

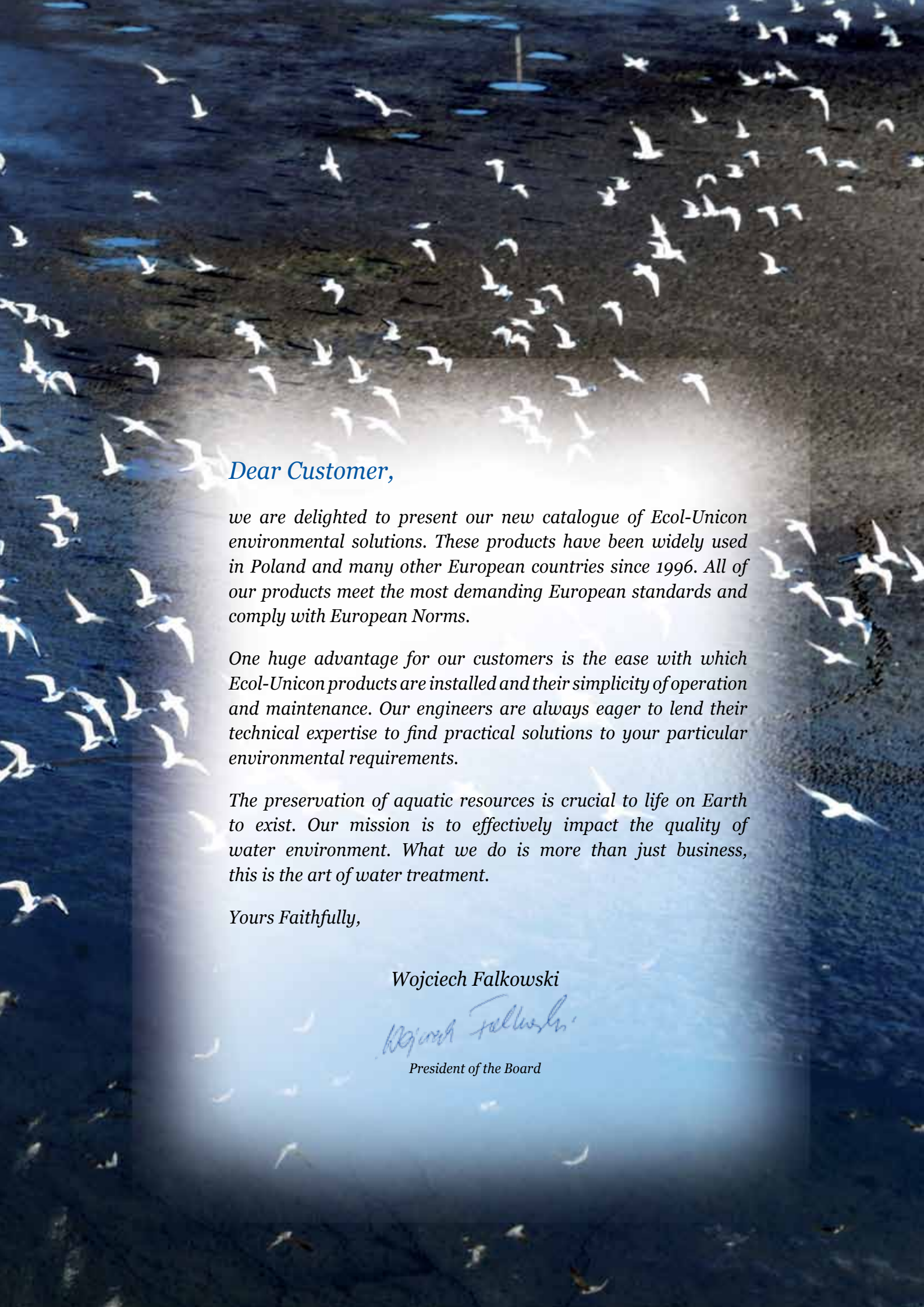
ecol-unicon



PRODUCT CATALOGUE







Dear Customer,

we are delighted to present our new catalogue of Ecol-Unicon environmental solutions. These products have been widely used in Poland and many other European countries since 1996. All of our products meet the most demanding European standards and comply with European Norms.

One huge advantage for our customers is the ease with which Ecol-Unicon products are installed and their simplicity of operation and maintenance. Our engineers are always eager to lend their technical expertise to find practical solutions to your particular environmental requirements.

The preservation of aquatic resources is crucial to life on Earth to exist. Our mission is to effectively impact the quality of water environment. What we do is more than just business, this is the art of water treatment.

Yours Faithfully,

Wojciech Falkowski



President of the Board



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Ecol-Unicon

The company was established in 1996. A controlling interest in the Company is held by a Polish enterprise Ecol Sp. z o. o. (established in 1988), owned by Wojciech Falkowski acting as President of the Board of Ecol-Unicon.

Ecol-Unicon is the largest Polish producer and distributor of **water protection devices** and the best known brand in **rainwater treatment and pumping technology**. Annual turnover of the company exceeds 25 million Euros.

WATER PROTECTION DEVICES

The company has **3 plants of concrete prefabrication and device production**: in the North, Central and South of Poland, control boxes production plant and **20 sales branches** in the bigger cities of Poland.

The company has been developing a broad network of partners on global markets.



Ecol-Unicon produces and delivers devices for communal systems infrastructure (water supply and sewerage). The most important of them include:

- concrete chambers and tanks
- oil separators
- grease separators
- settling tanks
- pumping stations
- dry well pumping stations with solids separation system
- wastewater treatment plants
- anti-odour filters
- flow regulators
- alarm installations and steering systems of devices
- remote monitoring and control systems of devices

SERVICE AND OPERATION

Ecol-Unicon offers a **professional and complex service** at every stage of investment.*

Service activity scope

- delivery, assembly and hydromechanical start-up of the devices
- inspections and maintenance of operating systems
- modernization of the existing devices, general overhauls
- professional assistance during selection of spare parts and subassemblies for the existing devices
- cleaning and disposal of waste generated during operation
- professional trainings with regard to operation of devices

Ecol-Unicon offers also the Ecol-Service Programme, whose main objective is to take over operation of the devices. *



* for Polish projects only

CONSTRUCTION OF ENVIRONMENTAL ENGINEERING PROJECTS

Ecol-Unicon offers the professional construction of your investments in water supply and sewerage, adjusted to the individual requirements of the Customers.

We have over twenty years of experience gained during numerous successful realizations throughout the whole country. We have the experienced technical staff, reliable construction teams, design support as well as a stable financial position.

Our engineers realize complex ventures of water supply and sewerage meeting the individual requirements of the Customers. These include among others:

- treatment plants of communal, industrial and rain wastewater for local administration units, industrial and private investors
- treatment of leachate from waste storage facilities
- pre-treatment of rain waters
- retention reservoirs

Investments with capital contribution

- Ecol-Unicon stable financial situation allows the company to involve its own capital in the projects with the selected investors in public-private partnership processes



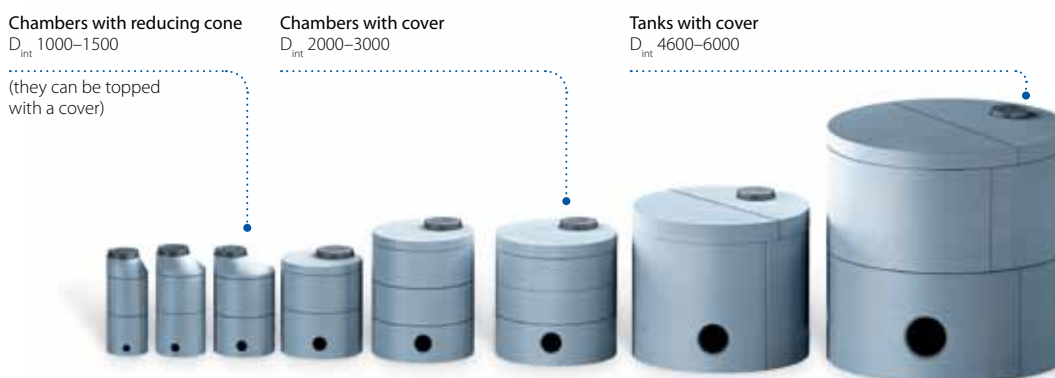
**1/CONCRETE
PRECAST CHAMBERS
AND TANKS**

Ecol-Unicon specializes in the production of high-quality **chambers** and **tanks** made of concrete and reinforced concrete. They are used in storm, sanitary and industrial sewerage. Many years of experience in various branches of the construction industry and the application of advanced technology has made it possible to refine the functional and proven production practices. The highest quality materials and continuous monitoring of parameters in all manufacturing plants guarantee the high quality of products, resistance to various types of damage and the possibility of using them in heavy ground and water conditions. All products are certified and meet stringent construction requirements (Tab. 1)

Table 1 Selected parameters of EU chambers and tanks

	Reference documents	Concrete class	Degree of watertightness	Water absorption	Frost resistance in water
Chambers	PN-EN 1917 standard; Technical Approval of the ITB ⁽¹⁾ ; AT-15-8484/2013; Technical Approval of the IBDiM ⁽²⁾ ; AT/2007-03-1386/2; Technical Approval of the IK ⁽³⁾ ; AT/07-2012-0255-00; GiG ⁽⁴⁾ evaluation concerning the use at mining damage areas PZH ⁽⁵⁾ approval for potable water storage tanks HK/W/0083/01/2013	C35/45; C40/50; C45/55	W8 W10 W12	<5% (<4% as an option)	F150
Tanks	Technical approval of the IBDiM ⁽²⁾ ; AT/2007-03-1386/2 PZH ⁽⁵⁾ approval for potable water storage tanks HK/W/0083/01/2013				

The advantages of using high-quality precast concrete products are their strength and deadweight, which ensure the durability of the structure for many years. Ecol-Unicon offers a wide range of concrete precast chambers and tanks. Primary designation of E-U chambers and tanks is their internal diameter D_{int} [mm]



Oval and oblong tanks



Rectangular tanks



⁽¹⁾ ITB – Building Research Institute
⁽²⁾ IBDiM – Road and Bridge Research Institute
⁽³⁾ IK – Railway Institute
⁽⁴⁾ GiG – Central Mining Institute
⁽⁵⁾ PZH – National Institute of Hygiene

Concrete chambers and tanks are used in sewerage as:

- inspection chambers, back drop manholes, manholes, measurement, installations and intercepting chambers
- tanks of wastewater treatment devices (settling tanks, separators, treatment plants, pumping stations)
- dry chambers (tanks of dry well pumping stations, hydrophore plants, water meter chambers)
- retention tanks (stormwater, potable water)
- wastewater tanks (septic tanks)
- fire reservoirs
- gate valve chambers
- wastewater separation chambers
- slurry tanks



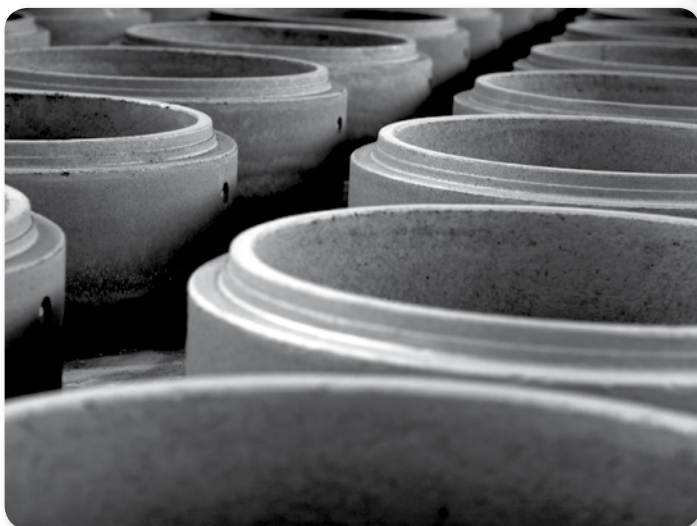
Technical data of the chambers and tanks are to be found in the catalogue pages available at www.ecol-unicon.com
 Technical consultations: export@ecol-unicon.com

EU CHAMBERS

EU concrete chambers are a group of prefabricated products of circular cross-section and internal diameter D_{int} of 1000-3000 mm.

Concrete and reinforced concrete elements of the chambers are made of **vibro-pressed concrete** (according to PN-EN 206-1). All elements can be manufactured according to individual Customer's requirements, e.g. using the elements with lower water absorption, slants, offsets (anti buoyancy shelves).

Prefabricated elements are connected with rubber seals, waterproof mortar or epoxy resin. Elements with D_{int} 2000-3000 can also be connected with the use of bentonite seals.



EU chambers with
reducing cone



EU chambers
with cover



Each type of a chamber consists of a tank bottom, concrete rings, cover element (Fig. 2) and may include **adjustment rings**, a **manhole** (according to PN-EN 124) and **access steps** (according to PN-EN 13101).

Chambers may also be equipped with ready-made **invert channel**, with dimensions tailored to the directions and diameters of connected pipes. In order to connect inlet/outlet pipes, **leak-tight passages** are used.

