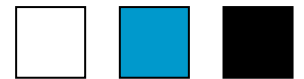


BOX 4 WATER®



Containerized Wastewater Treatment Plant



■ ■ ■ Introduction

Box4Water offers a

- turn-key,
- compact and
- mobile solution

for the **decentralized treatment of wastewater** at remote locations (small municipalities, working camps...)

- Complete wastewater treatment plant fully integrated in a standard container.
- No need for sewer connections to the nearest municipal wastewater treatment plant.
- Effluent in compliance with European and International regulations for direct discharge.

Design of **Box4Water** in accordance to customer needs for industrial and/or municipal wastewater



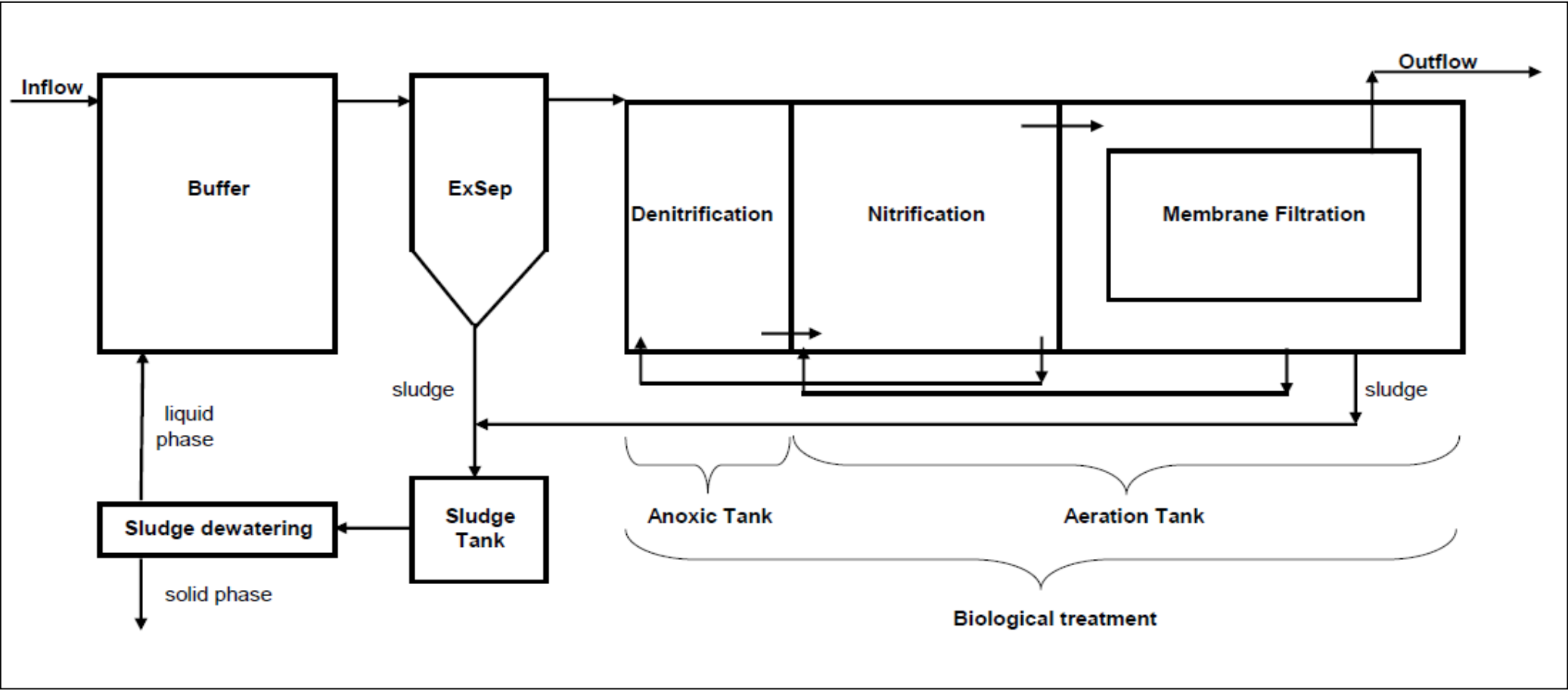
Box4Water Standard Models

Standard Box4Water Models	Water flow rate [m³/d]	Population	Container size
Box4Water 12.5	12.5	60 PE	20-ft. high-cube
Box4Water 25	25	125 PE	20-ft.* or 40-ft. high-cube
Box4Water 60	60	300 PE	40-ft. high-cube
Box4Water 120	120	600 PE	2 x 40-ft. high-cube

