

Tired of clogs and vibrations in your sewage pumps?



This is how you fix them!

This paper in short

- Sewage water problems and the unique features of existing pump impellers.
- Is there such a thing as the perfect impeller for pumping sewage water?
- Example of a temporary sewage pump installation with increased pump pressure at a higher speed.
- What is a waste warrior?

Tired of clogs and vibrations in your sewage pumps?

Whether it concerns a submersible pump in the sewer system or a dry-installed pump for a temporary bypass, you keep getting the same reports over and over. “The pump doesn’t work” or “the sewage comes up,” or “the pump makes a very strange noise and it’s vibrating.”

You know instantly what’s wrong: the impeller is clogged up again, stopping the pump from processing any water. For mobile pumps there is an additional issue; through the changing levels of sewage water the pump has to process a lot of air. Anyone who has ever seen this knows the result: the vibrations in the pump are so strong that you need to take a few steps back.

Sewage water problems

Handling sewage water has always been a challenge and its nature is constantly changing. There are also great differences between the sewage systems across countries and their respective levels of pollution.

It is often the large solids and long-fibrous materials that place real demands on sewage pumps. In addition, we should not underestimate the irregular volume and flow of air within the system, making it difficult to make the right pump choice.

You are going to see and smell all kinds of things if you have to fix a blockage! Probably this is where the phrase “it’s a dirty job but someone’s got to do it” started out.



It’s a dirty job but somebody’s gotta do it

If the correct pump size has been determined based on the sewer capacity and the required pump pressure, then the key for a trouble-free pump installation ultimately lies in the choice of the impeller. This brings us into the world of pump designers where the technology goes beyond just the addition of large solids handling. In the design department, the engineers always have a long list of requirements. At the same time, they must not compromise on pump efficiency, hydraulic performance, suction lift, solids handling, mechanical noise level and most certainly not on product quality.



Prevention is Better Than Cure

How can you prevent blockages or avoid high repair costs due to vibrations on sewage pumps? In order to answer these questions, we will first look at the unique properties of the different sewage pump impellers.

The unique features of different sewage pump impellers

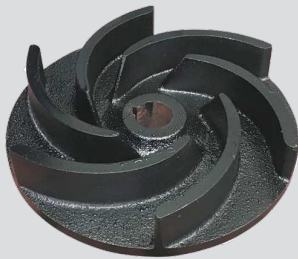
In order to avoid getting bogged down with boring design terminology, we focus on the heart of the matter, **the pump impeller**. To help you make the right decision, we have listed the features of the impeller types that are suitable for pumping sewage water.



Open impeller

The back of the impeller is closed and the front of the vanes rotate against a wear plate with a small clearance. The space in between the vanes determines the maximum free passage.

| | |
|---------------------|---------|
| Solids handling (Ø) | ★ ★ ★ |
| Fibrous material | ★ |
| Pump efficiency (%) | ★ ★ ★ |
| Head (ft.) | ★ ★ ★ ★ |
| Air mixture (%) | ★ ★ ★ ★ |
| Wear resistance | ★ ★ ★ |



Vortex impeller

The impeller is recessed into the pump casing with the free space to the suction opening determining the solid passage. While rotating, the energy is used to create a vortex flow.

| | |
|---------------------|---------|
| Solids handling (Ø) | ★ ★ ★ |
| Fibrous material | ★ ★ ★ |
| Pump efficiency (%) | ★ |
| Head (ft.) | ★ |
| Air mixture (%) | ★ ★ ★ ★ |
| Wear resistance | ★ ★ |



Channel impeller

The impeller has one channel and a wide blade, creating a large free passage. A wear ring at the suction opening ensures good efficiency but is less suitable for abrasive liquids.

| | |
|---------------------|-------|
| Solids handling (Ø) | ★ ★ ★ |
| Fibrous material | ★ ★ ★ |
| Pump efficiency (%) | ★ ★ ★ |
| Head (ft.) | ★ ★ |
| Air mixture (%) | ★ |
| Wear resistance | ★ ★ |



Screw centrifugal - impeller

A cone-shaped screw impeller with a large free passage that already starts in the suction opening. The liquid flow does not suddenly change direction so that solids move in a smooth motion through the pump.

| | |
|---------------------|---------|
| Solids handling (Ø) | ★ ★ ★ ★ |
| Fibrous material | ★ ★ ★ ★ |
| Pump efficiency (%) | ★ ★ ★ |
| Head (ft.) | ★ ★ |
| Air mixture (%) | ★ |
| Wear resistance | ★ |

Discover the best solution on the following pages



Is there such a thing as the perfect impeller for pumping sewage?

