



Kumac

System for Processing
Slurry and Digestate

PROCESSING TECHNOLOGY



Organic energy worldwide

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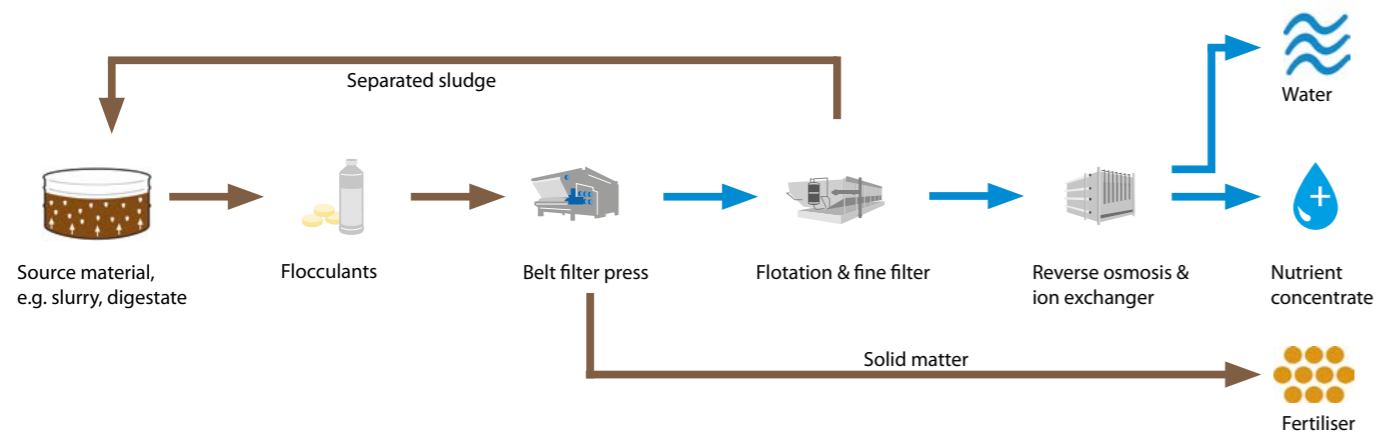
Slurry and Digestate Processing

Regions with intensive livestock breeding have a serious oversupply of liquid manure. The available area in such regions is often not large enough to make use of the accumulating amount of nutrients. Political regulations will reduce the farm fertiliser dosage and also the permissible application times especially in areas with a nutrient excess. This makes the transportation to other locations even more time- and cost-intensive. Therefore, there is a need for sustainable solutions for improved transportability and reduction of the nutrient surplus.

Kumac Process

The state-of-the-art processing system of WELTEC BIOWATER provides an effective contribution to solve this problem. In a multi-stage process, the Kumac processing system separates solid matter from water. The result: About 55 percent clear water, approximately 25 percent solid matter and about 20 percent liquid nutrient concentrate. This technology has already been in continuous use since 2007 and is successfully applied at 15 locations with intensive livestock breeding or large biogas plants. One of the key benefits of the solution – which is already well established in the Netherlands and Belgium – is the high technical plant availability. The scalable modular system can be used from an amount of 70,000t/year. If processing needs are higher, a combination of several Kumac lines can easily be implemented.

How It Works



1. Addition of Flocculants

First, additives are mixed with the source material with a custom-developed mixer. This enables a short reaction time and economical use of individually composed flocculants. The additives ensure flocculation of even the finest components. At the same time, the addition facilitates the separation of certain substances from the water and the minimisation of odours.

2. Belt Filter Press

In the next step, the substances are drained in a special belt filter process. In this process, they are transported on a belt filter over various rolls and cylinders and pressed against a second water-permeable belt with increasing pressure. The drained solid matter has a dry matter content of about 30 percent and can subsequently be used as fertiliser, compost, litter or biogas substrate.

3. Flotation Tank & Fine Filter

The remaining liquid phase is first treated in a stainless flotation tank. Using fine air bubbles, small organic particles and suspended matter are separated and settle in a floating layer and to the bottom of the tank. The foam and sludge are then re-transferred to the treatment process. The other solid components of the liquid phase are separated by a filter.

4. Reverse Osmosis & Ion Exchanger

The final process step comprises the application of a three-stage reverse osmosis procedure. The remaining liquid phase has already reached a very clean state. The semipermeable membranes in the three-stage reverse osmosis procedure can separate 95 to 99 percent of the dissolved salts and nutrients. The separated nutrient concentrate can be used as liquid fertiliser. The clean water that is left over from the treatment in the ion exchanger can be used at the local facilities or be returned to the water cycle.

Mass Balance

An independent study of the Kumac processing plant in Deurne, Netherlands, which was conducted by the Lower Saxony Chamber of Agriculture in November 2015, delivered the following results: *

	Source product	Products of the slurry processing		
	Pig manure 100%	Solid matter ca. 25%	Nutrient concentrate ca. 20%	Water ca. 55%
Proportion of total quantity				
Dry matter content	6,9 %	31,15 %	4,01 %	0,025 %
N _{total} (kg/t)	5,26	15,67	7,35	0,02
Ammonium (kg/t)	3,01	3,27	6,16	0,01
P ₂ O ₅ (kg/t)	3,10	14,94	0,10	0,01
K ₂ O (kg/t)	4,65	4,43	8,50	0,01

(*Studies conducted by Wageningen University back in 2011 had delivered similar results.)



The solid matter of the liquid manure is separated from the water in four process steps. The result: Water, nutrient concentrate and dry fertiliser.



The drained solid matter has a dry matter content of about 30 percent and serves as a high-nutrient fertiliser that is easy to transport.

ADVANTAGES

- Tried and tested technology with high plant availability
- Concentration of nutrients, resulting in the following:
 - Enhanced transportability
 - Reduction of the fertiliser application costs
- About 99.5% of the phosphorus and approx. 70% of the nitrogen are bound in the solid phase
- Reduction of the storage needs for slurry and digestate
- Approximately 55 percent of the source material turns into clean water
- Solid phase can be used as fertiliser, bedding, biogas substrate, compost etc.
- Designed for slurry from livestock breeding and digestate from biogas plants