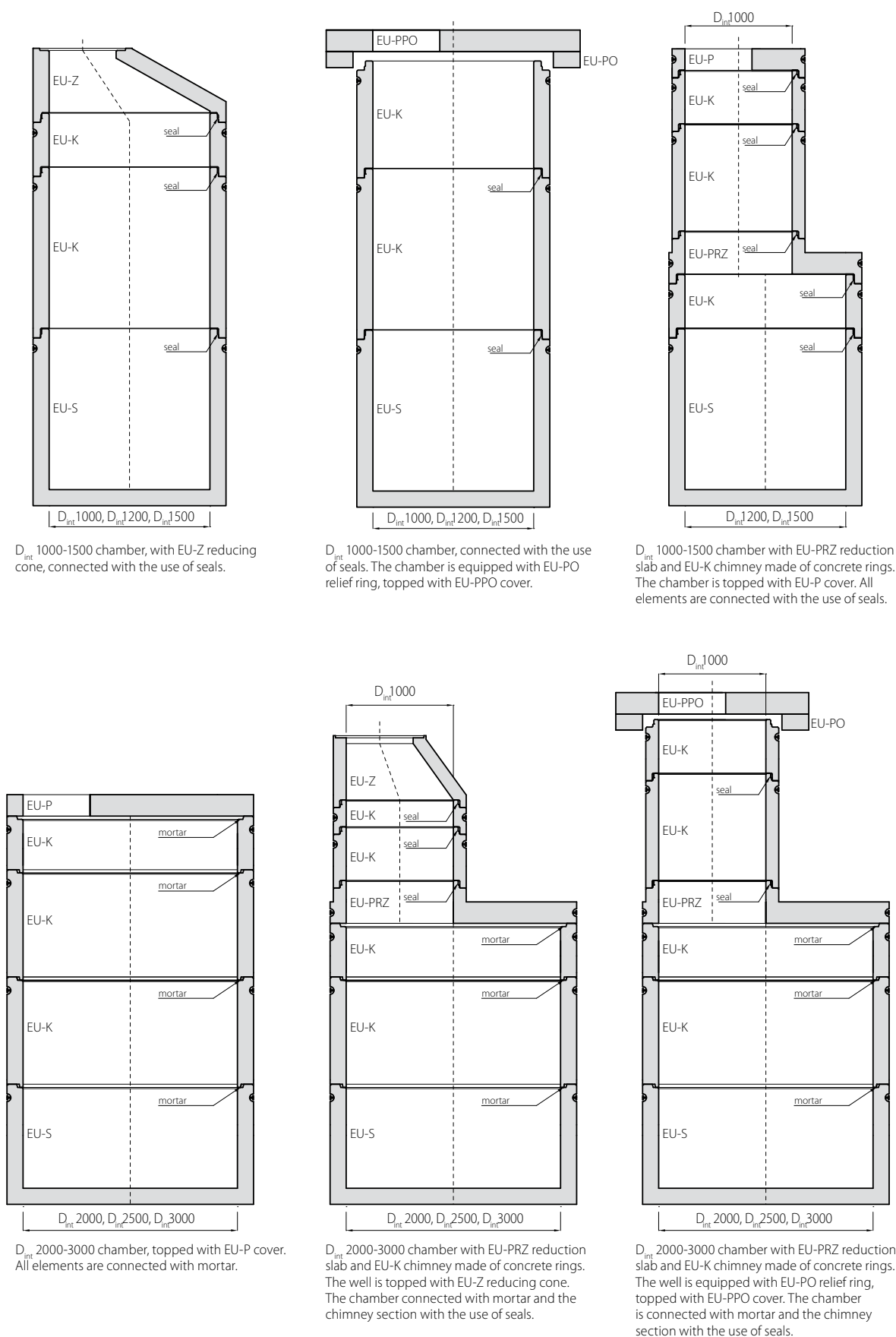


Figure 2 Sample configuration diagrams of EU chambers

Technical data of EU chambers are to be found in the catalogue pages available at www.ecol-unicon.com
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Concrete precast
chambers and tanks

Settling tanks

Separators

Pumping stations

Dry well
pumping stations

Wastewater
treatment plants

Flow regulators

Anti-odour filters

Monitoring systems

Projects



DZB TANKS

DZB tanks are a group of products with oval (D_{int} 4600, 5000, 5600, 6000 mm) and rectangular cross-section, made of reinforced concrete SCC (according to PN-EN 206-1). Each type of tank may consist of semicircular bottom elements, concrete rings, cover and EU-MD-U extension element (Fig. 3).

The tanks are available in **different versions** of heights, widths and lengths and are made of materials with parameters appropriate to the Customer's needs. They can be equipped with access steps or ladders made of stainless steel, manhole chimneys, internal dividers, sumps, etc.

The **leak-tightness** of connections between the vertical elements of the tank is ensured by the use of seals and steel couplers, whereas horizontal connection must be carried out using the seals between the tank and a riser.

Tank bottoms and EU-MD-U extension elements have a monolithic slant at the connection point of a side wall with a bottom end, which eliminates the occurrence of sedimentary rock.

Depending on their destination and the aggressiveness of the sewage, external or internal surfaces of the DZB tanks can be covered with a **protective coating**, e.g. a waterproofing, acid or oil resistant layer.

The foundation of the DZB tanks is built on a concrete substructure or reinforced concrete foundation plate, according to the structural design.

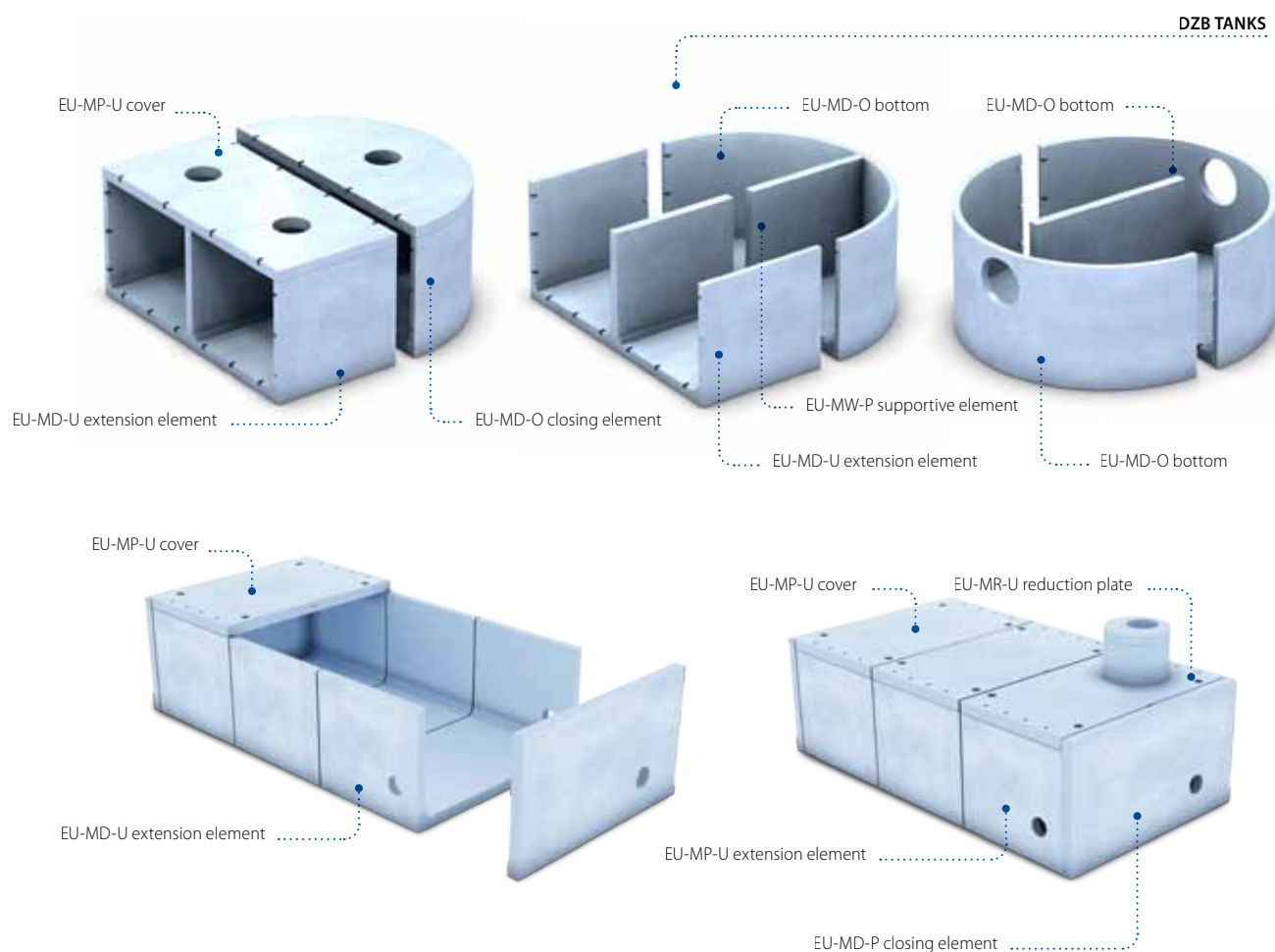
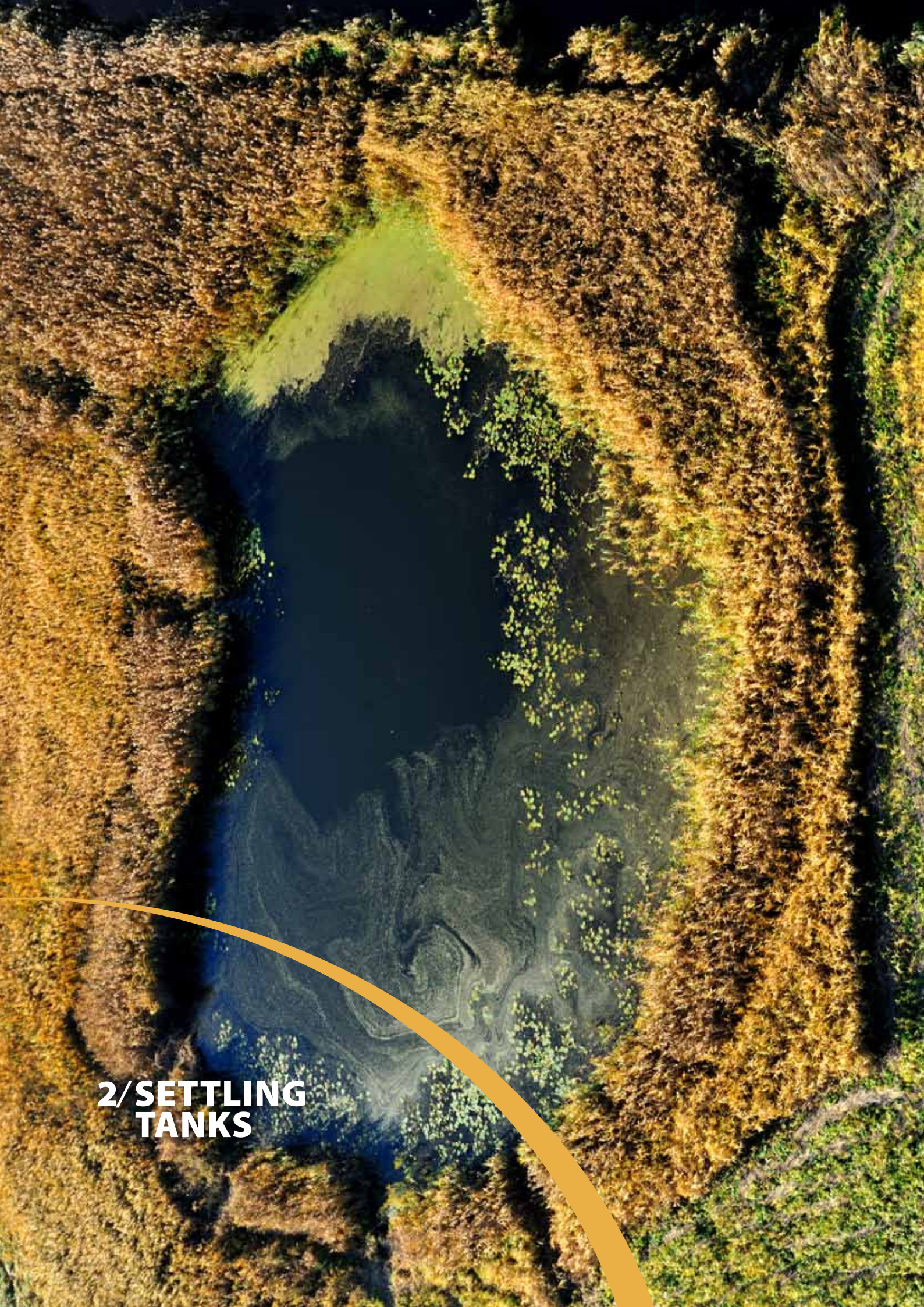


Figure 3 Exemplary configuration of DZB tanks.

An aerial photograph of a large, dark, rectangular pond, likely a settling tank, surrounded by dense, dry, yellowish-brown vegetation. The pond's surface is dark and shows some internal structures or sediment patterns. A thick, bright yellow curved line starts from the left edge and sweeps across the bottom right corner of the image. In the bottom left corner, the text "2/SETTLING TANKS" is written in white, bold, sans-serif capital letters.

2/SETTLING TANKS

Settling tanks are the devices for pre-treatment of wastewater from the easily settling suspension of density higher than 1 kg/dm^3 . Depending of the kind of catchment area as well as the required waste pre-treatment level, Ecol-Unicon offers two series of settling tanks: traditional **horizontal flow-settling tanks OS** and a high-performance **EOW vortex**.

The settling tanks **are usually used** at such places as roads, parking, industrial yards, staking and reloading yards, municipal catchment area facilities, ports, etc.

