



**ECO SMART**  
WATER TECHNOLOGIES NAMIBIA CC

## **ECO Smart Aerobic Waste Water Treatment System**

**Optimising the re-use and recycling of waste water**



## ECO Smart Aerobic Waste Water Treatment System

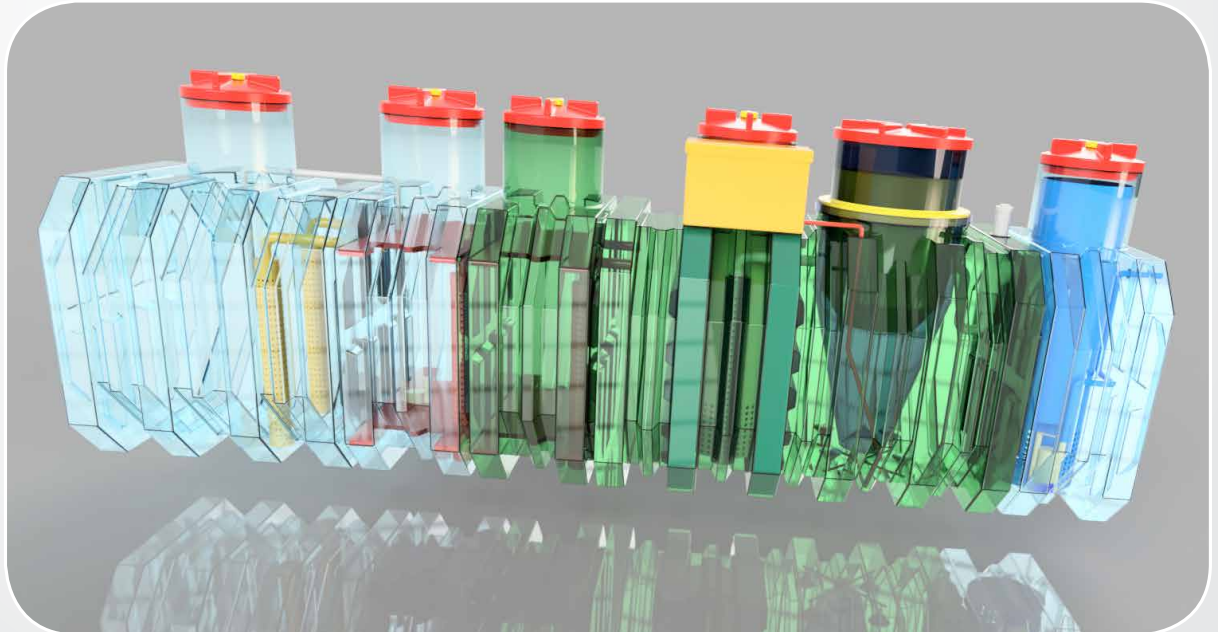


The **ECO Smart** aerobic wastewater treatment system is a self-contained wastewater treatment system that utilizes a combination of anaerobic as well as aerobic biological processes combined with a Nano filtration system to treat sewage. This waste water treatment system is designed to handle a continuous flow of waste water relying on bacteria suspended in the wastewater to break down solids as well as Nano filtration technology to remove other contaminants. The **ECO Smart** aerobic waste water treatment system operates on gravity and no feed pumps are required. The suspension and aeration are provided by an air pump (approximately 40 Watts), which provides air to the bio-filtration process, the aerobic bacteria generator chamber as well as the aeration chamber, providing a constant stirring of the wastewater in addition to the oxygenation.

The **ECO Smart** aerobic wastewater treatment system is a feature packed 6 stage waste water treatment system operating much like a small municipal sewage treatment plant resulting in a clean septic effluent. The ECO Smart aerobic waste water treatment system is also a modular system and the treatment capacity can be adapted to treat a wide range of operating requirements.

For the recycle sanitation system, the system has been adapted with the inclusion of an aerated biological filter as well as a cistern inline Nano filter to ensure that high quality of effluent is supplied to the toilet cistern.

Main Reactor Tank



## ECO Smart Aerobic Waste Water Treatment System



### Six Stages of the ECO Smart aerobic wastewater treatment system

Stage 1:

#### Sludge Box

This is the pre-treatment stage where the waste water enters the system. All large solids as well as undesirable substances remain behind in the sludge box, i.e. is separated from the wastewater. This stage acts much like a septic system where all fecal matter is contained and digested by anaerobic microbes added, preventing a solid build-up. The sludge end product formed in the sludge box is a fine soft watery mixture and continues to be consumed by the anaerobic microbes.

The sludge box is also fitted with a sludge filtering system ensuring that only the watery mixture present progress into the filter box for further processing.

