



ANITA™ Mox

Sustainably treating highly concentrated ammonia-loaded effluents

WATER TECHNOLOGIES

The cost-effective and sustainable response to the challenge of high-ammonia loaded effluents

At a wastewater treatment plant, dewatering sludge after treatment by anaerobic digestion produces liquids with a high ammonia-load that need to be treated.

These concentrated effluents are often returned to the head of the wastewater plant and they require costly treatment. This treatment may require adding a costly carbon source and leads to increased electricity consumption for biological treatment aeration.

The amount of ammonia contained in these effluents returned to the head of the plant may represent an increase of up to 20% of the amount of nitrogen to be eliminated by the plant.

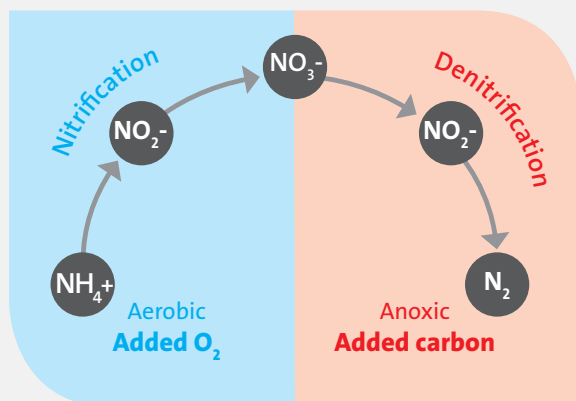
In some cases, this amount of nitrogen may become incompatible with the treatment capacity of a wastewater treatment plant. This additional load may also jeopardise downstream sludge digestion processes intended for sludge reduction or enhanced biogas production.



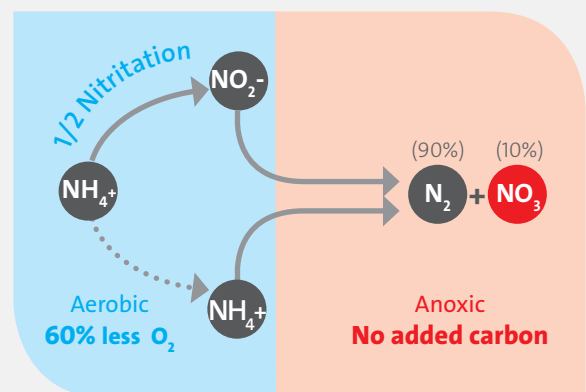
To address these issues, Veolia Water Technologies has developed the ANITA™ Mox solution, an alternative to conventional nitrification/denitrification processes for treating effluents with a high ammonia concentration. ANITA™ Mox can treat this sidestream nitrogen load without any additional source of carbon while reducing the electric power consumption by 60%.

ANITA™ Mox is the ideal solution to reduce operating costs and contribute to reaching the target of an energy self-sufficient wastewater treatment plant while meeting regulatory requirements on nitrogen concentrations in the treated wastewater.

