

Pumping stations

RAINWATER PUMPING STATIONS

EPD rainwater pumping stations are located in rainwater drainage networks to transport rainwater to the required distances and heights. The basic task of a pumping station is to pump rainwater, through expansion wells, into gravity or pressure collectors. These devices are designed to work properly in conditions of large irregularities of inflow intensity.

APPLICATION

Pumping stations are a reliable solution to the problems related to the deepening of gravity collectors in rainwater drainage systems. They are used especially in case of unfavourable terrain or difficult ground and water conditions – e.g. no possibility to further deepen the collector and/or significant distances to the collector.

BENEFITS

- reliable, proven design - easy service and operation
- wide range of compatible pumps
- long lifespan of the device thanks to the highest quality materials
- Possible to install in carriageway areas
- 5 years warranty

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Pumping station
Kraków, Jagiellonian University

CONSTRUCTION



Automation
Power supply and control switchboard with the option to connect to the BUMERANG management system

Ventilation
Ventilation ducts for air exchange in the pumping station

Chamber
Made of materials such as: concrete, reinforced concrete, polymer concrete or HDPE

Fixtures
The highest quality bolts and gates

Additional equipment
The highest quality equipment selected according to needs e.g.: ladder, service platform, cleaning system

Pumps
Submersible pumps – dedicated to the specified medium and parameters

CHAMBER

pumping station chamber can be made of materials such as: concrete, reinforced concrete, polymer concrete or HDPE

Diameter of the chamber is selected according to rainwater flow rate, pump size and diameter of hydraulic equipment. Chamber of the device is at the same time a rainwater intake chamber and its size must ensure appropriate retention capacity. In order to place the pumping station in the carriageway area, the chamber has to be properly designed in terms of load capacity.

Cover of the device has an opening fitted with a manhole cover made of stainless steel, HDPE or cast iron (depending on the intended use of the site). Dimensions of the opening enable operation and service work. Passages through the chamber walls are designed to be tight.

It is possible to integrate the pumping station into a HYDROZONE tank or to use a DZB tank as a chamber of the pumping station.

PUMPS

EPD pumping stations use submersible pumps with IP68 protection, adapted to work in underwater conditions. The choice of the pump impeller is determined by the type of the medium, the diameter of the piping inside the pumping stations and operating parameters, i.e. output and total head.

There are two main designs of pump impellers used in rainwater pumping stations:

- Vortex impeller – paddle rotor operates in a horizontal position, causing a centrifugal force that directs the rainwater towards the discharge port. Therefore, the medium does not flow directly through the impeller's structure, but is only an element providing the force to propel rainwater. A characteristic feature of this type of impeller is a large free passage, which makes the system resistant against any possible debris.
- -Channel impeller – The medium flows directly through the rotor structure. It is distinguished by high efficiency and is dedicated to transporting large volumes of rainwater.

Types of pump operation used in the EPD pumping stations:

- Alternating – each pump operates at a capacity equal to the total capacity of the pumping station at the assumed lifting height. Only one pump is running in each cycle. The pumps serve as backup for one another.
- Simultaneous – a system where two pumps operate simultaneously and together provide the total efficiency of the pumping station at the specified head.

Pumping systems used as standard in the EPD rainwater pumping stations:
1+1 – two pumps with alternating operation
2+0 – two pumps operating simultaneously
2+1 – three pumps; two operating simultaneously providing total capacity of the pumping station, third pump as backup

HYDRAULIC-MECHANICAL FITTINGS

The coupling elbow (coupling foot) is a fixed connection between the pump and the discharge pipeline, which carries the medium out of the unit to the pressure sewer network. Pressure pipes in pumping stations are normally made of stainless steel and are connected by thread (diameters up to DN50) or flange (above DN50).

A non-return valve protects the pumping station from the backflow of the pumped medium. As a standard, EPD pumping stations use ball valves, which guarantees tightness and low pressure losses. Diameter of the non-return valve is equal to the diameter of the discharge pipe. The shut-off valve serves to cut off or allow free flow in the discharge pipes. When the gate valve is in the closed position, the flow is blocked and it is possible to inspect and perform any service work in the pumping station.

Diameters of the gate valves are adapted to the diameters of the pipelines. Gate valve may be operated by means of a wheel directly in the pumping station or it may be located outside the chamber and operated from the ground level by means of a pin located in a street box.

The guide rails are used to direct the pump and to position it correctly on the coupling knee, thus enabling the pump to be automatically connected to the discharge pipe. The guides are used to lower or pull the pump out of the pumping station. Guide rails are made of stainless steel.

Chain - used to pull out and lower the pump. Each pump is fitted with a separate stainless steel chain

POWER SUPPLY AND CONTROL SYSTEM

The supply and control panel is the basic equipment of the EPD pumping station. It holds declaration of performance and CE marking confirming compliance with directives 2014/35/EU, 2014/30/EU. It is designed to control the EPD pumping stations. We recommend integrating the pumping station into the BUMERANG SMART system, which allows remote monitoring and management of the facility.

The main task of the switchgear is maintenance-free automatic starting of pumps, depending on the level of rainwater in the pumping station. The level can be measured by means of a hydrostatic probe.

Basic functions of the switchboard:

- pump control: automatic or manual,
- temporary switching on/off the pumps in case of small inflow,
- rainwater level detection,
- protecting the pumps against dry running,
- optical-acoustic signalling of emergency states, with the possibility of muting the sound signal,
- possibility to block simultaneous pump operation,
- possibility to set a time limit for pump operation,
- calculation of operation time and number of pump starts,
- emergency control of pumps with float sensors.

VENTILATION

EPD rainwater pumping stations are equipped with ventilation pipe filters, ensuring gravitational exchange of air in the pumping station chamber.

ADDITIONAL EQUIPMENT

- ladder (CE marked)
- maintenance platform (for chamber height > 4 m),
- deflector,
- railing,
- flow meter

INSTALLATION

Pumping stations chambers are delivered to construction site as a monolithic tank or in prefabricated elements. The chamber should be assembled according to the supplied instructions and dimensional drawing of the pumping station.

The next stage is the installation of internal equipment, which starts with positioning of the coupling sets, by means of which the pump is connected to the hydraulic system.

Installation of the discharge pipeline and fittings, guides and level sensors is performed after the auto coupling sets have been anchored.

Pumps are lowered by means of guides, and automatically connect to the discharge line attached to the auto coupling set. Installing and connecting the electrical system, power supply and control panel is the final stage

OPERATION

EPD rainwater pumping stations operate in automatic mode. Apart from the necessity to intervene in case of malfunction or periodical inspections, they require regular operational supervision of the user, in accordance with the service schedule, warranty card and operating manual delivered with the device.

During the operation of the pumping station, the following steps must be carried out on a regular basis:

- carry out basic operation/maintenance work with the frequency specified in the maintenance schedule,
- Increase frequency of inspecting the device in case of problems with electricity supply or during increased inflow of solids into the pumping station chamber,
- all operation/maintenance and warranty activities are recorded in the pumping station Operation Book provided by Ecol-Unicon.

MAINTENANCE WORK

Operation/maintenance work may only be carried out by persons who have been trained by the Manufacturer or an Authorised Service Centre of the Manufacturer.

Warranty inspections must be carried out in accordance with the inspection schedule specified in the operation and maintenance manual, by Ecol-Serwis or an Authorised Ecol-Unicon Technical Service.

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