#### Main Reactor Tank Components



## ECO Smart Aerobic Waste Water Treatment System



Stage 2:

### Filter Box

The filter box contains the biological filtering system where the bio filtration process takes place. This biological filtering system consist out of 4 x aerated bio-filters which contains a media on which microorganisms attach and grow to form a biological layer called biofilm.

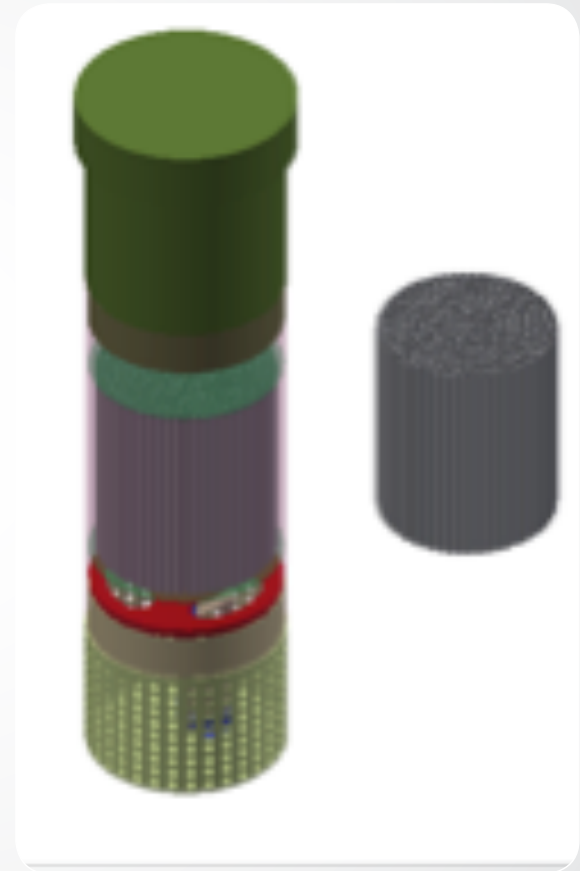
The waste water is applied over the media where the organic matter and other water components diffuse into the biofilm and treatment occurs, mostly by biodegradation.

Stage 3:

### Aerobic Bacteria Generator

Waste water from the filter box enters the aerobic bacteria generator chamber through the sludge filter where the aerobic bacteria generator, a bio-filtration system that is designed to promote fixed film bacterial growth in order to handle higher than normal levels of biomass in the wastewater, continue to break down and digest waste.

The ABG consist mainly out of a bundle of straight tubes which is used in what is called a “submerged packing process”; the wastewater is circulated through these packings under aeration so that aerobic microorganisms are generated on the surface of the individual packings (tubes) as films where various organic substances that come into contact with the films are decomposed.



ABG

## ECO Smart Aerobic Waste Water Treatment System



Stage 4:

### Aeration

Waste water passes to the aeration chamber where oxygen is pumped into the waste water providing a constant stirring of the wastewater in addition to the oxygenation.

Stage 5:

### Settling

Clear odorless effluent rises into the clarifier chamber from the bottom up. This is the settling out phase of the system as the cone shaped clarifier ensures that any fine solids still present sink down and settle out back into the aeration chamber where it get dispersed with the uniquely cone shape bottom floor. The clarifier also act as the anoxic zone where some de-nitrification take place, as there is no aeration taking place in the clarifier.

Stage 6:

### De-nitrification

The de-nitrification filtering chamber is fitted with a Nano filter (De-nitrification Filter) as well as a water circulation pump. Water passes from the clarifier into the de-nitrification filtering chamber, where the water is continuously recycled through the Nano filter by the water circulation pump, enhancing the water quality by removing phosphates, nitrates, heavy metals and other dissolved contaminants.

### Soak Away

Access effluent, which is highly treated and is according to and complies with the Special Standards as prescribed by the Ministry of Agricultural, Water and Forestry, is discharged into the soak away through the system overflow.

The soak away consists out of 6 lengths of 6 meters long, 40 mm dia. PVC pipes perforated with 5 mm dia. holes buried at a depth of no less than 600 mm in a bed of 19 mm dia. gravel covered with a plastic sheet at a depth of 400 mm below ground.

### Clarifier & De-nitrification



## ECO Smart Aerobic Waste Water Treatment System



### Discharge standards, general standard limits

PH 5.5 - 9.5  
Conductivity 150; 70 above water supplied mS/m  
Total Suspended solids 25 mg/l  
Chemical Oxygen Demand 75 mg/l  
Ammonia (as N) 6 mg/l  
Nitrate (as N) 15 mg/l  
Fecal Coliforms 0 CFU/100ml

### Operation and Maintenance

The system is designed to avoid complicated operation. The only moving parts are the submersible, sludge and air pumps which operate automatically and are controlled from the electrical control panel.

