

How to choose a
right lifting station?



Why is a lifting station necessary? What are the types of problem area where a lifting station is required? What are the factors to consider while planning a lifting station? How to determine a suitable lifting station?

ACO brings you the answers for all that one needs to know about selecting the right lifting station! read on to know more...

Gradient problem: When a grease separator is installed in the basement; or when a toilet, shower or washing machine in the basement; these rooms are generally located below the flood level (road level). The wastewater cannot be drained away with a gradient. Instead it has to be pumped/ lifted up by a wastewater lifting plant, so that it can flow with gradient into the sewer.



Backflow problem: Public sewers are designed for average rainfall events only and not for extreme events such as heavy rainfall. Heavy rainfall overloads the sewers and the back-flowing water rises in the sewer manholes up to the backflow level. To the same extent, the back-flowing wastewater pushes back into the plot drainage system of the surrounding buildings. The best possible protection against backflow can be achieved by a waste water lifting plant whose pressure pipe is taken over the backflow level.



Factors to consider while planning a lift station

There are a number of factors to consider while planning a lift station.

- **Site Conditions:** Installation inside building or underground outside. Determine load class (A15, B125 or D400) for outside installations.
- **Type of waste water:** Not all types of pumps are capable to handle wastewater containing faeces, solids and long fibres. So if your application requires handling of such items, ensure the pump you select is suitable for such application.
- **Backflow level:** This is usually road level
- **Delivery piping:** Vertical lifting height plus delivery piping to the sewer
- **Electricity/voltage:** 400 Volt/ 50Hz

Dimensioning of lifting stations

An ACO application engineer can help you with proper dimensioning a lifting plant. Following parameters has to be provided to determine suitable lifting stations:

- Static Head (H_{geo})
- Length of discharge pipework
- Inflow (l/s)
- Possible Diameter of discharge pipework (DN), if already available
- Approx. quantity of valves, fittings, elbows, etc.



With above parameters the ACO Lifting Plant Dimensioning Tool calculates following parameters to help in selection of an appropriate lifting station.

- **Total flow (Q):** This is calculated by considering all the components that contribute to the water in-flow.
- **Discharge Head (H_{tot}):** It is the sum of height to which water has to be lifted: it contains of **static head (H_{geo})** and the **losses in the system (H_v) by fittings, friction, etc.**

$$H_{tot} = H_{geo} + H_v$$

$$H_v = H_{v,A} + H_{v,R}$$

H_{tot} total head [m]

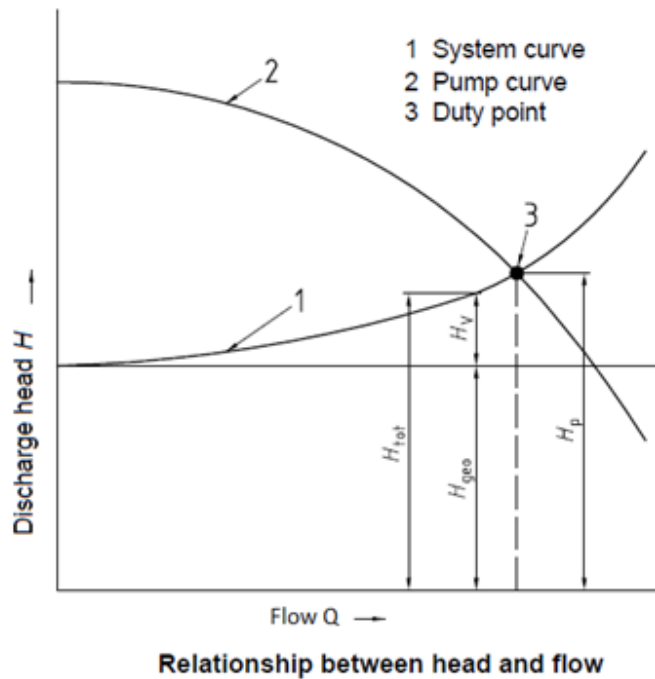
H_{geo} static head [m]

H_v head losses [m]

$H_{v,A}$ losses in valves and fittings [m]

$H_{v,R}$ friction losses in discharge pipework [m]

Operating point (theoretical): describes the minimum values to be achieved at the operating point. For calculation it's important that the real operating point is "higher" than the theoretical operating point. Otherwise the pumps is to weak and not able to work properly.



Selection of lifting stations:

By calculating above parameters, ACO dimensioning tool provides a list of suitable lifting plants. On selecting a lifting plant, the tool plots the pump and system- characteristic curve. It also provides parameters of volume flow and overall delivery head at the actual operating point (duty point).

In order to ensure efficient operation of pump, it also calculates following parameters

1. Velocity of water in the discharge pipework. It shall be between 0.7 m/s and 2.3 m/s
2. Renewing pressure line volume against usable volume of the lifting plant
3. Switching cycle time to ensure sufficient downtime of the pump (to cool the motor)

While selecting a lifting plant, ACO application engineer will help you choose the optimum model for the specific area of application.

One important criteria is the type of pump impeller suitable for the particular application. It depends on the type of delivery medium and maximum grain size. The channel impeller is suitable for pumping wastewater containing faeces as well as wastewater with solid and short fibrous solids and thick matter, sludge and organic substances.

Types of ACO impeller



Grinder Impeller



Vortex impeller



Channel impeller

Because of the large open space a vortex impeller ensures that solids and fibrous thick matter such as sanitary pads, textiles etc. can be easily pumped through the pump housing without causing blockages.

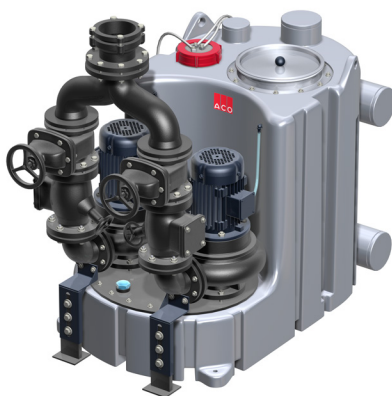
Grinder Impeller is particularly suitable for long fibres, liquefiable solids, even large lumps. It is also suited for the reliable transport of media through small pressure pipes even over long distances.

EN 12050 specifies following dimensions for minimum size of pressure line depending on delivery medium.

EN Standard	Medium	Minimum DN of delivery piping
12050-1: pump without grinder (cutting wheel)	Black water (containing faeces)	DN 80
12050-1: pump with grinder (cutting wheel)	Black water (containing faeces)	DN 32
12050-2: pump without grinder (cutting wheel)	Grey water (free of faeces)	DN 32

A dual pump lifting plant such as ACO Muli Pro-PE K duo or ACO Muli Star DDP is recommended where uninterrupted service and added reliability is necessary. The pumps alternate at every cycle and the secondary pump turns on automatically in case of primary pump fault or unexpected high inflow.

ACO prefabricated lifting plants comes with configurable control box and pneumatic level switching for various inlet height configurations. For high level of operational safety air bubble injection using a mini compressor is recommended while using alongside grease separators.



ACO Muli Pro-PE K duo



ACO Muli Star DDP

ACO. creating
the future of drainage

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