Ecol-Unicon settling tanks ensure:

- effective pre-treatment of wastewater from suspended solids down to the level below 100 mg/dm^3 (according to European standards)
- protection against an excess of suspended solids flowing into the devices (e.g. before separators, treatment plants or receivers)
- effective separation of light liquids in the integrated system with lamella section (EOW-2L).



Ecol-Unicon settling tanks should be **supplied by gravitation inflow**, and in case of disadvantageous sewerage slope drop, the pumping station should be located below the pre-treating devices or a stilling chamber should be placed before the settling tank. Ecol-Unicon settling tanks are hermetically sealed, **concrete tanks** (chapter: **Concrete precast chambers and tanks**). The settling tanks founded at load-bearing ground do not require special preparation of the foundation and – up to 10m below ground level – do not require a static calculation (foundation on well-compacted layer thickness of 15 cm – to a depth of foundation 7m or concrete C8/10 layer thickness of 15 cm to a depth of foundation 7-10 cm).

It is recommended to situate the settling tanks in areas without heavy traffic. Depending on location of the device, cast iron or cast iron-concrete manholes are used of A15, B125, C250 classes, and in case of location in an area with heavy traffic (road, parking, manoeuvre yard, etc.) it is necessary to use manholes of a heavy type, class D400.

In order to adjust the settling tank cover to terrain elevation, additional concrete rings of a diameter corresponding to the diameter of the tank. If the sewerage network is located deep below ground level, reduction slab and a chimney of $D_{\text{int}} 1000$ rings should be used.

As a standard, the inlet and outlet are located in the settling tank axis. Some tanks offer a possibility of the inlet and outlet deviation from the axis (details to be found in the catalogue pages available at: www.ecol-unicon.com).

In order to automatically inform about the amount of collected sediment, **monitoring installations** are used (chapter: **Monitoring systems**) equipped with sediment level sensors (Fig. 1), which inform about the necessity of cleaning of the settling tank. This can significantly reduce operation costs.

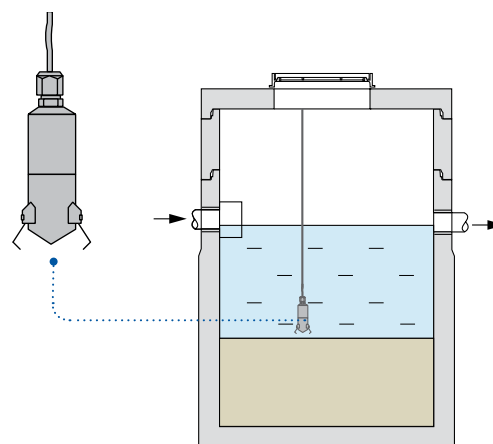


Figure 1 Sediment level sensor

HORIZONTAL SETTLING TANKS

Horizontal flow-settling tanks OS characterized by a simple structure ensure effective removal of suspended solids for the following flows:

- up to 130 dm³/s – structure based on the EU chamber up to 3000 mm diameter (series of types according to Technical Approval IOS⁽¹⁾: AT/2009-08-0231/A1 – catalogue pages)
- over 130 dm³/s – structure based on the EU tanks of the diameters larger than 3000 mm (designed individually).

The OS settling tanks slow the flow down and collect sediment. The suspended solids and solid impurities are collected in the tank thanks to the phenomenon of **sedimentation**. Here takes place separation of suspended solids from wastewater. The inlet of the settling tank is equipped with **deflector** increasing its efficiency.



Selection of a horizontal settling tank OS

By using a graph (Fig. 2), it is possible to determine the internal diameter D_w of the settling tank with horizontal flow for the required degree of suspended solids reduction (efficiency) and the designed wastewater flow. The given approximate efficiency concerns the settling tanks with the inlet and outlet located in their axis. In case of the inlet duct deviation, the efficiency will be lower. The graph was prepared considering data on the degree of suspended solids reduction as well as the shape of OS settling tanks.

In order to correctly select a settling tank it is necessary to:

1. read the optimal diameter of the series of types from the graph (Fig.2) or calculate individually the value of the settling tank surface **Ap**
2. calculate the sensitive volume **V_{cz}** of the settling tank on the basis of maximal inflow to the system (protection of the device against washing out of the sediment).

With the calculated parameters, it is possible to select a settling tank **from the catalogue or individually**, using the offered chambers and tanks (chapter: **Concrete precast chambers and tanks**).

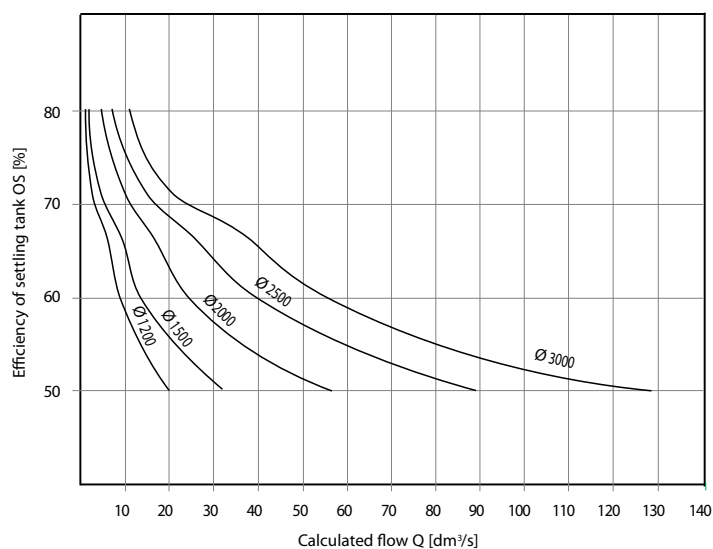


Figure 2 Efficiency of settling tanks OS depending on the wastewater flow

Technical data of the settling tanks OS are to be found in the catalogue pages available at www.ecol-unicon.com
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⁽¹⁾ IOS – Institute of Environmental Protection in Poland

EOW VORTEX SETTLING TANKS

Vortex settling tanks are an optimal solution in urban areas, where it is required to use devices of **high efficiency** and **small dimensions**. Apart from gravity, vortex traps additionally utilize **centrifugal force**. As a consequence, a relatively high efficiency of separation of the suspended solids at high hydraulic loads is achieved, and simultaneously the planned settling tank surface is reduced. Those settling tanks are usually used by urban catchment area facilities, large communications junctions, etc. Main advantages of vortex traps include:

- high efficiency of wastewater treatment from suspended solids
- smaller built-up area than in case of horizontal settling tanks
- possibility of the settling tank inlet location at any angle, which significantly facilitates connection of the tank to sewerage
- easy operation.

A rotary movement of the wastewater flowing into the device is achieved with a **directional deflector**. The outlet from the vortex chamber takes place in the middle part of the tank (central pipe). In case of a **double-chamber settling tank**, the second tank is divided into two parts; the first is a trap for the floating parts lighter than water, including oil substances, while the second – plays the role of an outflow chamber. In a series of types with **lamella section**, the second tank includes the lamella section and plays the role of oil separator.

The wastewater swirls more intensively in the tank during the treatment process when the inflow increases. The wastewater table rises with floating parts. When it exceeds the level of the central pipe, the floating parts are pulled into the pipe and flow to the outflow with the current of wastewater. The petroleum derivative substances and other light impurities are caught, depending on the settling tank type, in:

- the second part of the tank (EOW-1 in the option with a deflector)
- the second tank (EOW-2)
- oil separator located in the second tank (EOW-2L) integrated with lamella section.

Ecol-Unicon offers three types of EOW settling tanks:

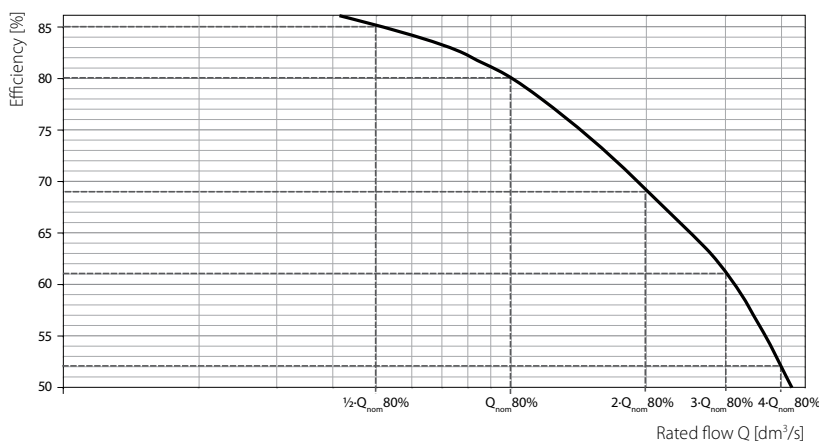
- single chamber EOW-1
- double chamber EOW-2
- integrated with lamella section EOW-2L

A **selection** of EOW types is based on two parameters:

- **hydraulic flow capacity of the device**, which should not be lower than maximal flow directed to the device ($Q_{\max}$ of catchment area)
- **efficiency** of removal of suspensions required for the rated flow directed to the device ($Q_{\max}$ of catchment area).

Knowing the value of flow from the catchment area $Q_{\max}$ and Q_{nom} , it is possible to make a preliminary selection of the settling tank from the catalogue while maintaining the rule: $Q_{\max}$ of the catchment area $< Q_{\max}$ of the device.

Vortex settling tanks EOW demonstrate suspension removal efficiency at the level of 80% for the rated flow of the device Q_{nom} (80%). In case of the required different suspension removal efficiency, the device should be selected using the graph (Fig. 3), from which it is possible to read a suitable flow for the set efficiency.

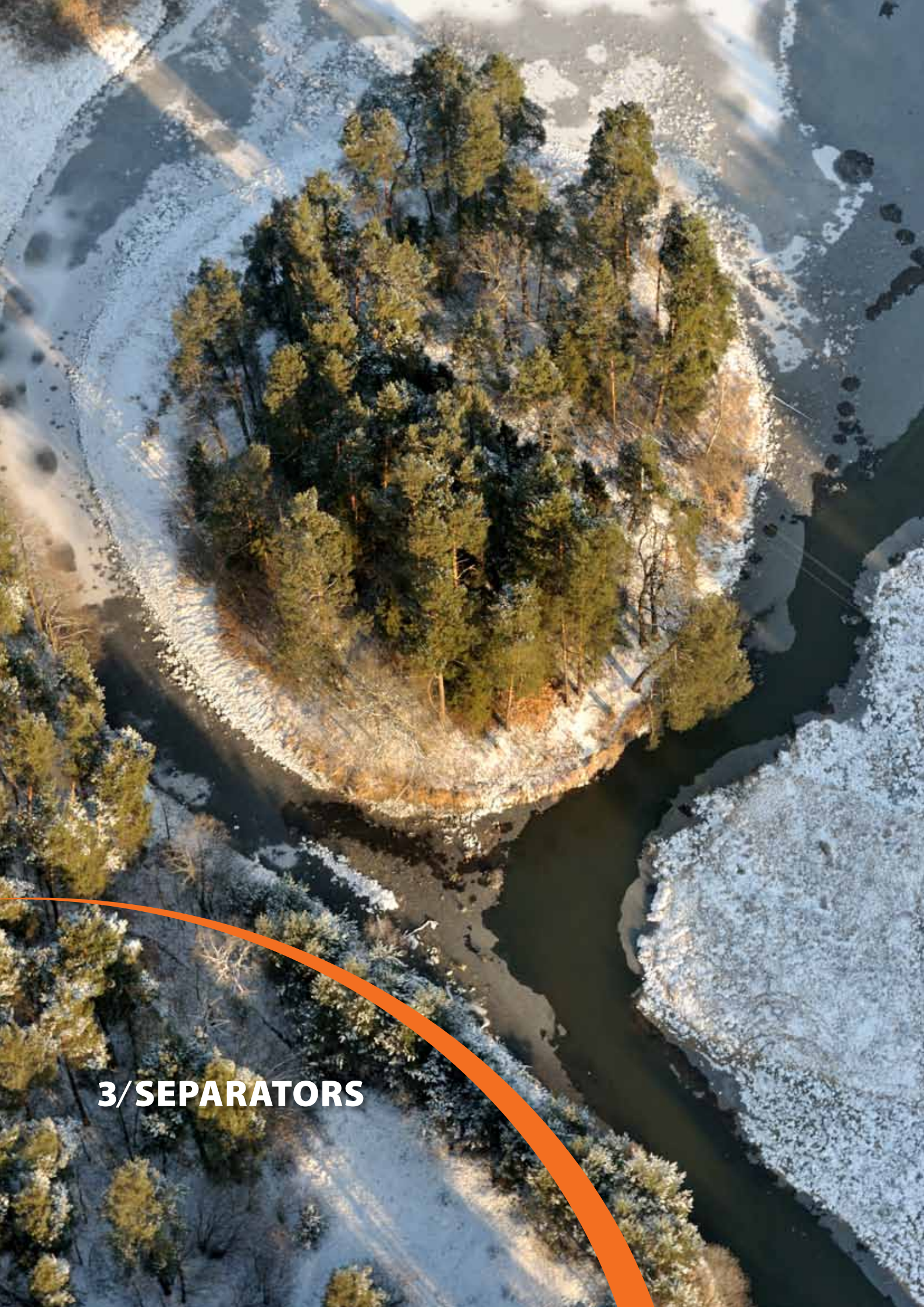


Example: for the required efficiency of 69% a double rated flow is possible $2Q_{\text{nom}} 80\%$, which means a possibility of a lower model of the settling tank.