### Sludge Management

The Aerobic Bacteria Generator system produces small quantities sludge and is broken down into methane gas, carbon dioxide and water. Depending on the volume and BOD influent values the system will require minimum de-sludging.

### Disinfection

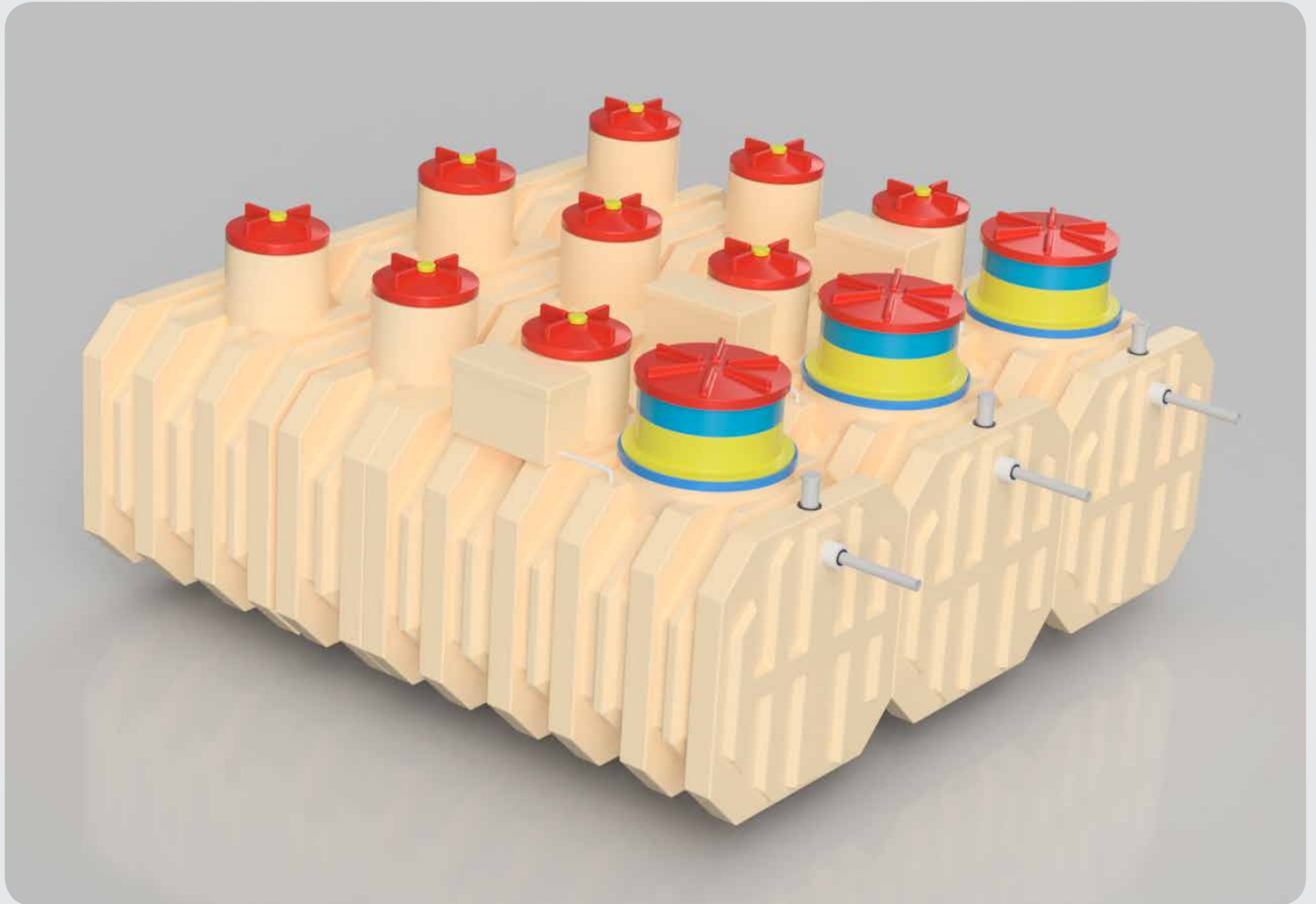
For this application we recommend final disinfection using chlorine pills dispersed through an Eco SMART chlorinator.

### Commissioning

Generally, the system takes 2-3 weeks to run optimally from start-up. Bacterial seeding is required. Foaming can occasionally be seen during the initial start-up period but settles down once the bacteria bio film has established.

### Warranty

5 years on the structure  
1-year manufacturer's warranty on aeration pumps



Standard 4 850 litre Waste Water Treatment System

# ECO SMART

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