

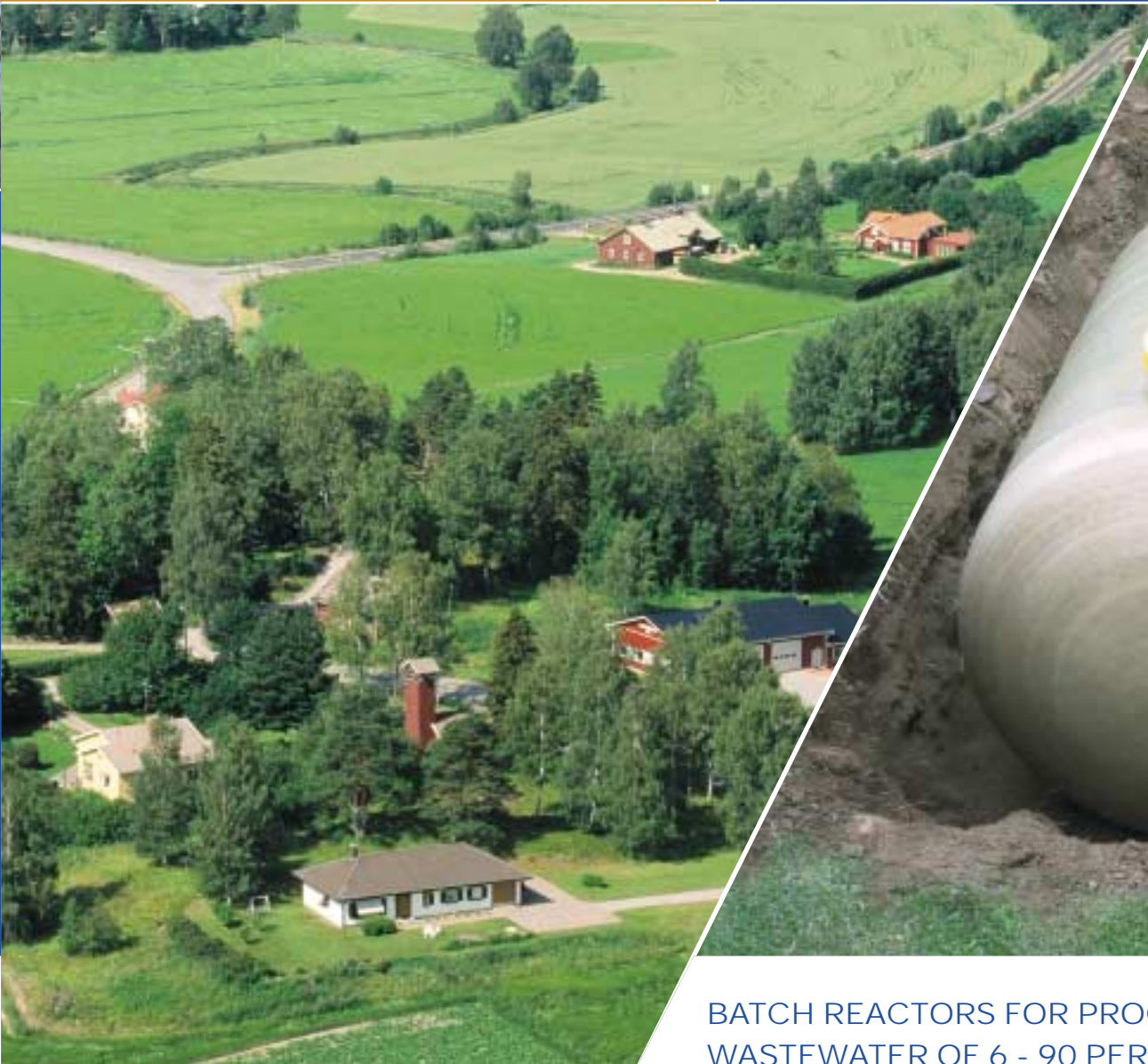
wavin

Labko

December 2006

Labko® BioKem
Wastewater Treatment Plants

Product brochure



BATCH REACTORS FOR PROCESSING
WASTEWATER OF 6 - 90 PERSONS

Reliable solutions

Wastewater treatment systems

Labko® BioKem Batch Reactors

Labko BioKem Batch Reactors are biological-chemical wastewater treatment plants, into which all the wastewater from a residential building can be led. They are intended as effluent treatment systems for residential buildings used all year round in rural or sparsely populated areas.

