-NTA
1400L high performance neutralizer reactor	AISI 304 double wall Insulated
300L NaOH settling tank	AISI 304
300L water settling tank	AISI 304
Oil feeding pump	Centrifugal multicelular 230L / min; 1.1KW
NaOH and water feeding pump	Dosing pump
Electric mixer	1450 RPM 1.5 KW
Level control switches	Type: vibrating fork
Safety vacuum valves	Type: vacuum relief valves
Safety overpressure valves	Type: pressure relief valves
Safety cut valves	Type: ball valves AISI 316
Flow check valves	Type: Check valves
Commanded electro-valves	Type: diaphragm air operated
Control pressure transducers	Range: 200 – 1000 mbar



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**BB1000-NTA Specifications (continued):**

Specifications	BB1000-NTA
Temperature control transducer	Type: PT100
Analogical pressure	Type: Pressure gauge AISI 316
Analogical temperature	Type: Temperature gauge AISI 316
Electric heaters	2 electric heaters 10KW each
Industrial PLC controlled	Yes
Alphanumeric display	Yes
Skid mounted	Yes
316 and 304 stainless steel devices	Yes
316 stainless steel valves	Yes
Automatic stand alone unit	Yes
Light and sound alarms	Yes
Operation information on PLC	Yes
Three phase electric unit	Yes
Isothermal double wall reactor	Yes
Turn key, no assembling needed	Yes
One year guarantee for instruments and pumps	Yes
Five years guarantee for SS tanks	Yes
Control panel included	Yes
Manufactured according CE standards	Yes
Operations manual included	Yes



## Process description

The WVO must be filtered and stored for 24 hours (in alternative could be centrifuged) before neutralization to ensure total particles removal. After this period, the oil is filtered in 60 – 100 microns cartridge filters.

When the unit starts the command unit display asks for the number of cycles and FFA percentage in the feedstock. Introduced these data, 1000L of WVO is filled into the neutralizer and heated up to 75°C in a completed automated process.

The acidity determination (% FFA) is made by NaOH and fenolftalein titration and the obtained value is introduced in the PLC display.

Once the ideal reaction temperature was reached the NaOH solution and water start being dosed, the neutralization reaction begins. One hour later the unit discharges the neutralized oil and the water to the separation tank or to the centrifuge settling tank, then to the drying unit to eliminate all water residues (separation and drying units not included), and restart the process.

The BB1000-NTA neutralizer is pre defined to make 4 cycles with only one operator's intervention; nevertheless this value could be changed any time the unit is started.

Except the NaOH solution pre preparation, all the automated neutralization process is commanded by the control unit.

The neutralized oil must be decanted for 2 hours (in alternative could be centrifuged) and dried to guarantee the extraction of all water.

The NaOH 15% (m/m) solution pre preparation must be well mixed to guarantee the complete solution of the NaOH on the water.

Because NaOH is irritant to the skin and eyes, the operator should dress mask and gloves during all the NaOH solution preparation to avoid any type of contact.

Thank you for your time reading this paper,