Figure 3 Flow characteristics of vortex traps EOW

Technical data of the settling tanks EOW are to be found in the catalogue pages available at www.ecol-unicon.com
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An aerial photograph of a large, forested island in a river. The island is covered in dense green trees and is surrounded by water. A large, thick orange arc graphic curves across the bottom left of the image. The text "3/SEPARATORS" is overlaid on the orange arc.

3/SEPARATORS

The separators are devices which design allow the separation and storage of light liquids, grease and organic oils from the wastewater. Separators used in the sewerage are divided into oil separators (lamella and coalescence) and grease separators. Ecol-Unicon separators have CE marking (Tab. 1).

- **Oil separators** are installed in storm and technological sewerage as one of the device used for treatment of wastewater coming from the catchment area susceptible to contamination with oil from municipal areas, roads and facilities. The most significant places where they are used are: roads and motorways, parking lots, public transportation zones, transport equipment bases, industrial plants, car washes, etc. Ecol-Unicon separators are used for the treatment of wastewater, removing the content of oil and they are divided into **lamella (ESL)** and **coalescence (ESK)** types. All of Ecol-Unicon separators fulfill European standards achieving results of oil removal much lower than 5 mg/l (Tab. 3)
- **Grease separators (EST)** are used for pre-treatment of wastewater from food and catering industries. Under PN-EN 1825 standard, grease, is the vegetable oil and or animal fats that are insoluble or slightly soluble in water, that have a tendency to saponify. Grease separators are most commonly used by the restaurants, canteens, butcheries, dairies and other facilities that discharge grease into the wastewater.

Table 1 Reference documents

Name of series of separators	Type	Reference documents
ESK	coalescence	CE marking Compliance with PN-EN 858 standard class
ESL	lamella	
EST	grease	CE marking Compliance with PN-EN 1825 standard

Wastewater containing a high concentration of suspended solids should be subjected to pre-treatment in the settling tank. Ecol-Unicon offers oil separators with settling tanks available in two configurations:

- integrated with a settling tank – one tank
- with settling tank in a separate chamber – two tanks

The design of a settling tank depends on the location, type of wastewater subjected to pre-treatment process (storm or technological), flows and assumed amount of suspended solids in the influent wastewater (chapter: **Settling tanks**). Recommendations concerning settling tank selection (according to PN-EN 858-2) depending on the separator's hydraulic load are shown in Table 2.

Table 2 The capacity of settling tanks

Estimated amount of suspended solids	Suggested object of usage	Minimum capacity of a settling tank [dm ³]
None	- condensate	not required
Low	- process wastewater with a defined low volume of sludge - all areas collecting stormwater with a small amount of mineral suspension from the traffic or similar type areas, such as catchment area near petrol tanks and indoor petrol stations	$\frac{100 \cdot NS}{f_d}^*$
Average	- petrol stations, car washes - bus washing sites - paths from the garages and car parks - power plants, industrial plants	$\frac{200 \cdot NS}{f_d}^{**}$
High	- washing plants for site vehicles, site machines, form machines - truck washing sites	$\frac{300 \cdot NS}{f_d}^{**}$
	- automatic car washes	$\frac{300 \cdot NS}{f_d}^{***}$

* Not applicable to separators of less than or equal to NS 10, apart from indoor car parks
 ** Minimum capacity of settling tanks: 6000 m³
 *** Minimum capacity of settling tanks: 5000 m³
 f_d – density ratio

Separator's kit is placed inside a sealed concrete **tank** (chapter: **Concrete precast chambers and tanks**). Depending on the location of the separator, two types of cast iron or concrete/cast iron manholes are used, classes A15, B125, C250 and D400. In order to adjust the top of the separator cover to the contours of the land, additional concrete rings with a diameter corresponding to the diameter of the tank shall be used. In the case of a large cavity of sewerage, a reduction slab and chimney made of concrete rings D_{int} 1000 can be used. The inlet and outlet are typically located on the axis of the separator. However, it is possible to deviate the axis of inlet and outlet, and to connect several inlets.

The separator in a concrete tank founded at load-bearing ground does not require special preparation of the foundation and – up to 10 m below ground level – does not require a static calculation (foundation on well-compacted layer thickness of 15 cm – to a depth of foundation 7 m or concrete C8/10 layer thickness of 15 cm to a depth of foundation 7-10 cm).

Separators should be supplied by **gravitation inflow**. If it is necessary to pump wastewater, it is required to locate the pumping station behind the separator. The location of the separator in the field must allow access for the septic tanker truck. The tank of the separator can also be made of other materials eg. PE-HD.

In order to reduce operating costs and improve environmental safety, it is possible to connect the **monitoring system** to the separator (chapter: **Monitoring systems**), equipped with sludge layer thickness, oil and overflow sensors. An ongoing monitoring of equipment minimizes the need for local control of devices and reduces the response time of the technical services in case of an accident.

Comparison of oil separation technologies

Depending on the type of catchment area and operating conditions of the device, an appropriate oil separation technology must be chosen (Tab. 3). Particular attention when choosing the appropriate technology should be given to:

- the size of the catchment area
- the protection of the device from possible hydraulic overload
- amount of suspended solids and oil in the wastewater
- receiver sensitivity (protection zone, closed water regions, etc.).

The maximum flow directed to the lamella separator, which goes through the purification section, is considered as a safe hydraulic load for the equipment and accumulated pollution, whereas in a separator with a by-pass, the entire flow that is larger than nominal is directed to the by-pass pipe. Thus, the role of the by-pass is reduced solely to protect the device from hydraulic overload.



Table 3 Types of oil separation technologies

Techno-logy	Type	Effectiveness compared to the flow Q_{nom}^*	Maximal flow through the device Q_{max}	Character of the catchment area	Application
coalescence with sorbent	ESK-S	$\leq 0,5 \text{ mg/dm}^3$	No (only external overflow system)	Catchment areas that require very high level of treatment.	All types of catchment areas located in special protection areas. E.g. catchment area surrounded by water intakes, protected receivers and farmlands..
coalescence	ESK	$< 2 \text{ mg/dm}^3$	No (only external overflow system)	Small catchment areas and catchment areas characterized by a high degree of dispersion of pollutants in raw wastewater.	Catchment areas of smaller wastewater flows and, at the same time, more heavily polluted. E.g. workshops, car washes, petrol stations, transport bases, industrial plants, small car parks, bridges, railway areas, power industry. For nominal flows in systems with external overflow in the case of larger catchment area.
coalescence with a by-pass	ESK-B	$< 2 \text{ mg/dm}^3$	10-fold Q_{nom} (NS)	Catchment areas characterized by varying wastewater flow load.	Catchment areas of varying flows. E.g. municipal water basins, car parks, manoeuvre areas, industrial areas, roads and motorways. In all these cases, particularly at larger drainage basins, it is recommended to interchangeably use lamella technology due to a better efficiency curve in a wider range of flow
lamella	ESL	$< 5 \text{ mg/dm}^{3**}$	10-fold Q_{nom} (NS)	Larger catchment areas characterized by varying wastewater flow load and pollutant load in raw wastewater.	Catchment areas of higher wastewater flows. E.g. outlets of municipal stormwater networks, large car parks and manoeuvre areas, industrial plants and areas, logistic centres, airports, roads and motorways.

* Result obtained when testing the device in accordance with the requirements of PN-EN 858 standard

** Lamella separators allow wastewater treatment both in the case of nominal flow (maximum treatment efficiency) and flows larger than the nominal flow, whereas the treatments efficiency decreases with increasing flow rate (Fig. 1).

LAMELLA SEPARATORS

Lamella separators separate oil with the use of flotation and sedimentation processes. Wastewater enters the separator through the inlet chamber, where the flow is calmed down and is directed to the main chamber where the lamella section is situated. The separation of pollution occurs during the multi-layer flow through the lamella section. Subsequently, purified wastewater enters the outlet chamber (equipped with a backflow stop as an option). The applied oil separation technology additionally enables stoppage of easily sedimenting suspensions, collected at the bottom of the separation chamber.



The **lamella section is a removable** component fitted with a handle for pulling it out of the separator. The separator can be cleaned from the surface and it is not required to enter the interior of the device.

When choosing the lamella separator, an appropriate level of treatment should be selected, using the oil separation efficiency curve (Fig. 1), depending on the maximum flow capacity of the device (Q_{max}), e.g. for 20% Q_{max} the efficiency is 97%.

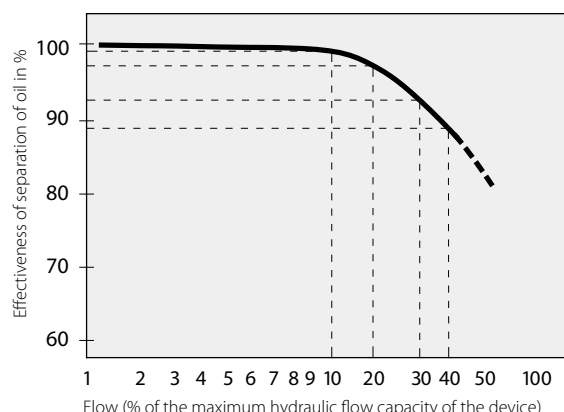


Figure 1 Oil separation efficiency curve

Interaction of the lamella separator with the settling tank

Wastewater containing suspended solids should be subjected to pre-treatment at the settling tank. A properly designed settling tank should ensure optimal treatment efficiency and adequate storage capacity of the sludge (Table 2).

Ecol-Unicon offers oil separators with settling tanks (chapter: [Settling tanks](#)) available in two configurations:

- integrated with settling tank ESL-H – one tank
- with settling tank in separate chamber EOW-2L – two tanks.

The integrated system is designed to reduce area of installation, while ensuring a high level of treatment of both oil and suspended solids. It is used primarily in areas with a high rate of urbanization. As an option, the device can be equipped with a monitoring system (chapter: [Monitoring systems](#)).



COALESCENCE SEPARATORS

The separation of oil in the high efficiency coalescence separators is performed through the use phenomenon of gravitational separation of oil and water, which is additionally supported by coalescence and sorption phenomena (ESK-S). The design of the separator calms down the flow of polluted water and, at the same time, forces the division into oil (stored in the separator) and water. Petroleum derivatives lighter than water float to the surface, where they accumulate, forming a layer. Small mineral oil droplets that do not have adequate buoyant force, form larger drops (coalescence) during their flow through the coalescence material, which facilitates their separation. Submerged outlet prevents escape of separated contaminations into the receiver.



Due to the extensive use of high-efficiency coalescence separators, different versions are available, tailored to the individual Customer's needs:

- high-efficiency coalescence separator – ESK
- high-efficiency coalescence separator with by-pass – ESK-B
- high-efficiency coalescence separator with sorbent – ESK-S
- high-efficiency separator with the inflow closure – ESK-E
- systems integrated with coalescence separators (with regulators, pumping station and settling tank).

The standard **equipment** of the device includes coalescence separation column with the outflow check valve which closes the outlet pipe in case of exceeding the limit of oil storage capacity in the separator. The task of the float valve on the outflow is also to secure collected petroleum derivatives from being washed out into the outflow.

All components are made of stainless steel and polymers distinguished by high chemical resistance and mechanical strength. As an option, the device can be equipped with an monitoring system (chapter: [Monitoring systems](#)).

Coalescence separator with a by-pass

High-efficiency coalescence separators with internal hydraulic by-pass (ESK-B, ESK-BH) are equipped with a **precise wastewater flow control system**, which continuously controls the inflow into the device.

The system ensures optimal operation of the coalescence system (maximum treatment efficiency). **Ecol-Unicon by-pass system is protected by a patent** (application no. P393813).

Contaminated stormwater enters through the inlet pipe and, subsequently, through the vertically downward inlet, it is directed to the interior of the separator. The overflow edge, located inside the by-pass pipe, directs the nominal flow to the separator. Additionally, the amount of wastewater flowing into the separator is controlled by a composite float valve. The flow of higher than nominal intensity is not subjected to treatment but, as a result of closure of the inlet by the composite float, directed to the by-pass pipe instead.





Coalescence separators with sorbent

High-efficiency coalescence separators with sorbent (ESK-S and ESK-HS) are characterized by a very high efficiency of wastewater treatment, supporting the separation process with sorption effect. The hydrophobic material of the sorbent effectively absorbs and efficiently stops oil droplets that have not separated. Due to the high-efficiency wastewater treatment (Table 3), coalescence separators with sorbent are recommended for use with particularly sensitive receivers.

Coalescence separators with the inflow closure

The interior fittings of high-efficiency ESK-E coalescence separators are made of stainless steel, which meets **industrial and power plants requirements due to their high temperature strength and chemical resistance**. Inflow closure which automatically cuts-off the inflow in the case of impoundage of wastewater in the device, constitutes a standard equipment. Impoundage may occur as a result of exceeding the limit of oil storage capacity, too high inflow intensity of wastewater or outflow closure.

Interaction of coalescence separator with the settling tank

Wastewater containing suspension should be subjected to pre-treatment at the settling tank. A properly designed settling tank ensures optimal treatment efficiency and adequate storage capacity of the sludge (Table 2).

Ecol-Unicon offers oil separators with settling tanks (chapter: [Settling tanks](#)) available in two configurations:

- integrated with settling tank ESK, ESK-BH – one tank
- with settling tank in separate chamber – two tanks

The integrated system is designed to reduce area of treatment installation, while ensuring a high level of treatment of both oil and suspensions. It is used primarily in areas with a high rate of urbanization. As an option, the device can be equipped with a monitoring system (chapter: [Monitoring systems](#)).