Labko BioKem is based on batching principle. Sequenced aeration, sedimentation of phosphorus, clearing of the wastewater, and discharging of the clean water take place in the process tank. Aeration brings oxygen, essential to the microbe activity, to the process, and mixes the mixture of activated sludge and wastewater in the tank. Purified wastewater is pumped further into an open ditch, or into some other discharge area approved by the authorities. The treatment plant does not need a separate pre-clarification. Maximum installation depth of the Labko BioKems' inlet sewer is 1.3 m.

Dimensioning of the Labko BioKem batch reactors is based on the number of inhabitants (population equivalent), according to which the processing capacity is calculated. One person is assumed to produce in one day 150 l of wastewater.

Solutions for one, two and three households

Labko BioKem models 6, 10 and 15 are designed for the use in one, two or three households to process the wastewater from 6-15 persons (see the table on page 4).

- Simple and fail-safe process, easy commissioning
- Control unit location in the residence is easily controllable
- Service-check agreement as a standard

The reactors consist of an underground process tank, of the device shelter on the ground surface, and of the control unit located in the residence. The control unit controls the purification process and reports if the chemical canister is to be replaced.

Using Labko BioKem is low-cost

The running costs of the Labko BioKem 6 build up as follows:

- Emptying: once a year
- Chemical consumption: about two canisters a year
- Power consumption: only some 400 kwh/y



Labko BioKem 6 batch reactor.

Service-check agreement

A two-year service-check agreement is included in the delivery of the Labko BioKem 6, 10 and 15 batch reactors. (NOTE! Only in Finland)

The cooperatives of Wavin-Labko Oy take care of the service checks included in the agreement. If requested, the supplying of the chemicals is done with the service checks by the cooperative. Chemicals and spare parts can be purchased from our retailers, too.



The chemical pump, the compressor and the chemical canister are located in the device shelter. The device shelter is placed next to the process tank on the ground surface. The picture presents the device shelter included in the delivery of the reactors Labko BioKem 6, 10 and 15.

Common reactors for multiple residences

Labko BioKem models 20...90 are designed to be used in village schools, terrace houses, and by multiple residences together. Depending on the model, the batch reactor can process wastewater from 20-90 persons (see the table on page 5).

Once in the reactor, the wastewater is led into the stabilizing tank, from which it is pumped further into the process tank. In the process tank the wastewater is purified biological-chemically sequencing the different phases of the purification process. The purification principle is the same as in continuous-operating communal wastewater processing plants, however the scale is smaller and the process is based on batching principle. All the phases of the purification process take place in the same tank, and the sequences are controlled by the control unit. Running time, equipment, and the size of the process tank depend on the size of the batch reactor.

Alarms from the batch reactor can be transmitted directly into the user's house automation system. Using a Labcom data transfer unit, the alarm can be forwarded to the LabkoNet service, or as an SMS to a GSM phone.

Some examples where Labko BioKem batch reactors are used:

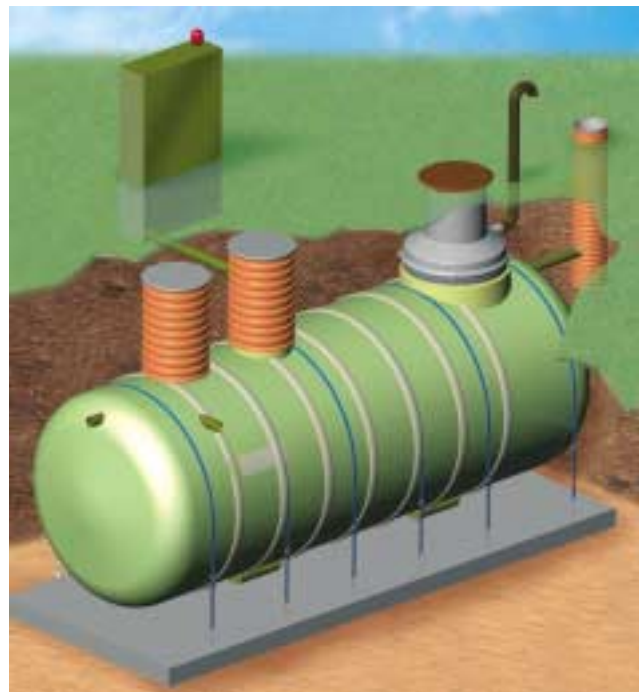
- Industrial plants (cleaning wastewaters from the personnel premises)
- Schools
- Combined business and residence buildings
- Common plants for multiple residences
- Camping centres

Cleaning efficiency



Labko BioKem batch reactor meets the cleaning efficiency:

- Organic matter (BOD₇) 90 %
- Phosphorus total (P_{tot}) 85 %
- Nitrogen total (N_{tot}) 40 %



Labko BioKem 60 batch reactor.



