
ExSep®

Primary Treatment, Solid/Liquid Separation



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1. Introduction

Epuramat's patented ExSep® (Extreme-Separator) is a solid/liquid separation technology based on gravity and fluid dynamics. This innovative primary treatment system can be used for municipal and industrial wastewater treatment applications.

ExSep® operates with low energy and chemical demand and is ExSep® is scalable to fit a wide range of wastewater characteristics and capacities, from 0.5 m³/h to 250 m³/h, with separation efficiency up to 99%. Because it can replace traditional big sand traps and sedimentation tanks as well as energy-intensive alternatives such as flotation systems, ExSep® combines high efficiency with small footprint, low investment, operation and maintenance costs like no other existing pre-treatment technology.

ExSep® can be used in particular as a pre-treatment unit for various industrial process water, for overloaded municipal wastewater treatment plants or for oil-water separation. It is also integrated in our Box4Water, a containerized and complete wastewater treatment plant designed for remote areas without access to public sewer for up to 600 people. For all these applications, the pre-treatment by ExSep® relieves subsequent treatment steps which results in more compact design and cost savings.

The ExSep® primary treatment system is designed with the following specifications:

- ExSep® made out of stainless steel, bolted steel plates or plastic (depending on size and applications)
- Complete insulation of sensitive parts or housing
- Pumps and piping
- Precipitation / flocculation dosing station (optional, depending on kind of industries)
- Complete measurement sensor technology devices
- Control System with remote monitoring and controlling
- Standard version: ExSep® 2000 (2,000 mm diameter) with possible design in an ISO container frame
- Custom version:
ExSep® 500 to ExSep® 7000 (500 to 7,000 mm diameter)

ExSep® 1500



2. Parameters

2.1 Water Characteristics

Inflow: Municipal wastewater / sewage (yellow, black and grey water)

Industrial process water (depending on industry)

Effluent: Water almost completely free of solids allowing relieved subsequent treatment or discharge in municipal wastewater treatment plants if necessary.

Parameter	Assumed influent characteristics for municipal wastewater
Chemical Oxygen Demand (BOD5)	400 – 800 mg/l
Biological Oxygen Demand (BOD5)	200 – 400 mg/l
Total Suspended Solids (TSS)	100 – 350 mg/l
Total Nitrogen (TN)	15 – 60 mg/l
Total Phosphorus (TP)	3 – 12 mg/l

2.2 Technical Data

	Diameter [mm]	Height [m]	Average flow [m³/h]	Energy demand [kWh/m³]
ExSep® 500	500	2,1	1,0	0,46
ExSep® 800	800	2,	2,5	0,23
ExSep® 1000	1 000	3,0	4,3	0,20
ExSep® 2000	2 000	6,0	17,2	0,12
ExSep® 3000	3 000	6,0	39,0	0,11
ExSep® 4000	4 000	12,0	69,0	0,10
ExSep® 5000	5 000	15,0	110,0	0,10
ExSep® 6000	6 000	18,0	156,0	0,10
ExSep® 7000	7 000	21,0	212,0	0,09

Important Note:

The treated effluent water is not to be used as potable water. Depending on its origin and the targeted treatment goal it has to be further treated or discharged indirectly into a municipal wastewater treatment system.

Operating Costs Drivers

Electricity:	0,09 to 0,46 kWh/m ³ of wastewater (per ExSep®), depending on ExSep® size and quality of wastewater
Operation:	remote monitoring through Internet link / GSM interface voids the need of an on-site operator and enables early detection of malfunctions
Maintenance:	only required for pumps and motors

In conjunction with a sludge dewatering:

Sludge press:	press screw to be replaced every 06 till 18 months (depending on the sand ratio of the wastewater)
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ExSep® as part of Epuramat's Box4Water containerized wastewater treatment plant

3. Process

The pre-treatment of wastewater is done normally by the following treatment steps:

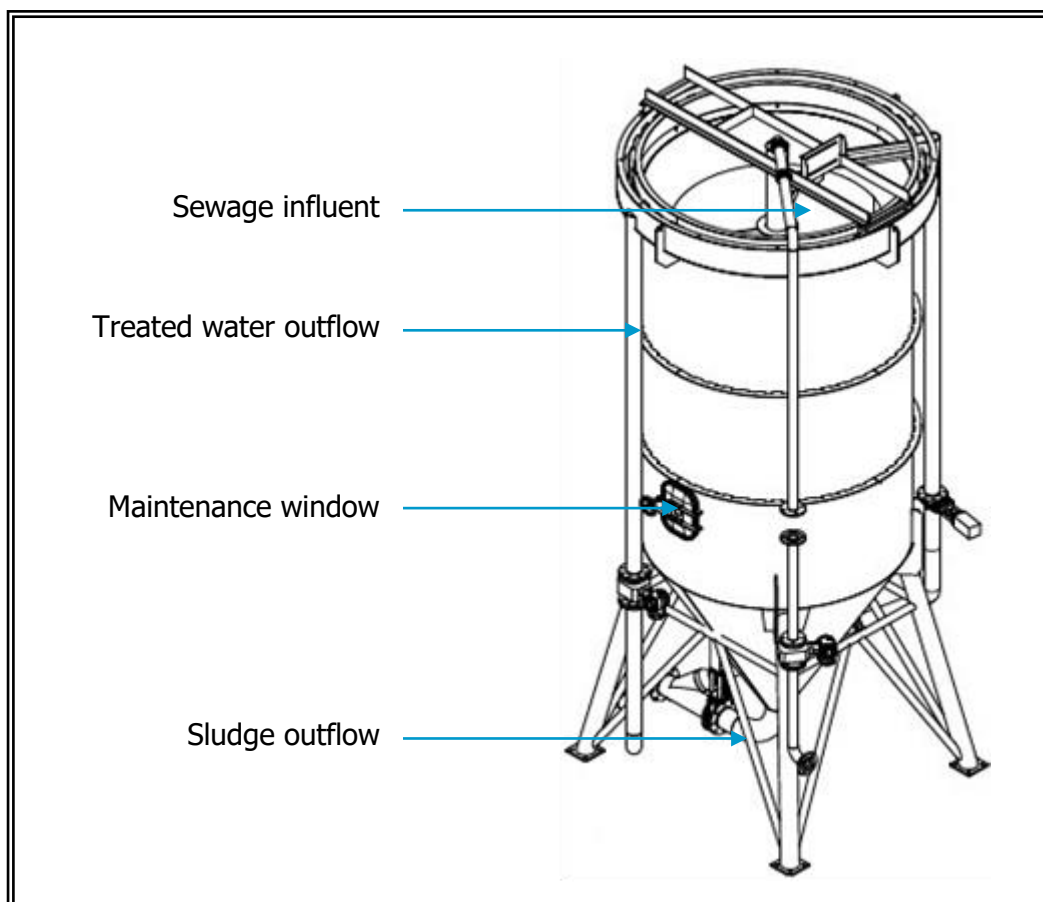
1. Coarse cleansing with screen
2. Buffering and homogenization of the inflow and of the presswater from sludge dewatering
3. Mechanical pre-treatment (solid-/liquid separation) using ExSep®

All processes are monitored and controlled using a programmable logic control (PLC), which can be managed on site via touch panel or remotely, to ensure a consistently smooth operation of the water treatment process.

3.1 ExSep® Description

The patented Extreme-Separator ExSep® is a treatment for mechanical solid/liquid separation developed by Epuramat. In the municipal sewage the ExSep® replaces sand and fat trap as well as huge sedimentation tanks. In the field of industrial waste water treatment, the ExSep® takes over the complete primary treatment. Furthermore, the ExSep® can be also used for post-purification. It is characterized by a very high efficiency in the separation of organic and inorganic solids (particle size ≥ 15 microns) in the amount of up to 99%.

The ExSep® is equipped with an inlet tube with diffuser/baffle combination, located at the inner part of the body, supplied with wastewater from the top.



How it works: The inlet pipe with the diffuser/baffle combination is designed to force the wastewater from the vertical to the horizontal movement. Due to the special design of the diffuser/baffle combination heavier and mostly inorganic particles settle. Lighter, fine (organic) and colloidal particles move upwards, agglomerate in a layer, formed by the smaller colloidal particles. The lighter particles agglomerate and settle down while filtrate moves up. The filtrate exists at the upper part of the body, slightly below the fat trap.

This procedure delivers a very high level of purity in the clear water while the sludge is thickened.



ExSep® 7000

3.2 Sludge Dewatering System

A sludge dewatering solution can be added to the ExSep® system and fully integrated in a separate container.