* depending on local conditions

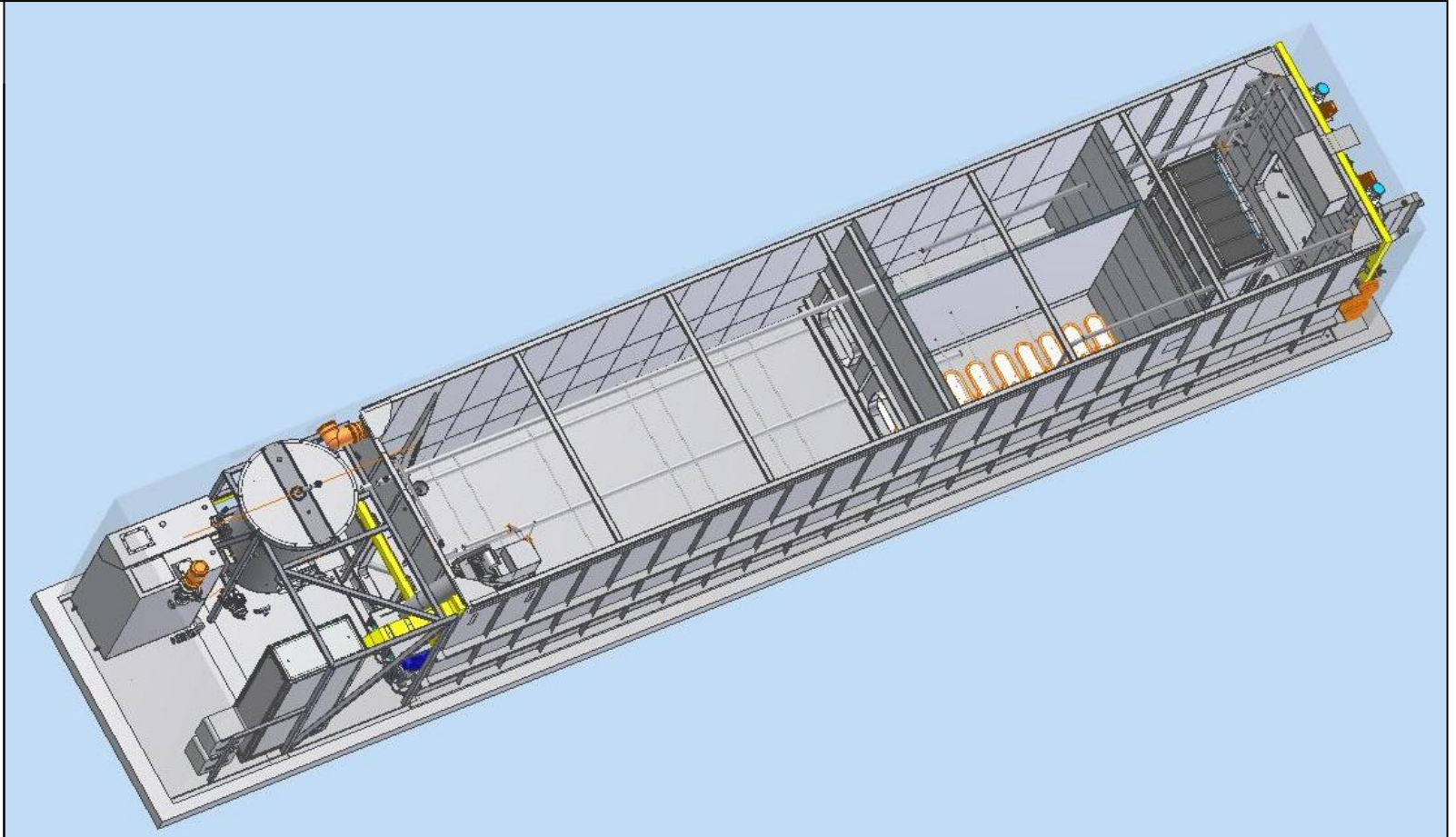


Flowchart



■ ■ ■ Process

- Coarse cleansing with 2 mm screen
- Buffering and homogenization
- Mechanical pre-treatment (solid/liquid separation) using ExSep®
- Biological treatment with Membrane-Bio-Reactor (MBR)
- Membrane filtration technology
- Sludge dewatering with more than 15% Dry Solid (DS) content



Example: Box4Water 60 m³/d in 40" high-cube container

1. Preliminary Sedimentation and Filtration by **ExSep®**

ExSep®:

Epuramat's patented technology for solid/liquid separation.

- Uses gravity and fluid dynamics
 - Separated solids sink to the bottom of the **ExSep®** where the suspension thickens and is sucked off for subsequent sludge treatment
 - Fat and floating particles will be trapped and removed from the water surface
 - Very low energy consumption
 - Most application without chemicals
 - Separation efficiency up to 99 %
- Reduces the pollutant load for subsequent treatment steps.
- Smaller plant dimensions.
- Lower investment and operating costs.



2. Biological Treatment : Membrane-Bio-Reactor (MBR)

■ Anoxic zone

- Treatment of wastewater mixed with return sludge
- De-nitrification process using bio media
- The bacteria stick on the free floating bio media and accumulate



■ Aeration zone

- The bacteria grow and consume organics that are in the wastewater
- Final treatment by a subsequent membrane filtration

→ Advanced carbon and nutrients removal

→ High level of effluent quality

3. Sludge dewatering system

A complete sludge dewatering system is integrated inside the container.

- All sludge produced in the Box4Water is dewatered
- 15% DS or even higher (depending on the sludge origin) without using any chemicals.