Labko BioKem 30 batch reactor installed.

Advantages of Labko BioKem batch reactors:

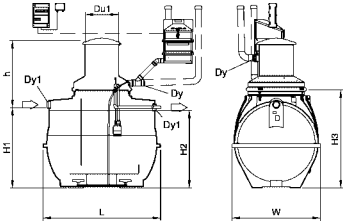
- Meets the treatment requirements of the standards
- Simple process
- Easy to maintain
- Low-cost in use
- Odourless
- Durable and long-lasting
- Easy and quick to install



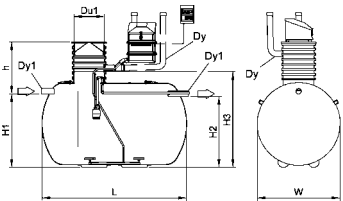
Legend

- Du1 = diameter of the emptying pipe / maintenance shaft
- Dy = diameter of the ventilation pipe (accessory)
- Dy1 = diameter of the inlet/outlet/combining pipe
- h = maximum installation depth
- H1 = distance from the lower edge of the inlet to the bottom
- H2 = distance from the lower edge of the outlet to the bottom
- H3 = height
- W = width
- L = length

Labko BioKem 6...15 batch reactors



Labko BioKem 6



Labko BioKem 10 and 15

Labko BioKem	6	10	15
Population equivalent	2-6	5-10	10-15
Capacity (m ³ /d)	1,0	1,5	2,2

Labko BioKem 6 batch reactor

- Qty 1 batch reactor with equipment
- Qty 4 anchoring belt

Labko BioKem 10 batch reactor

- Qty 1 batch reactor with equipment
- Qty 4 anchoring belt

Labko BioKem 15 batch reactor

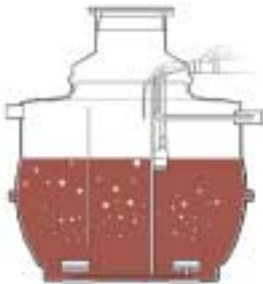
- Qty 1 batch reactor with equipment
- Qty 6 anchoring belt

Labko BioKem	Du1	Dy	Dy1	h*	H1	H2	H3	W	L	Weight
	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg
6	600	110	110	1300	1450	1400	1900	1590	2120	370
10	600	110	110	1300	1450	1400	1900	1660	2850	500
15	600	110	110	1300	1450	1400	1900	1660	4000	670

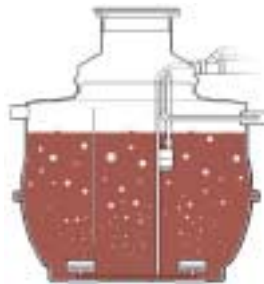
* Installation depth of the maintenance shaft adjustable between 700 and 1300 mm. BioKem 15 includes 2 maintenance shafts.

Batch reactor delivered with 30 litres of phosphorus sedimentation chemical. As accessories 2 ventilation pipes (D110) with bends and an earth wire (7x1.5 MCMO) required.

Operating principle of the Labko Biokem 6 batch reactor



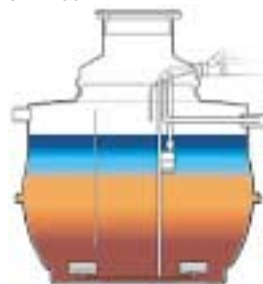
1. The process starts with aeration. This brings oxygen into the process, which is vital for the functioning of microbes, and the activated sludge is mixed.



2. Biological purification takes place in the activated sludge process, in which the microbes dissolve the organic matter of the wastewater.



3. Sedimentation of phosphorus is achieved chemically with sedimentation chemical.



4. During settling phase the activated sludge and the sediment phosphorus are settled on the bottom of the tank.

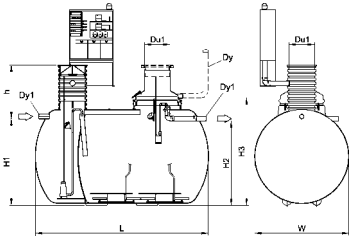


5. At the end of the settling phase the activated sludge has settled as a compact layer on the bottom of the tank.



6. The process ends when the purified water is pumped into the outlet sewer. The cycle starts anew with the aeration phase.