COALESCENCE SEPARATORS IN OVERFLOW SYSTEMS WITH REGULATORS

The use of regulators enables the effective protection of the storm-water pre-treatment plant, against overload resulting from the storm-water inflow. Overflow systems developed by Ecol- Unicon are **selected individually** and consist of:

- flow dividing chamber with flow regulator, adjusted to the flow capacity of pre-treatment devices
- connection chamber
- external overflow system with a diameter and decrease adjusted to the maximum stormwater inflow.

In the case of pre-treatment systems, in front of which a flow dividing chamber with the flow regulator, as well as by-pass pipeline are installed, it is important for the chamber to enable proper wastewater separation. Nominal flow (Q_{nom}) from the catchment area should be treated thoroughly, and in the case of maximum flow (Q_{max}), the separator should be protected against hydraulic overload. Properly selected flow regulator ensures achieving $Q_{reg} = Q_{nom}$ at points A and B (Fig. 2).

The height of the bottom of the by-pass pipe (or the top of overflow edge) should be located at the ordinate $H \geq H_A$, which ensures that the flow directed to the pre-treatment system will be equal to Q_{reg} . With the increase of wastewater inflow, the level of wastewater damming increased to the height of $H=H_B$ and the inflow lower than Q_{reg} is directed through the regulator, which protects the device against hydraulic overload. The flow of higher intensity than Q_{reg} is directed to the by-pass pipeline.

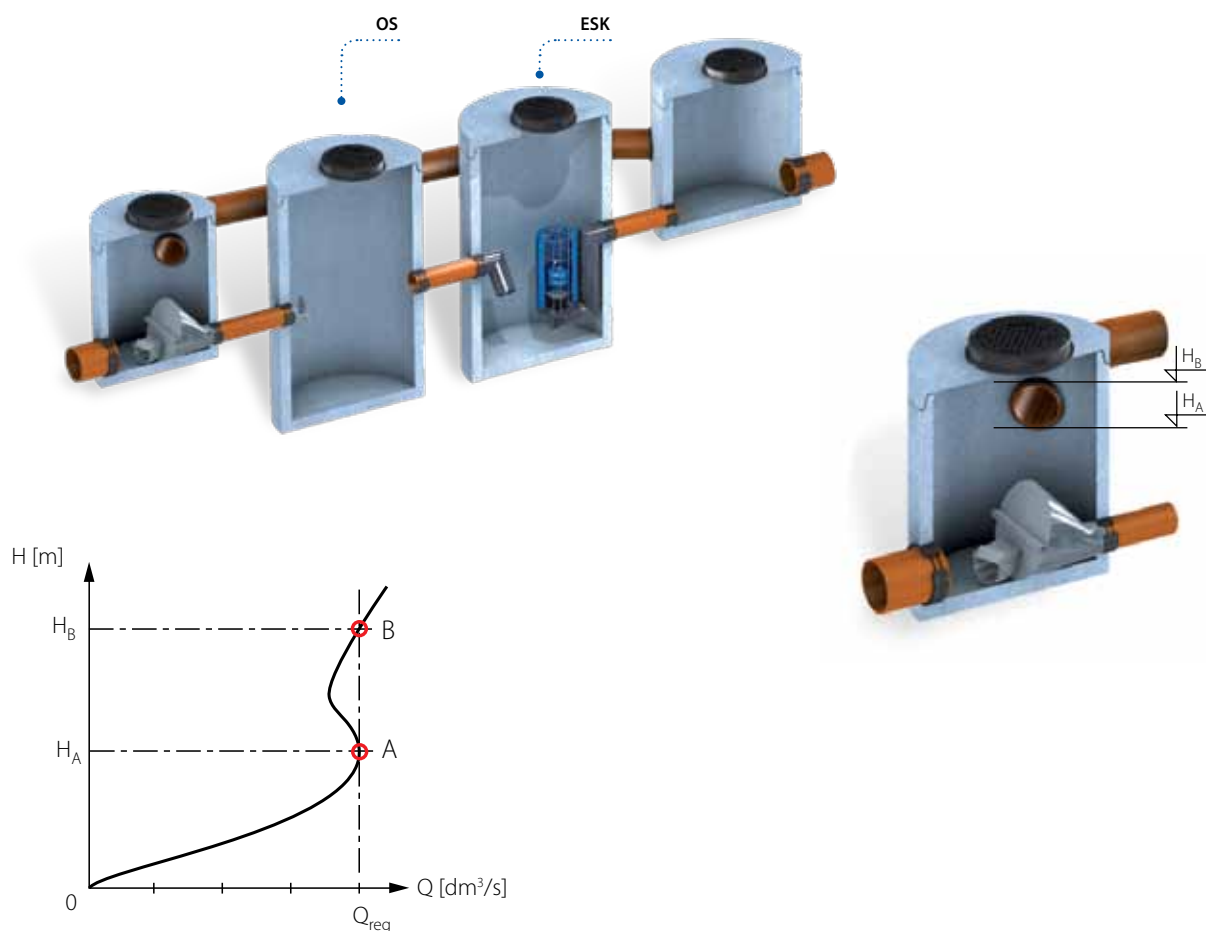


Figure 2 Operating characteristics of the regulator

Technical data of the coalescence separators are to be found in the catalogue pages available at: www.ecol-unicon.com
 Technical consultations: export@ecol-unicon.com



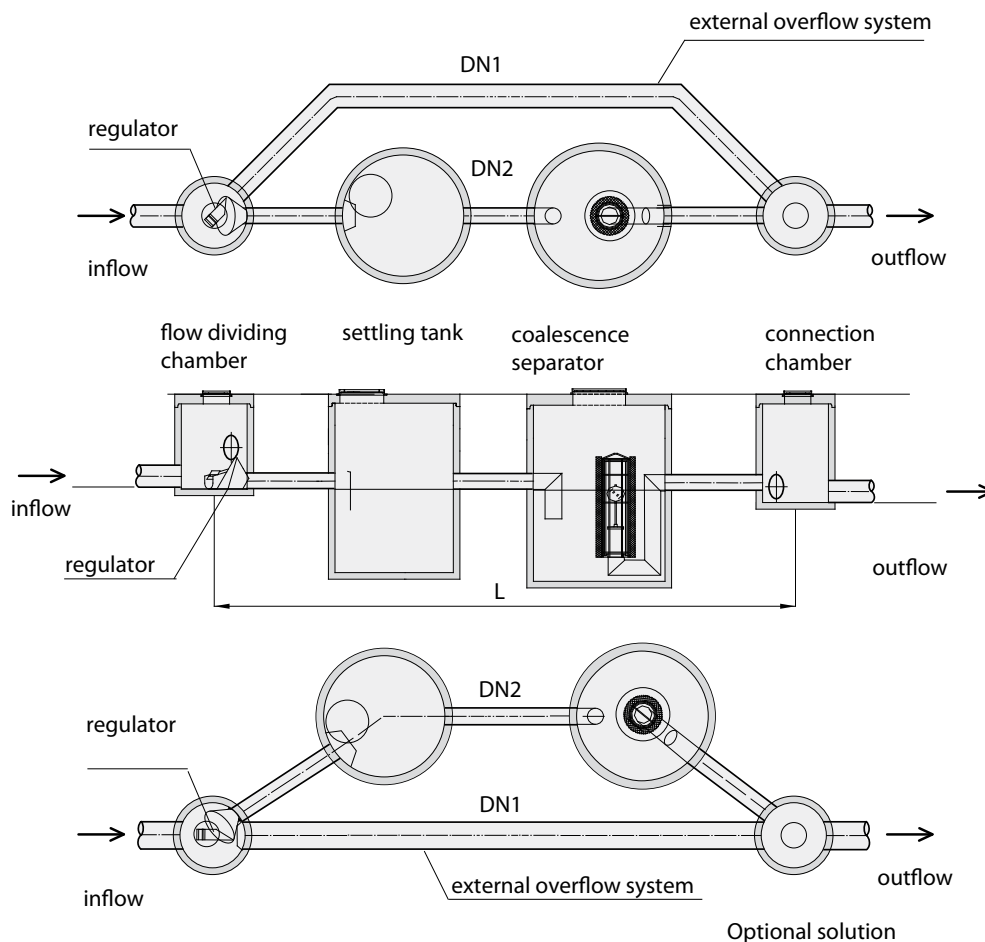


Figure 3 Overflow systems based on the types of coalescence separators

GREASE SEPARATORS

In the case of grease separators, organic oils are separated through the use of gravitational separation as well as a flotation process. Due to the fact that the density of grease particles is lower than the density of water, they accumulate on its surface. Specially shaped deflectors, located within the tank of the separator (at the inlet and outlet), force an adequate flow of sewage and prevent the escape of separated grease substances from the separator. Pollution of higher density, which enter along with the wastewater, settle at the bottom of the tank.

As an option, the device can be equipped with a monitoring system (chapter: [Monitoring systems](#)).

GREASE SEPARATORS WITH A SETTLING TANK

Wastewater contaminated with suspended solids should be subjected to pre-treatment at the settling tank. A properly designed settling tank should ensure optimum treatment efficiency and adequate storage capacity of the sludge. Major suspended solids are separated from the wastewater with the use of baskets, screens or other sorting means.

Ecol-Unicon offers grease separators with settling tanks (chapter: [Settling tanks](#)) available in two configurations:

- integrated with settling tank ESK-H – one tank
- with settling tank in separate chamber – two tanks

The integrated system is designed to reduce area of treatment installation, while ensuring a high level of treatment of both grease and suspensions. The device is used primarily in areas with a high rate of urbanization.

Technical data of the grease separators are to be found in the catalogue pages available at: www.ecolunicon.com
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An aerial photograph of a lush, green valley. A river flows through the center of the valley, surrounded by dense forests and grassy fields. A prominent blue curved line sweeps across the lower half of the image, starting from the left and ending near the bottom right. In the bottom left corner, the text '4/PUMPING STATIONS' is displayed in white, bold, sans-serif font.

4/PUMPING STATIONS

Pumping stations are used to transport sanitary, storm and industrial wastewater solving the problem of the lack of slope in sewerage. In particular, they are used in adverse terrain, high water table or places located at a long distance from the discharge point. The **working principles of EPS** pumping station are based on the operation of pumps and pipelines at constant parameters, regardless of the size of the inflow to the retention tank. Stable operation of the pumping station is ensured by periodically activated pumps placed in the retention tank. The following types of pumping stations are distinguished: network, plant, household and - a special group - dry well pumping stations with solids separation system (chapter: [Dry well pumping stations with solids separation system](#)).

Network and plant EPS pumping stations

EPS pumping stations manufactured by Ecol-Unicon are designed individually, based on Customer's technical requirements. The typical EPS pumping station includes:

- tank
- hydro-mechanical equipment
- pumps
- monitoring system with remote control as an option (chapter: [Monitoring systems](#)).

Most popular material design of the tank is a high-quality concrete or reinforced concrete (chapter: [Concrete precast chambers and tanks](#)). In case of heavy ground and water conditions, the concrete tanks are equipped with an anti-buoyancy collar and optionally, in case of aggressive wastewater, they are protected with insulating coatings. Polymer concrete tanks are also used, which are characterized by high strength and resistance to aggressive media. Light tanks made of plastic (PE-HD) are used mainly at household and industrial sewage pumping stations.

Inlet and outlet pipelines are connected through the **holes to the tank** as well as signal and supply conduits. Hole dimensions are adjusted to the size of pipelines. Passages through the walls of the chambers are made tight.



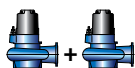
Manholes embedded in the cover slab are adapted to the pump dimensions, making it easy to assemble and disassemble them. Manholes of the relevant load class (green or sloped area) are manufactured in particular of acid-resistant steel or cast iron.



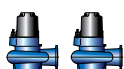
Submersible pumps in a stationary position are assembled with the aid of a coupling base that connects the pump to the discharge pipeline. Guides and chains, made of acid-resistant steel, are used to embed the pump on a coupling elbow, and thus to self-connect with a discharge conduit. The source of wastewater and catchment area determine the use of appropriate pump rotors (open, channel, screw, etc. types), as well as pump operation systems. The most popular operation systems are as follows:



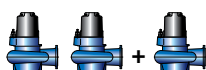
One operating pump, used mainly with household pumping stations.



Two pumps in an alternating operation system. Each pump contributes to the total pumping station output, with the second pump as a back-up. Solution used mainly for sanitary, municipal and process wastewater.



Two pumps in a parallel operation system. Both pumps contribute together to the total pumping station output. Solution used mainly for stormwater



Two pumps in a parallel operation system and one as a back-up.

Pumping stations' **discharge pipeline** is made of acid-resistant steel. The pipeline is joined with flanges (flange: aluminium or acid-resistant steel, fasteners: acid-resistant steel) or screw threads (up to DN 50).



Check valves prevent backflow of wastewater when a pump is stopped. **Ball valves**, characterized by low pressure loss, are used as a standard.

Shut-off valves, used to fully open or close the inflow in the inlet pipeline, may be provided with installation enabling service from the surface. **Wedge gate valves** are used as a standard, and knife gate valves as an option.

EPS pumping stations can be equipped with a number of **additional installations**, depending on the requirements, such as: manhole ladder, operating platform, washing device, anti-sedimentation slants, deflector, basket screen, handles, rails, crane with a winch, etc.