Sludge and fat resulting from solid/liquid separation by ExSep® are stored and homogenized in a buffer tank.

The sludge dewatering procedure is then made by press filters, which can achieve a high dry solids content of more than 15 % without using any chemicals

This dewatering system will be delivered fully equipped with pumps, piping, valves, sludge conveyor and control cabinet with PLC.

This solution requires low maintenance efforts because the collected sludge cake can be stored for a comparatively long period of time in a sludge bin within the container and disposed of easily.

*Exemplary dewatering sludge device
with dry solid content of ~15%*



3.3 Touch Screen Control Panel with Remote Monitoring and Control

The ExSep® system can be equipped with a touch screen control panel as well as remote monitoring and control using internet or satellite connection. By choosing this option, the customer is able to monitor and control the ExSep® system without being present on site.

The individual components of the system can be activated at any time by touch panel either on site or remotely through internet access.

In addition the trends of all measurements such as pH, temperature, flow measurements and other changes can be visualized on a daily, monthly and annual basis.



4. ExSep® Performance

4.1 Municipal Wastewater, Example with 35 m³/h, 2 x ExSep® 2000

Parameter	Sewage characteristics	Reduction by ExSep®
Water flow [m³/h]	17,50	-
Population Equivalent [PE]	~ 2000	-
BOD ₅ -load [kg/d]	~ 125	30 - 40 %
COD -load [kg/d]	~ 250	40 - 50 %
Dry Solid Matter [kg/d]	~ 145	80 - 90 %
TN -load [kg/d]	~ 23	10 - 15 %
TP -load [kg/d]	~ 4	15 - 20 %