Conventional nitrogen removal

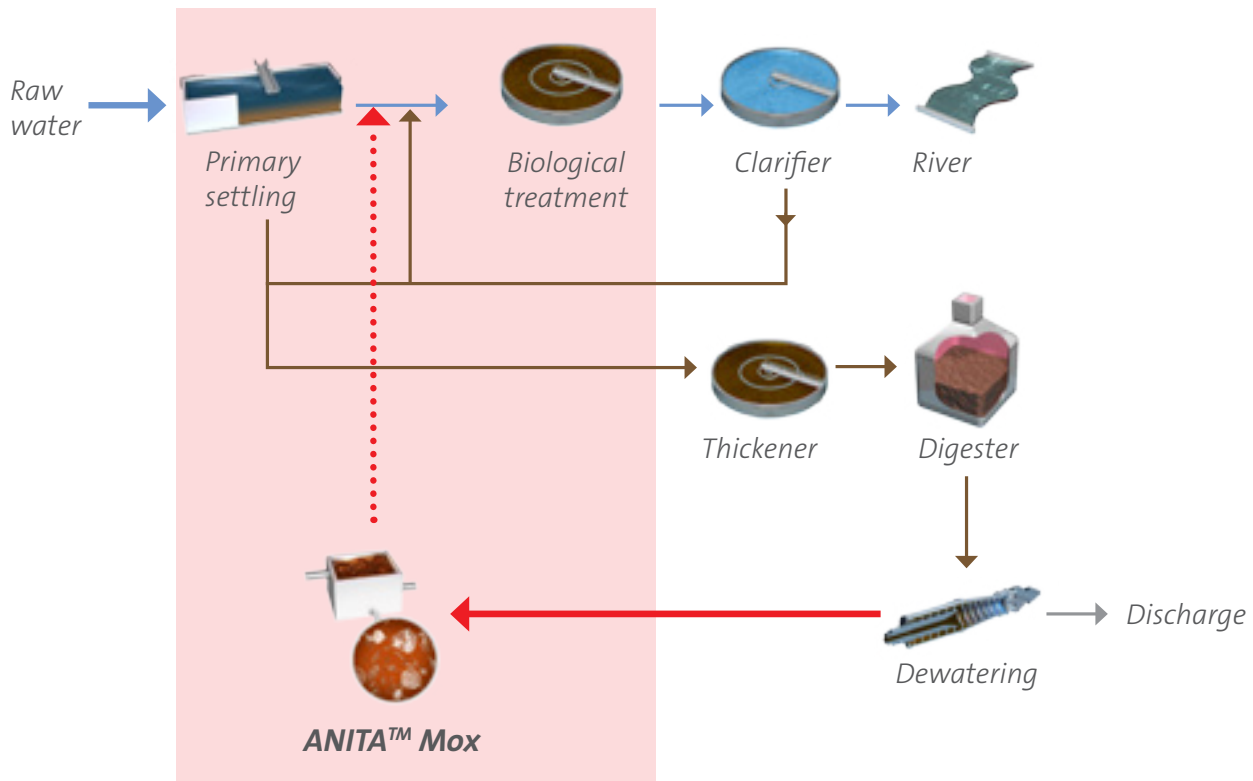


Nitrogen removal using the ANITA™ Mox process



A wide range of applications

The ANITA™ Mox solutions limit the impact of digestion on the water process at a wastewater treatment plant.



ANITA™ Mox solutions are especially suited to:

- Bring into compliance wastewater treatment plants with existing sludge digestion and facing a significant rise in the nitrogen content of their raw water.
- Wastewater treatment plants wishing to add sludge digestion that may or may not be combined with thermal hydrolysis, to recover the energy contained therein while reducing sludge disposal costs and becoming more energy self-sufficient.

For industrial effluents, ANITA™ Mox also provides an efficient and sustainable response for:

- Treating leachate from waste landfills,
- Treating effluents from green waste composting or biowaste methane production facilities,
- Polishing treatment after anaerobic treatment (for slaughter houses, agri-food applications, etc.).

The ideal combination:

ANITA™ Mox + thermal hydrolysis (Exelys™ / Bio Thelys™)

The ANITA™ Mox process is especially recommended for plants with digestion systems combined with thermal hydrolysis (Exelys™ / Bio Thelys™), a combination that is used to increase biogas production and reduce the amount of sludge produced. The increased nitrogen load after thermal hydrolysis is preferentially treated in the ANITA™ Mox process under sustainable conditions.



- > 80% nitrogen removal
- > Safety and simplicity
- > A carbon footprint reduced by up to 85%

- > Reduced operation costs with up to 60% less oxygen demand and no external carbon requirements.