Power control box, CE-certified (compliance with 2004/108/EC and 2006/95/EC Directives), constitutes a standard equipment of the EPS pumping stations. The panel is designed to control the device, but it can also be connected to the EU-MS monitoring system (chapter: **Monitoring systems**). In addition to automatic actuation of pumps, depending on the level of wastewater in the pumping station, and full control of the operating conditions (including emergency conditions), the main tasks of the control system are as follow:

- temporary actuation of pumps in the case of small liquid inflow,
- “dry run” pump protection
- emergency conditions optical-acoustic signalling, with the possibility to disconnect the acoustic signal
- pumps operating time and number of switching on count
- possibility to block parallel pump operation
- possibility to set the pump operating time limit
- overcurrent protection of the control system



Technical data of the pumping stations are to be found in the catalogue pages available at: www.ecol-union.com
 Technical consultations: export@ecol-union.com



**5/ DRY WELL
PUMPING STATIONS
WITH SOLIDS
SEPARATION SYSTEM**

ETS dry well pumping stations with solids separation system, like the EPS pumping stations, are devices used for pumping wastewater. ETS can be applied at locations where the natural topography varies – in areas with low population density, at households and industrial plants situated at a considerable distance from the point of sewerage discharge, as well as in urban areas.

The observed increase in the concentration of solids in the wastewater, which results mainly from water saving, means that the application of the ETS is often more rational solution (Tab. 1).

The separation of solids, as applied in the ETS, increases the efficiency and reliability of the system, and also enables the use of pumps with higher pumping efficiency (impellers with a smaller free passage). Placing the pump and the pumping station in a **dry tank** significantly improves the operating and maintenance conditions. Watertight retention chamber is equipped with an anti-odour filter that completely eliminates the unpleasant smell. The decision concerning the solution to be applied – that is the choice between a traditional pumping station (wet well pumping station) and a dry well pumping station (with separation of solids), or the intermediate option – a dry pumping station (a pumping station without separation of solids) – is made in agreement between the Investor, User and Designer.



Table 1 Comparison of pumping equipment for wastewater transportation for typical systems.

Pumping stations	Wet well pumping station	Dry well pumping station*	Dry well pumping station with solids separation system ETS
Separation of solids	not available	not available	separator with an elastic flap
Odour elimination	partial	good	complete
Comfort of servicing	lower	average	high
Costs of investment	lower	higher	higher
Cost of energy consumption	higher	high	lower – no solids in pumped wastewater, caught by the separators
Costs of service	higher	average	lower

* Ecol-Unicon offers individually designed dry pumping stations without separation of solids.

ETS dry well pumping stations with solids separation system offered by Ecol-Unicon – even with a capacity of over 300 m³/h – are designed according to individual Customer's requirements. The typical ETS dry well pumping station consists of tank, pumping station module with separators, pumps, hydraulic accessories, automation system and remote control as an option (chapter: **Monitoring systems**).

ETS dry well pumping stations with solids separations system are manufactured in accordance with European Directive 89/106/EEC, PL-EN 12050-1:2002 standard, and also have **CE marking**.



Their **main advantages** are:

- **serviceability** of technological elements of one of the two inflow cycles **while the dry well pumping station is running**
- **quick and easy service access** to all technological elements of the system – pumps, separator, elastic flaps of the separator, check and shut-off valves, inflow distributor
- **application of pumps of any manufacturer**, selected individually on the basis of the design specification or in accordance with user requirements.

ETS pumping stations working principles

The wastewater flows through the inlet pipe into the distributor, from where it is routed to two separate inflow cycles. Appropriately shaped distributors minimize the risk of blockage, and the two independent inspection windows ensure an effective inspection. Then, the wastewater flows to the separator, in which the solids (screenings) are stopped with the help of elastic filter flaps. Solids-free wastewater flows into the retention chamber, and the sewage containing solids remains in the separator chamber. When reaching the maximum level of wastewater in the retention chamber, one of the pumps is switched on and the sewage is pumped out to the receiver, along with the solids from the separator. This operation mode is repeated in cycles, and the pumps operate in an alternating system.



ETS pumping stations structure

Taking into a consideration Customer's requirement as well as ground and water condition, **ETS module** can be assembled in a watertight tank made of concrete, polymer concrete, PE-HD or other resistant and watertight material. Gravity and mechanical ventilation ensures constant air exchange inside the body. A manhole situated at the cover slab enables entry to the inner part of the tank for maintenance purposes (dimensions of the opening are adapted to transport parts, such as pumps).

The pumping station module is made entirely of stainless steel. This eliminates the need for additional anti-corrosion coatings and ensures its long life. Inspection hatches are located at the upper part of the pumping station module, which enable monitoring of the retention chamber during its operation.

Solids separators (with elastic flaps) are installed outside ETS module, in front of each pump. This allows control and service of the separators during the operation of the pumping station – at that time the device operates during the second cycle.

High-efficiency pumps, suitable for “dry” operation, can be made as IP55 version or as submersible version with a cooling jacket, having degree of protection of IP68. Submerge resistant pumps are used at floodplains, exposed to periodic flooding.

Fittings of ETS consist mainly of check valves and shut-off gate valves. Ball-type check valve stops the inflow when the maximum level of wastewater is reached in the retention chamber. The location of shut-off valves, enable the cut-off of one cycle and to perform its service without stopping the operation of the pumping station.

Piping that connects the device with the discharge collector can be made of acid-resistant steel or PE-HD, depending on individual requirements.

Additional installations included in the standard equipment of the ETS dry well pumping stations are: acid-resistant steel ladder, fitted with anti-slip steps, interior lighting, flooding sensor and pumping station body drainage. As an option, the pumping station can be equipped with additional installations, according to the specifications or user’s requirements.



Power control panel, CE-certified (compliance with 2004/108/EC and 2006/95/EC Directives), constitutes a standard equipment of the ETS dry well pumping stations. It is also possible to connect the **EU-MS** to the system (chapter: **Monitoring systems**). A hydrostatic level sensor with a ceramic membrane resistant to mechanical damage has been applied to control the level of wastewater. Additional sensors protect the system in emergency conditions and enable automatic operation of the pumping station in the case of probe failure.

The additional tasks of the control system, apart from actuation of pumps, depending on the level of wastewater in the pumping station and full control over the operating parameters (including emergency conditions), are as follow:

- pump operation and failure signalling
- emergency conditions optical-acoustic signalling, with the possibility to disconnect the acoustic signal
- pumps operating time and number of switching on count
- possibility to set the pump operating time limit
- overcurrent protection of the control system



Technical data of the dry well pumping station with solids separation system ETS are to be found in the catalogue pages available at: www.ecol-unicon.com
 Technical consultations: export@ecol-unicon.com

An aerial photograph of a river winding through a landscape. The left side of the image is heavily overlaid with a semi-transparent red color. The river itself is a mix of brown, grey, and white, suggesting sediment or ice. Bare trees and some evergreens are visible along the banks. In the lower-left corner, there is a green curved line that sweeps upwards and to the right, framing the text.

6/WASTEWATER TREATMENT PLANTS

Ecol-Unicon provides solutions for sewage treatment and disposal according to the housing density in the relevant area:

- High density built-up areas : BIOCOMP, BIOFLOW, BIOSBR
- Lower density – rural areas: BIO-FIT

Increasing demand on the quality of treated sewage requires the best and most appropriate treatment technologies. Ecol-Unicon's product range ensures the maximum level of purification with low operation and maintenance costs.

Ecol-Unicon offers four types of wastewater treatment plants with different purification technologies:

- **BIO-FIT** – wastewater treatment plant by microorganisms grown on a submerged fixed-bed reactor
- **BIOCOMP** – the process of organic pollutants decomposition is contributed by microorganisms cultured on activated sludge in the circulation chambers - biological reactors and anaerobic chamber
- **BIOSBR** – wastewater treatment plant representing a flow-through sequencing batch reactor, where the decomposition of organic pollutants is contributed by a low biologically loaded active sludge in a single reactor serving also as a settling tank. This technology requires no holding tank
- **BIOFLOW** – flow-through wastewater treatment plant where microorganisms (activated sludge) located in anaerobic, pre-denitrification, denitrification and nitrification of biological reactor are used for biological neutralization of pollutants.

Table 1 Division of Ecol-Unicon wastewater treatment plants with regard to size and the applied technology

Type	Size [PE*]	Biofilter
BIO-FIT	5–450**	Fixed
BIOCOMP	800-9999**	Low-loaded activated sludge
BIOFLOW	2500-25000**	Activated sludge
BIOSBR	500-10000**	Low-loaded activated sludge

* Population equivalent, it is assumed in housing that 1 PE = 1 INHABITANT

** Large wastewater treatment plants are offered in accordance with INDIVIDUAL technical projects

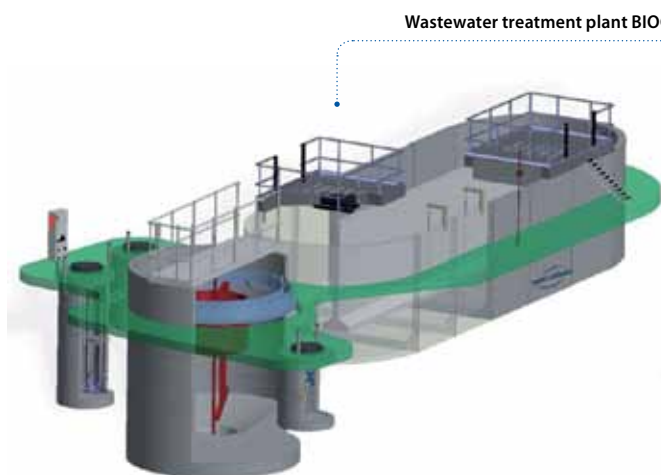


Figure 1 Wastewater treatment plant BIOCOMP

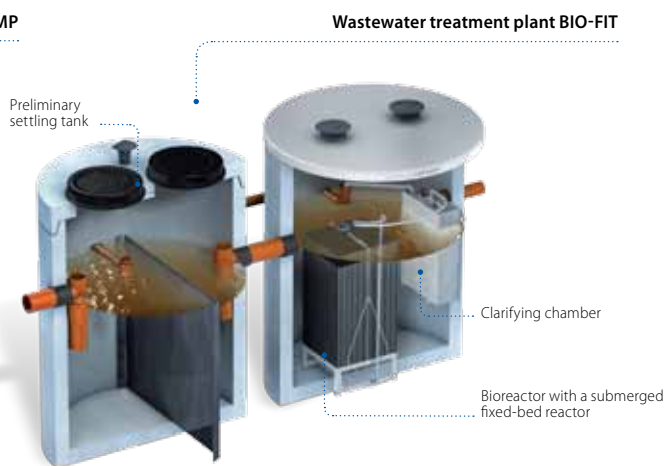
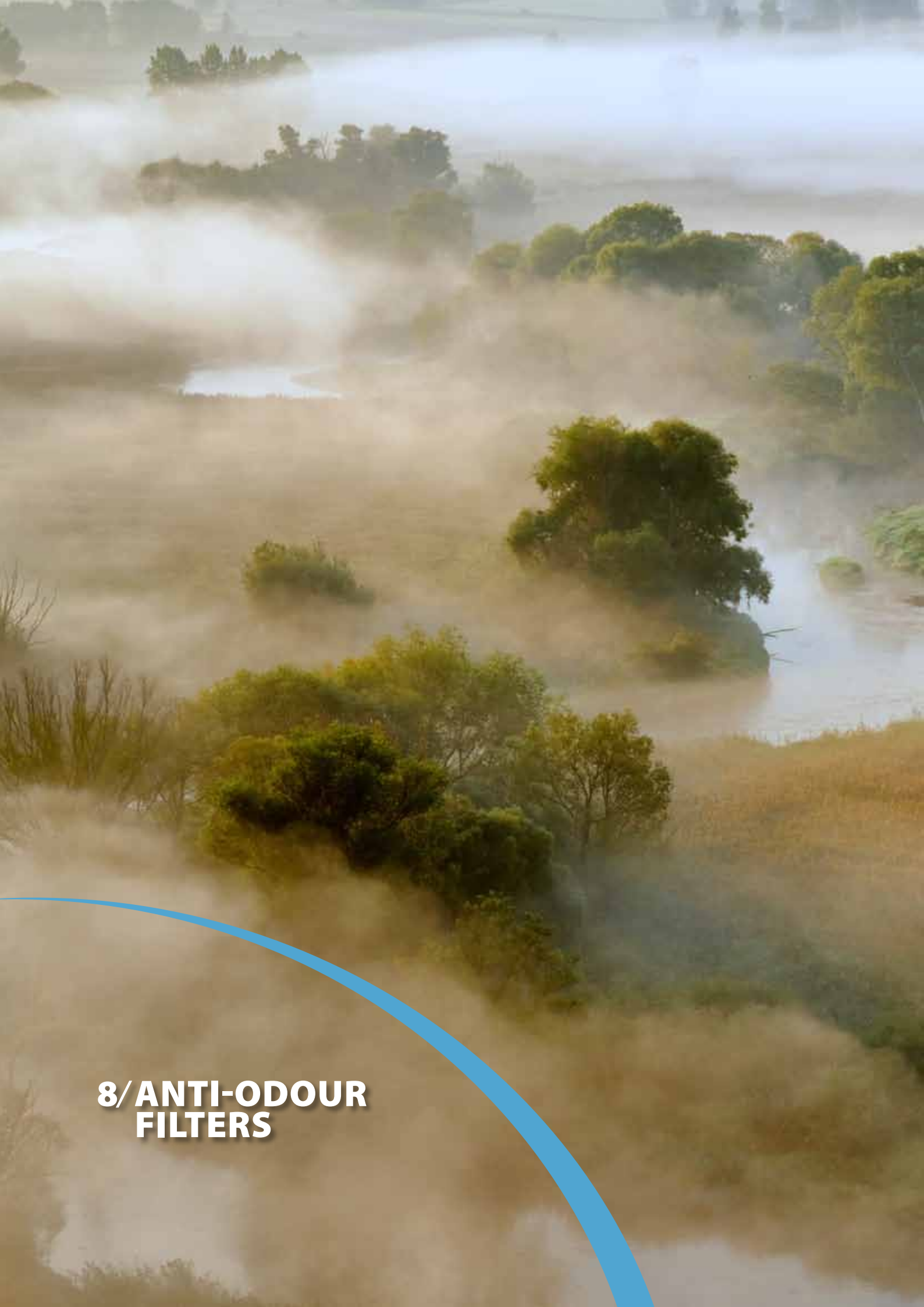


Figure 2 Structure of wastewater treatment plant BIO-FIT



Technical data of the wastewater treatment plants BIOCOMP and BIO-FIT are to be found in the catalogue pages available at: www.ecol-unicon.com
 Technical consultations: export@ecol-unicon.com

A misty, atmospheric landscape with a river, trees, and a blue curved line at the bottom. The scene is hazy with soft light, suggesting early morning or late evening. The river flows through the landscape, surrounded by lush greenery and trees. A thick layer of mist or fog hangs over the water and the surrounding land, creating a dreamlike atmosphere. In the foreground, a large, curved blue line sweeps across the bottom of the frame, partially obscuring the text.