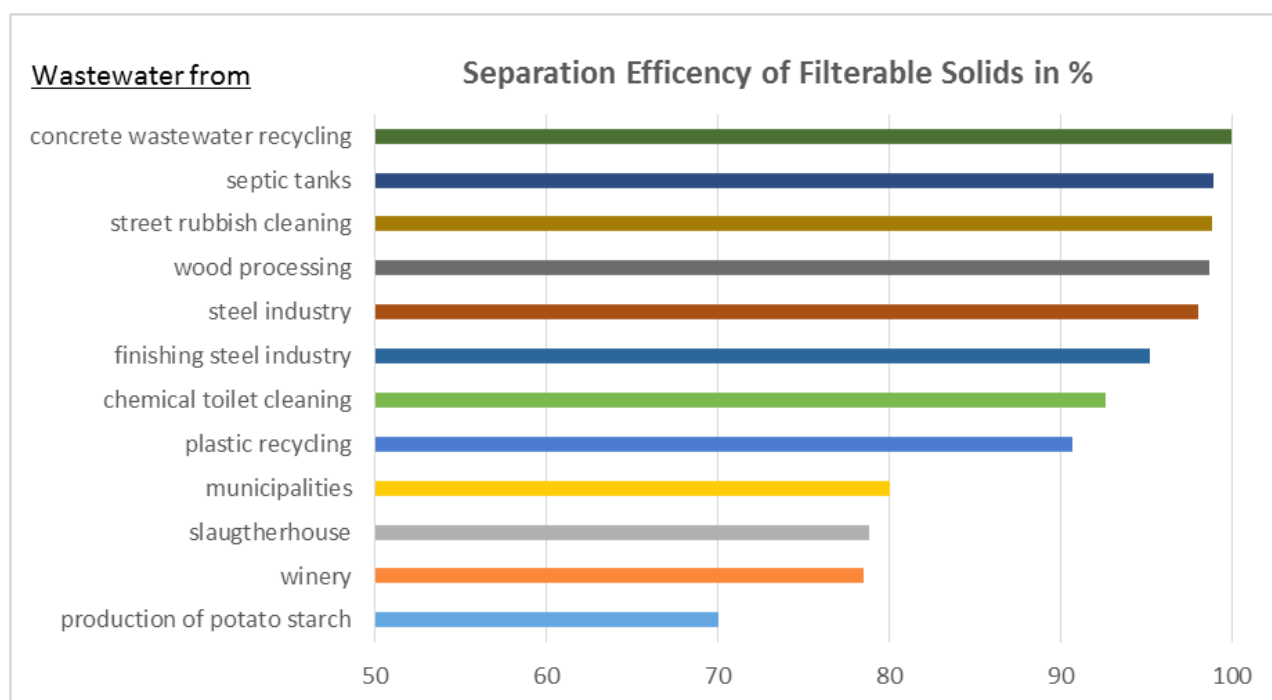
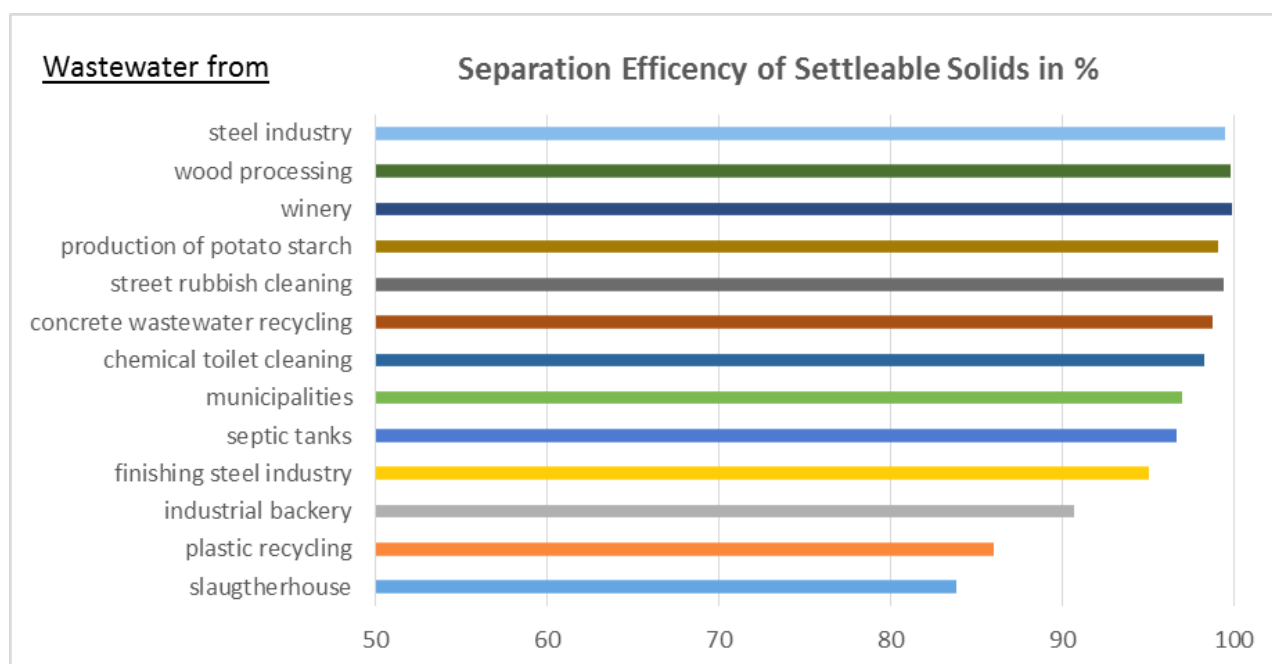


ExSep® system with two ExSep® 2000 and sludge dewatering station in 20' Container for the extension of a municipal wastewater treatment plant

4.2 Industrial Wastewater

For industrial wastewater, ExSep® performance is depending on type of industry and wastewater composition. Detailed effluent characteristics can be provided only after wastewater analysis and/or trials.

However, you can see below typical efficiency of ExSep® according to different examples of industrial wastewater and in comparison with municipal water.





ExSep® system with two ExSep® 2000 for reuse of process water from a soil and plastic recycling company

5. Unique Selling Points of ExSep®

- Mechanical primary treatment for a wide range of municipal and industrial applications
- Solid/liquid separation efficiency of up to 99%
- Modular construction system allows easy enlargement
- Up to 90 % smaller footprint in comparison to traditional wastewater treatment plants
- Low investment, operation and maintenance costs
- Remote monitoring and control
- Subsequent treatment steps are relieved by efficient pre-treatment and can be designed in smaller scale
- Recycling industrial water delivers savings on fresh water and wastewater disposal costs
- Short system delivery and commissioning lead times

6. Warranty

Function, moving parts, components and sealing:	2 (two) years.
ExSep® and tank, with the exception of fittings and hinges:	10 (ten) year.

Certifications



Excerpt of Awards Received