ANITA™ Mox references

Sjölunda (Malmö), Sweden

- Treating digestion returns by MBBR and Hybas™
- 200 kgN per day

Sundets (Växjö), Sweden

- Treating digestion returns by MBBR
- 430 kgN per day
- Adding co-digestion and thermal hydrolysis systems in 2014

Holbaek, Denmark

- Treating digestion returns and landfill leachate by MBBR
- 120 kgN per day

Grindsted, Denmark

- Treating digestion returns by MBBR
- 110 kgN per day
- Adding co-digestion and an Exelys™ system in 2015

James River, USA

- Treating digestion returns by MBBR
- 250 kgN per day

South Durham, USA

- Treating digestion returns by MBBR
- 330 kgN per day

Egan (Chicago), USA

- Treating digestion returns by MBBR
- 940 kgN per day

Locarno, Switzerland

- Treating digestion returns by MBBR
- 300 kgN per day

Industrial client , Poland (Food & Beverage)

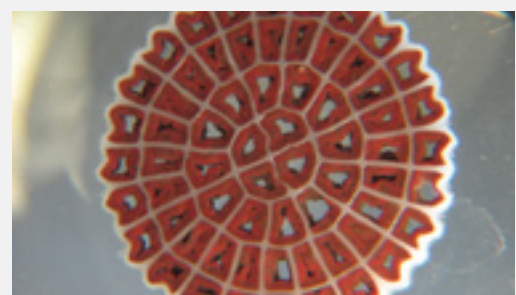
- Treating sludge digestion returns by MBBR
- 340 kgN per day



Sjölunda, Sweden

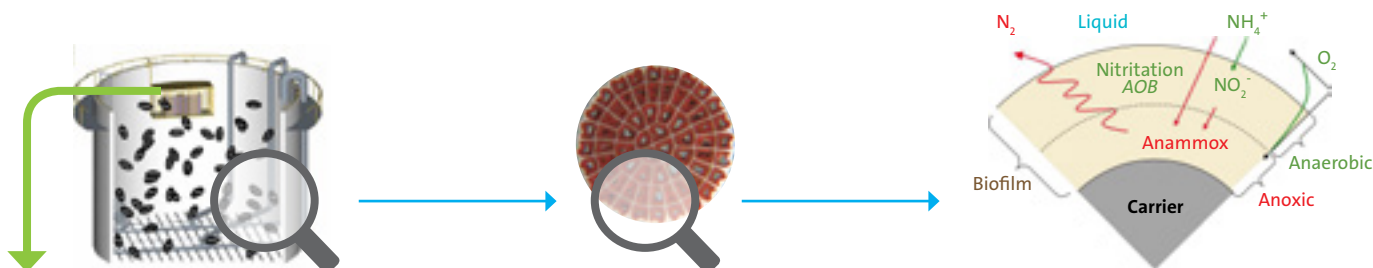


Grindsted, Denmark



ANITA™MOX: operating principle

ANITA™Mox implements an Anammox biomass in an MBBR (Moving Bed Biofilm Reactor). The specificity of this biomass lies in its use of ammonium to grow. These bacteria attach onto carriers that are kept in motion within the reactor.



The presence of retention grids with a suitable meshing avoids any loss of carriers out of the reactor and **guarantees process safety over time.**

Carriers with large protective surface area allow Anammox bacteria as well as nitrite producing bacteria (AOBs) to develop as a biofilm.

Specific operation conditions with controlled aeration strategies are applied within the MBBR to **optimize biofilm growth for better nitrogen removal.**

Two processes take place simultaneously on the carriers:

- Partial nitritation in the presence of oxygen in the outer aerobic biofilm layer
- Anammox reaction in the inner anoxic biofilm layer



BioFarms for quick process start-up

Pre-colonized in BioFarms, the carriers are used to accelerate the start-up of the ANITA™ Mox MBBR. Coupled with advanced control of operating conditions, this method ensures maximum reactivity and a reduced start-up period.

Key benefits

In operation, ANITA™ Mox is the most economical solution:

- **60% savings on aeration** compared to conventional processes
- **No carbon source needed**, reducing operating costs and environmental impact
- Carrier + retention grid = no loss of Anammox biomass
- **Compact and flexible process**, suited to bring existing plants up to standards
- **90% reduction in sludge production** compared to conventional treatment
- **Ease of operation** and handling temporary variations in flow and concentrations.