8/ANTI-ODOUR FILTERS

Construction and modernization of sewerage brings about new requirements regarding neutralization of odours generated during transport, storage and treatment of wastewater. The chemical composition of gaseous pollution includes both organic and inorganic substances, which are often very toxic (i.e. hydrogen sulfide, thiosulfates, mercaptans). Released chemical substances (odour and odourless) may occur in high levels of concentration which represent a direct threat to both human health and the environment.

High efficiency air cleaning and construction solutions adapted to all conditions allow for the **installation** of anti-odour filters in such places as:

- sewage pumping stations and dry well pumping stations
- wastewater treatment plants (primary settling tank, domestic wastewater treatment plants)
- septic tanks
- pressure relief wells and filtering systems
- inspection chambers (Fig. 1).

Advantages of Ecol-Unicon anti-odour filters:

- reliable and tested in all weather conditions
- easy to install and maintenance free
- suitable for both municipal and process wastewater
- also designed according to individual Customer's needs (e.g. container filter).

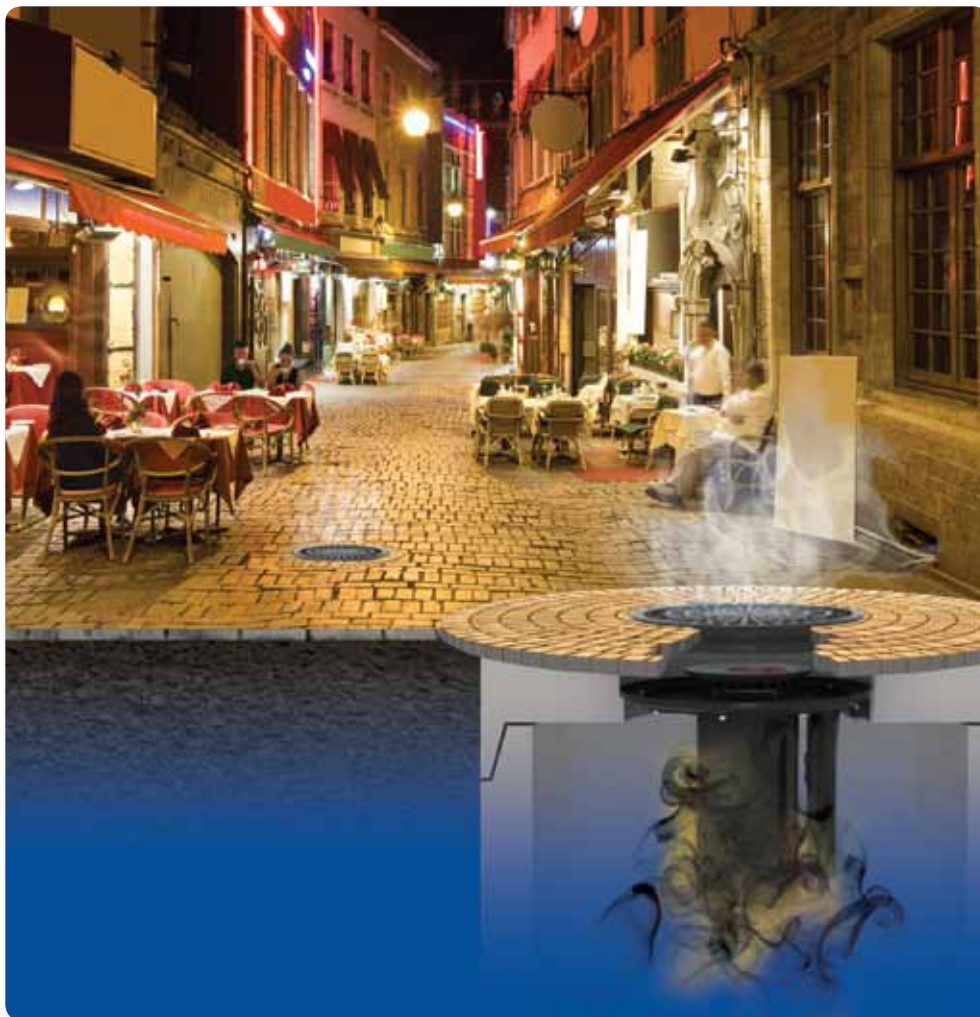


Figure 1 Exemplary use of submanhole filter



Anti-odour filters offered by Ecol-Unicon are available in the following types:



Anti-odour EMF submanhole filters

- design that enables easy fit to manholes with standard diameters from Ø 600 to Ø 800
- custom design for non-standard manholes



KF pipe filter

- available in two standard diameters, Ø 110 mm and Ø 160 mm
- equipped with a sealing flange



Integrated EZK supply-exhaust pipe filter

- inserts available in two standard diameters, Ø 110 mm and Ø 160 mm
- effective anti-odour alternative for two traditional vent pipe filters
- equipped with a mounting plate that ensures proper sealing



KFW insert for pipe filter

- available in two standard diameters, Ø 90 mm and Ø 140 mm
- for use in existing pipe filters



Pipe and submanhole filters are made entirely of PE-HD polyethylene or stainless steel, which ensures their resistance to prolonged contact with aggressive substances, present in sewerage.

Internal filter inserts have a chemically impregnated activated carbon beads (**chemical adsorption** process) or selected bio filtration medium (**biological processes**). Properly chosen parameters or activated carbon or biomass affect the efficiency of gas treatment.



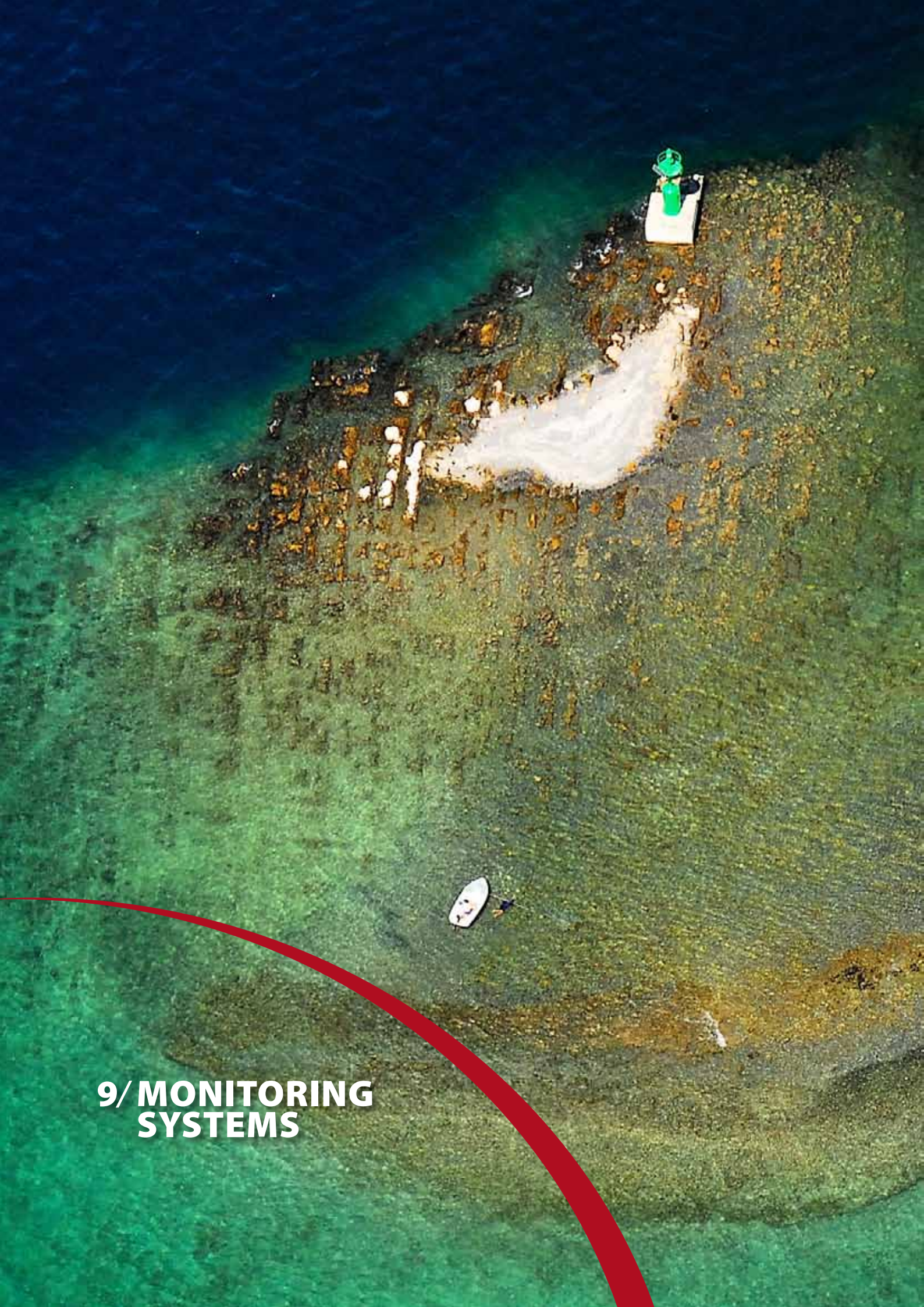
Volumes, as well as physical and chemical parameters of Ecol-Unicon filter inserts ensure their **long operating life** (2-4 years), and provide a high efficiency of the deodorizing process of chemicals produced in the wastewater.

The effectiveness of odour removal is dependent on the concentration of chemicals in the sewage and working conditions of anti-odour filters, i.e. humidity, temperature (activated carbon: from -20°C to +50°C; biomass: from 0°C to +40°C). Depending on the filter insert used, the removal rate of the most troublesome odours – volatile sulfur compounds – is min. 95%.

Applied technical solutions enable easy replacement of the filter instead of exchanging the whole device. This solution significantly reduces operating costs.



Technical data of the anti-odour filters are to be found in the catalogue pages available at: www.ecol-unicon.com
 Technical consultations: export@ecol-unicon.com



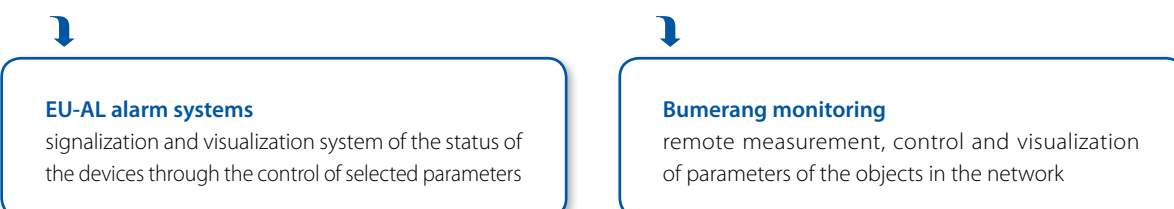
**9/ MONITORING
SYSTEMS**



Monitoring and remote control of the devices installed in the sewerage are inseparable elements of the modern water supply and sewerage systems. They allow for **cost-effective, efficient and comfortable** operation management. This is mainly due to:

- the reduction of operating costs through minimizing the need for local control of objects and the accurate scheduling of services
- the enhancement of environmental safety through reducing the response time of the technical services in case of an accident

Monitoring data not only support the current control system, but are also used in a long-term development of operational plans. They can cooperate with other objects of the sewerage network. Offered monitoring and remote control systems are flexible and in line with Customer's expectations. Depending on the purpose and function, they are divided into:



EU-AL ALARM SYSTEMS

Construction of EU-AL alarm system is based on sensors. They are used both for individual and network objects (Fig. 1). Individual components and accessories included in the alarm system should be selected separately:

- selection of the signalling device – type of power supply and GSM module as an option
- configuration of system – according to the monitored parameter



Figure 1 Exemplary use of EU-AL-GSM alarm systems

Signalling devices are as follows:

- LEDs on the main panel
- PC software (connection: computer-signalling device via USB cable)
- SMS (signalling device with GSM module)
- mobile visualization system (tablet).