Low maintenance efforts :

- can be stored for a comparatively long period
- Easy disposal
- Saving of transport costs



❑ **Ultraviolet (UV) Disinfection System (optional)**

Wastewater disinfection to sufficiently reduce the quantity of pathogens present

- by killing or inactivation
- no health hazards expected when the wastewater is discharged
- treatment done without the use of chemicals



□ **Touch Screen Control Panel with Remote Monitoring and Control**

- The Box4Water is equipped with a touch screen control panel.
- Remote monitoring and control using internet or satellite connection.
- On-site or remote activation of the individual components and visualization of all the plant parameters (pH, temperature, flow rate, O2-level...)

→ The customer is able to monitor and control the Box4Water without being present on site.

→ Easy operation of the plant

→ Optimal follow-up of parameters and performances



Box4Water Performances

- **Inflow:** Municipal wastewater / sewage (yellow, black and grey water)
- **Effluent:** Water in compliance with future European and international regulations for direct discharge

	Assumed influent wastewater characteristics:	Treated (effluent) characteristics:
Biological Oxygen Demand (BOD ₅)	100 – 400 mg/l	< 5 mg/l
Total Suspended Solids (TSS)	100 – 350 mg/l	< 1 mg/l
Total Nitrogen (TN)	15 – 60 mg/l	< 2 mg/l
Total Phosphorus (TP)	3 – 12 mg/l	< 2 (1)* mg/l
Faecal Coliforms	n.a.	< 1
Virus Retention	n.a.	99.99%
Turbidity	n.a.	< 1 NTU
ph value	n.a.	6.5 – 8.5

Wastewater volume assumption:
200 l / person / day (no rainwater considered)

* by additional precipitation

Box4Water Performances

The **Box4Water** is designed according to International and European minimum requirements for direct discharge as listed below.

Parameter* (pH 6-9)	Unit	Range of inflow	Effluent requirements of European Union			Canadian regulations	Effluent Box4 Water 60 PE – 600 PE
			Class I 50 PE - 1,000 PE	Class III 5,001 PE - 10,000 PE	Class V 10,001 PE - 100,000 PE	for environmental protection zones	
Chemical Oxygen Demand (COD)	mg/l	200 - 800	150	90	75	50	< 50
Biological Oxygen Demand (BOD ₅)	mg/l	100 - 400	40	20	15	< 10	< 5
Total Suspended Solids (TSS)	mg/l	100 - 350	-	10	10	< 5	< 1
Total Nitrogen (TN)	mg/l	15 - 60	-	-	18	< 2	< 2
Total Phosphorus (TP)	mg/l	3 - 12	-	-	1	< 1	< 2 (1)**
Fecal Coliforms	c./100 ml	-	-	-	-	< 100	< 1

* Water characteristics of typical inflow, European and international requirements for direct discharge and effluent from Box4Water

** by additional precipitation



Technical data

	Box4Water 12.5	Box4Water 25	Box4Water 60	Box4Water 120
Water treatment capacity	12.5 m³ / d	25 m³ / day	60 m³ / day	120 m³ / d
Population Equivalent (PE)	60 PE	125 PE	300 PE	600 PE
Buffer tank capacity (8h)	4.5 m³	8.3 m³	20 m³	40 m³
Membrane filtration capability	40 nm (ultra filtration)			
Energy requirement (without heaters or AC equipment)	~ 5 kW	~ 6 kW	~ 9 kW	~ 11 kW
Operating environmental temp.	- 45°C to + 45°C			
Inside temperature during operation	+ 15°C to + 30°C			
Noise emission (inside container)	max. 75 dB (A)			
Sludge Dry Solid (DS) content	min. 15% (typical 17%)			

■ ■ ■ Summary by Unique Selling Points (1)

Box4Water

Unique selling points (1)



Whole sewage treatment process in standard 20' and 40' High Cube container, no need for additional equipment or tanks, thanks to the proprietary ExSep® technology.

- World wide most compact STPs installed in a container
- Buffer tank (up to 8 hours) with homogenization function within the containerized plant
- Low operation costs (low energy consumption, low maintenance and no need for chemicals)
- Effluent values compliant with future legislation thanks to the Bio-Membrane-technology
- Mobile & modular construction, allowing wastewater treatment of 12,5 to 60 m³/day in one High-Cube container (120 m³/d in two 40' HC container)

Construction and functional testing at the workshop of Epuramat in Contern, Luxembourg



■ ■ ■ Summary by Unique Selling Points (2)

Box4Water

Unique selling points (2)



View inside Box4Water with ExSep® for pre-treatment

- All units are designed into insulated containers, for operation in temperatures from -45°C to $+45^{\circ}\text{C}$
- Enclosed unit, with no disturbance due to bad odor or noise
- Sludge treatment included (without chemicals) achieving minimal 15 % Dry Solid content (DS) of dewatered sludge
- Remote monitoring and control via GSM or satellite link to laptop, smart phone/tablet PC
- During operation personnel presence is required only once a week for emptying the dewatered sludge bin
- Short implementation time (delivery 3 months from the date of order, operational within days after start-up)

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