Labko BioKem 20...90 batch reactors



Labko BioKem	20	30	40	50	60	70	80	90
Population equivalent	16-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90
Capacity (m ³ /d)	3,0	4,5	6,0	7,5	9,0	10,5	12,0	13,5

Labko BioKem 20 batch reactor	
Qty 1	batch reactor with equipment
Qty 3	anchoring belt (accessory)

Labko BioKem 30...40 batch reactor	
Qty 1	batch reactor with equipment
Qty 4	anchoring belt (accessory)

Labko BioKem 50 batch reactor	
Qty 1	batch reactor with equipment
Qty 5	anchoring belt (accessory)

Labko BioKem 60 batch reactor	
Qty 1	batch reactor with equipment
Qty 6	anchoring belt (accessory)

Labko BioKem 70...80 batch reactor	
Qty 1	batch reactor with equipment
Qty 7	anchoring belt (accessory)

Labko BioKem 90 batch reactor	
Qty 1	batch reactor with equipment
Qty 8	anchoring belt (accessory)

Labko BioKem	Du1	Dy	Dy1*	h**	H1	H2	H3	W	L	Weight
20	600	110	110	1300	2050	2000	2450	2200	2700	1000
30	600	110	110	1300	2050	2000	2450	2200	3500	1150
40	600	110	110	1300	2050	2000	2450	2200	4100	1300
50	600	110	110	1300	2050	2000	2450	2200	5200	1500
60	600	110	110	1300	2050	2000	2450	2200	6000	1650
70	600	110	110	1300	2050	2000	2450	2200	6900	1800
80	600	110	110	1300	2050	2000	2450	2200	7400	1900
90	600	110	110	1300	2050	2000	2450	2200	8500	2050

* D110 or according to delivery

** Installation depth of the maintenance shafts (h) adjustable between 900 and 1300 mm.

BioKem 20...40 include 2 maintenance shafts. BioKem 50...90 include 3 maintenance shafts.

Batch reactor delivered with phosphorus sedimentation chemical (BioKem 20...30: 60 l, BioKem 40...90: 90 l).

As an accessory a ventilation pipe (D110) with bends, an earth wire (MCMK 4x2.5+2.5, cabling exceeding 50 m: MCMK 4x6+6), and anchoring belts (see table) required.

Operating principle of the Labko Biokem 20...90 batch reactors

Once in the reactor, the wastewater is led into the stabilizing tank, from which it is pumped further into the process tank for the actual processing. The processing starts with aeration. Wastewater is batched into the process tank through the whole aeration phase, or until the batch capacity is reached.

Chemical sedimentation of phosphorus takes place at the end of the aeration phase, when the chemical is quickly mixed in the wastewater. Sedimentation chemical is automatically dosed from the chemical tanks in the device shelter. Should the batch capacity of the process tank be reached before the end of the aeration phase, the excess chemical batch is dosed into the process tank.

After aeration, the settling phase starts, during which the activated sludge and the sediment phosphorus are settled on the bottom of

the process tank. At the end of the settling phase, there is a clear boundary layer of purified water and activated sludge in the tank.

Treatment of the batch ends by pumping off the purified water at the very end of the settling phase. Purified water is pumped from the process tank into the outlet sewer, which can lead directly into an open ditch, or into some other discharge area approved by the authorities.

All the phases of the purification process take place in the same tank, and the sequences are controlled by the control unit. After discharge pumping the batch reactor is ready to treat a new batch. Labko BioKem 20...90 batch reactors process two batches during one day.



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Wavin-Labko in brief

Wavin-Labko Oy is a Finnish company with over 40 years' experience in developing, manufacturing and marketing of measurement devices and various plastic products. In the field of measurement devices we are specialized in level instruments and alarm devices, automation and identification, and in web-based solutions of data transfer. In the field of plastic products we have focused our know-how on wastewater and storm water treatment by using various separator systems. These systems cover the separator solutions in business and services construction, the wastewater treatment in rural area settlements, as well as the wastewater treatment of private houses and summer cottages.

Wavin-Labko Oy is a part of international Wavin Group, which is the leader in the European market for plastic pipe systems. Wavin Group has a presence in 27 European countries.



Wavin-Labko Oy reserves the rights to alterations without prior notice. Due to policy of continuous improvement in R&D, technical specifications may change. Installation shall always be made as documented in manufacturer's instructions.



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