Due to the location of monitored devices, it is possible to select the supply source: mains supply (230V), or battery back-up as an option. The use of alternative power source, such as solar panels or small wind turbines, is also available.



Sensors used by Ecol-Unicon are resistant to aggressive interaction of the wastewater. They can be installed within the explosion hazard areas with intrinsically safe circuits.

List of sensors:

- Overflow sensor
- Oil/grease level sensor (Fig. 2)
- Sludge layer sensor
- Limit sensor
- Gas detection sensor

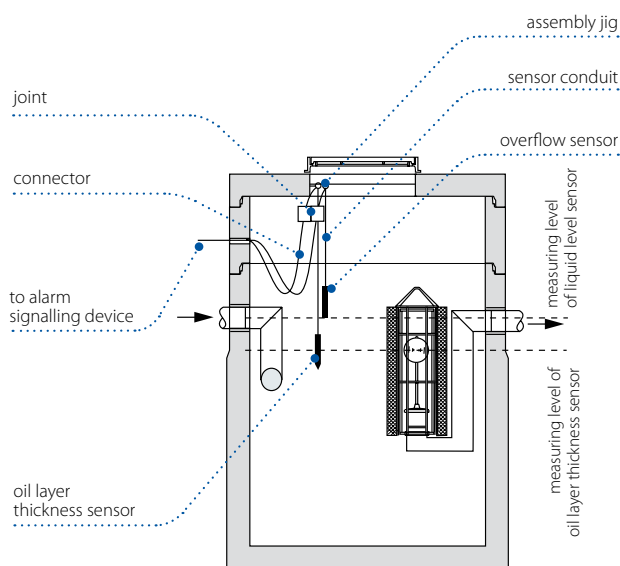


Figure 2 Outline of oil level and overflow sensor installation

Table 1 EU-AL signalling devices configurations

Functionality	EU-AL	EU-AL-GSM	EU-ALB-GSM
230V power supply	•	•	
Uninterruptible power supply	•	•	
Battery back-up			•
EU-AL SMS/monitoring		•	•
PC software		•	•
Overflow sensor	•	•	•
Oil/grease level sensor	•	•	•
Sludge layer thickness sensor	•	•	•
Sluice opening limit sensor		•	•

Mobile visualization system

A modern visualization system designed to work with EU-AL signalization devices equipped with a GSM module. The system collects the data transmitted by the signalization devices and converts it into visual information on the screen of a mobile device (tablet etc.). In case of an alarm, an audible warning occurs and visualization appears on the screen.

The main advantages of the system:

- supervision of a virtually unlimited number of devices
- mobility
- edition of names of individual devices
- event history log on all devices
- remote switching off of the acoustic signal at the device.

BUMERANG MONITORING

Bumerang is an intelligent monitoring and remote control system of water and wastewater objects. The telemetry modules combine the qualities of a classic controller and GSM/GPRS modem. Supplemented with specialized software, they can be used as modern facility-oriented controllers that supervise the operation of pumping stations, dry well pumping stations, waste water treatment plants, water intakes and others. It can analyze more than 100 parameters "in the background" and keep the operator informed of the typical failures and irregularities in the operation of the devices that require service intervention. EU-MS monitoring allow for professional and reliable monitoring and control of operating objects and devices.

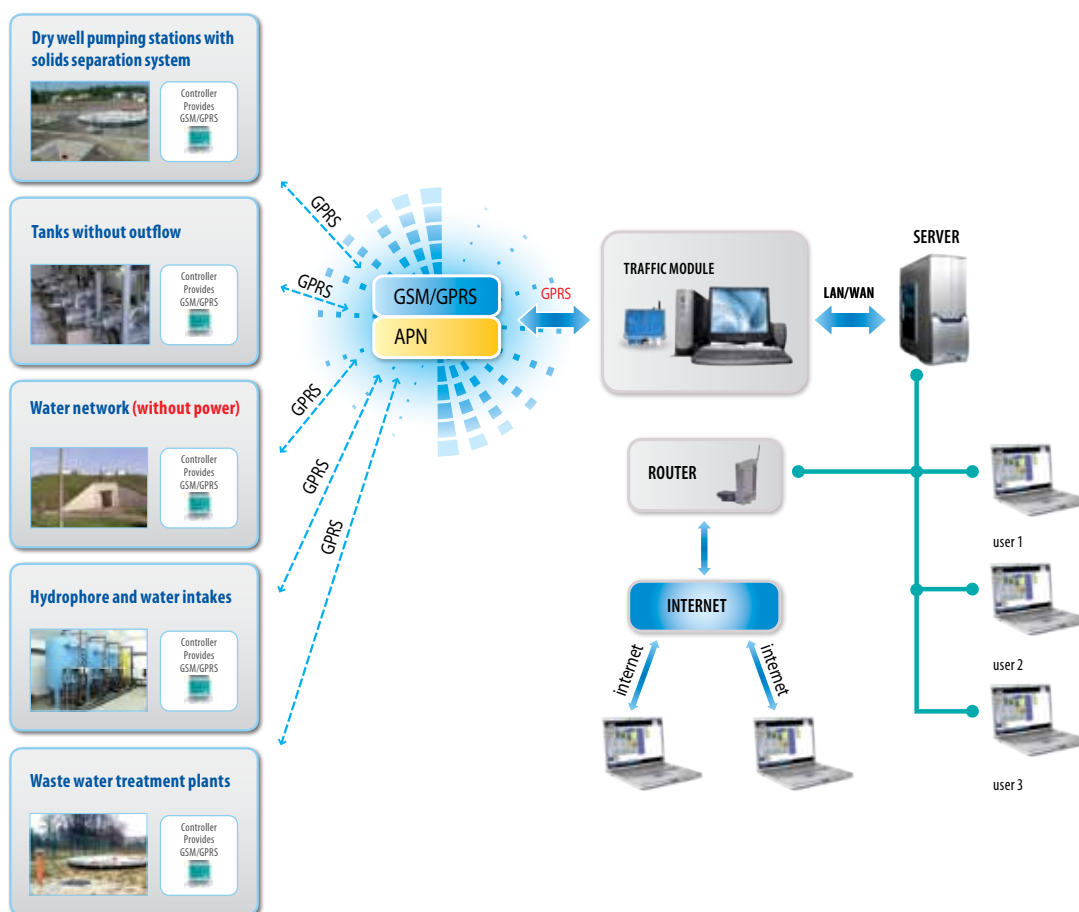
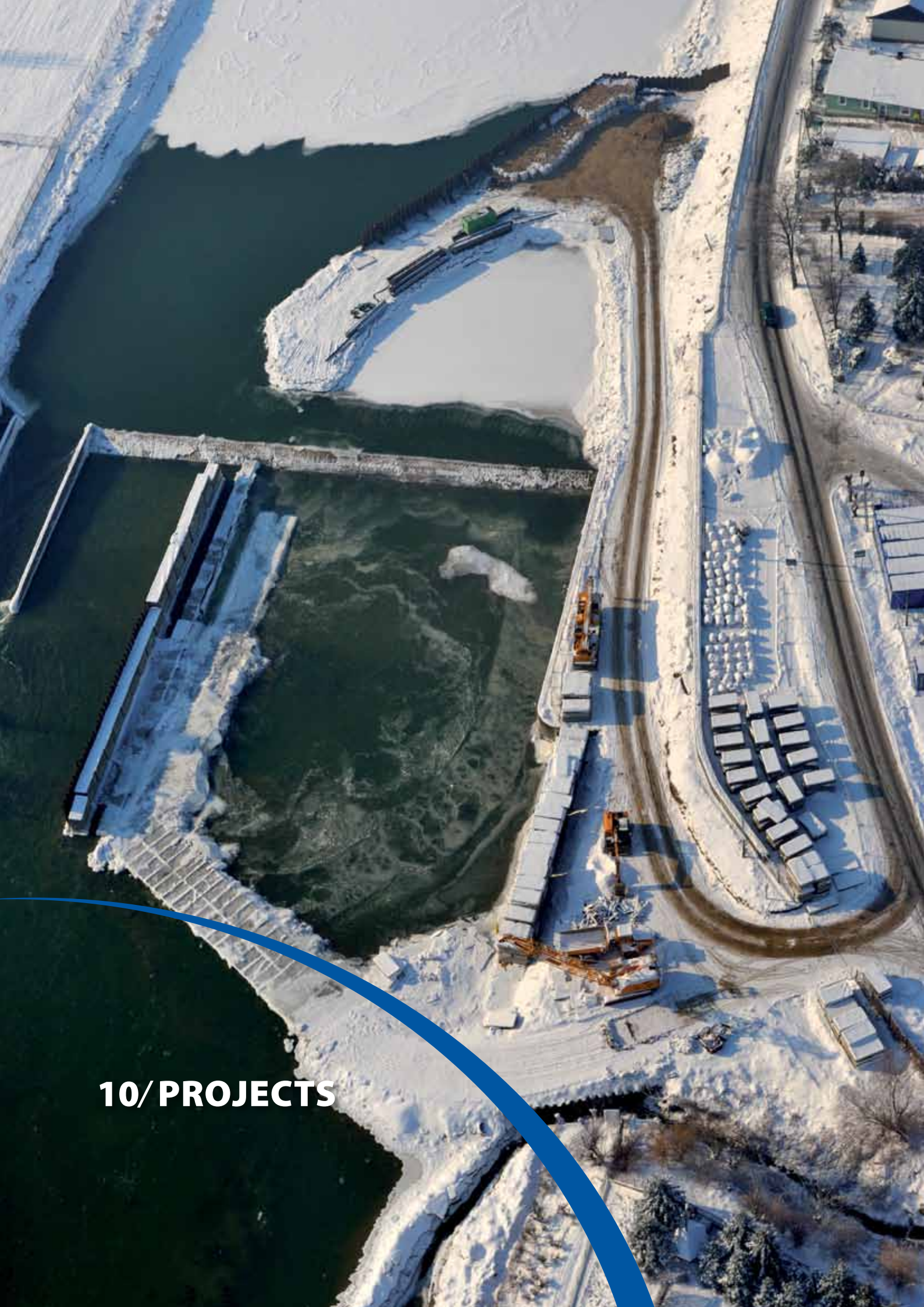


Figure 3 Exemplary use of Bumerang monitoring system

Advantages and characteristics

- low installation and operating costs of the system
- data transmission utilizing GPRS technology and mobile internet
- on-line monitoring and control from the site or other location via the internet
- extension of failure-free operation of the devices
- possibility of linking an unlimited number of devices
- event-driven data transmission guarantees keeping the facilities status updated
- fast, reliable and secure data transfer (private APN for monitoring purposes)
- devices map, full up-to-date status of all monitored devices
- graphic and tabular summary list of all the parameters, together with an animation of the process at the selected device
- remote diagnostics and parameterization of devices controllers (e.g. MIN, MAX levels).

Technical data of the monitoring systems are to be found in the catalogue pages available at: www.ecol-unicon.com
 Technical consultations: export@ecol-unicon.com



10/ PROJECTS



Wroclaw Motorway Bypass
coalescence separators, settling tanks



Katowice Sewerage System
dry well pumping station with solids separation system ETS

Concrete precast chambers and tanks
Settling tanks
Separators
Pumping stations
Dry well pumping stations
Wastewater treatment plants
Flow regulators
Anti-odour filters
Monitoring systems



PGE Arena, Gdansk
EU chambers



Katowice Sewerage System
dry well pumping station with solids separation systems ETS

- Concrete precast chambers and tanks
- Settling tanks
- Separators
- Pumping stations
- Dry well pumping stations
- Wastewater treatment plants
- Flow regulators
- Anti-odour filters
- Monitoring systems



Rest area, Highway Junction Sosnica
pumping station EPS



Railway investment, Wrocław
EU tanks

Concrete precast
chambers and tanks

Settling tanks

Separators

Pumping stations

Dry well
pumping stations

Wastewater
treatment plants

Flow regulators

Anti-odour filters

Monitoring systems

Projects



Zgierz Thermal Power Station
pumping stations, flow regulators, EU chambers



Water and sewerage company, St. Petersburg
Anti-odour filter EMF



Gdansk Lech Walesa Airport
pumping stations EPS, separators, EU chambers, settling tanks



Swidnik Airport
pumping stations EPS, separators, settling tanks

Concrete precast
chambers and tanks

Settling tanks

Separators

Pumping stations

Dry well
pumping stations

Wastewater
treatment plants

Flow regulators

Anti-odour filters

Monitoring systems

Projects



Construction and reconstruction of storm water channels, Gdynia
settling tanks, separators



Reservoir, Limanowa
EU tanks



Biedronka's Logistic Centre, Sieradz
pumping stations EPS, EU chambers



Solid waste disposal facility, Tczew
EU tanks

Concrete precast
chambers and tanks

Settling tanks

Separators

Pumping stations

Dry well
pumping stations

Wastewater
treatment plants

Flow regulators

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Monitoring systems

Projects



Hotel, Gizycko
pumping station EPS



Gdansk
pumping station EPS



Reconstruction of the water junction, Gdansk
pumping station EPS



Chalupy
pumping station EPS

Concrete precast
chambers and tanks

Settling tanks

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