Sewage water specialists know that the screw centrifugal impeller with two four star ratings is excellent at pumping large solids and long-fibrous materials. But there are also a few drawbacks to this impeller, which are especially applicable to mobile sewage pump installations.

Vibrations at higher speeds

The design of the impeller has the shape of a corkscrew and is therefore difficult to balance. This is why the pump cannot run at higher speeds and becomes very restless when there is a lot of air in the volume flow.

Another disadvantage is the sensitivity to wear. If sand is present in the liquid, the clearance between the impeller and cone will quickly increase, causing the efficiency to drop.



Wouldn't it be great to combine all the good features of the different sewage pump impellers into one design?

The open impeller is already close to perfection. Some manufacturers work with cutting blades or cutting grooves in the wear plate that chop fibrous materials into smaller pieces. The chance of blockages is therefore reduced, however it never works flawlessly.

The solution is the KS screw channel impeller

Through a smart redesign we can turn the drawbacks of the screw centrifugal impeller into positive properties. The solution is now available and the results are amazing. The corkscrew design remains, but it gets its own "flywheel," which creates much more stability during pumping.

The screw channel impeller has significantly less clogging than the open impeller

This allows the speed to be increased to **2300 revolutions per minute (rpm)** and the pump continues to run vibration free. The big advantage of a higher pump speed is the higher pressure that the pump delivers (more than 60 pounds per square inch).

Air in the volume flow is no longer a problem. Further, if sand is present, you will now have much less wearing because the liquid is no longer guided along the cone.



KS screw channel impeller

Centrifugal pumps deliver more pressure with a higher pump speed

You need pressure to bridge the height difference and pipe friction loss while pumping certain amounts of liquid. This is especially true for mobile sewage pumps: the more pressure the pump can deliver, the more flexible you are to take on bypass projects. The calculation example below clearly shows that increased pump pressure is not an unnecessary luxury.

Practical example of a temporary sewage pump installation

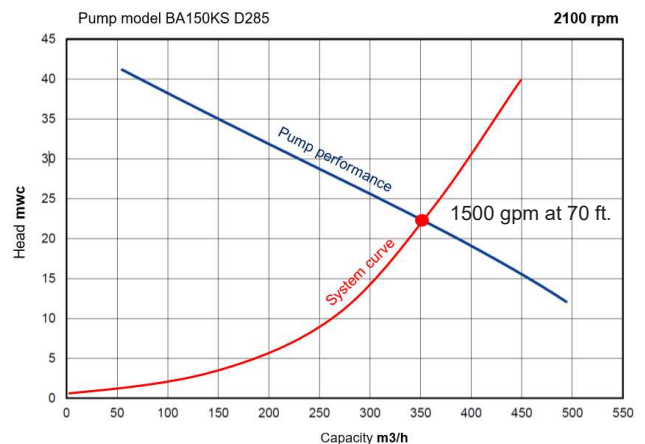
In a random city district, the existing sewerage system must be replaced. According to the specifications, the wastewater flow must be maintained by a temporary pump installation with a minimum capacity of 1500 gallons per minute. The drain in which the discharge takes place is just 400 feet away on the same side of the street, so for the sake of convenience we do not count the resistance losses of accessories.

The sewer has a maximum depth of 10 feet and the height difference on the discharge side is just 8 feet. Given the required capacity, a 6-inch sewage pump including connected piping seems obvious. The system calculation will then look like this:

- Maximum capacity: 1500 gpm
- Total 400 feet 6-inch pipe work
- The height difference is 18 feet

You will find various pipe resistance calculators on the internet from which the required pump pressure can be easily and quickly calculated (see below). Despite the compactness of the temporary sewage installation, the pump in this example already has to deliver at least 70 feet (30 pounds per square inch) pressure to guarantee the required waste water flow.

As a solution to the practical example, we can take the BA150KS D285 with a diesel engine that runs at 2100 rpm (*still below its maximum speed*). We can visualize this well in a diagram showing the pump performance and the system curve. We call the intersection point of these two lines the operating point.



The screw channel impeller is affected much less by vibrations from air bubbles and/or higher speeds

In practice, the KS screw channel impeller has a clear advantage at high speeds. Delivering a greater pump pressure without fear of vibrations, should air bubbles occasionally come along.

| Calculate the required pump pressure | | | | | | |
|--------------------------------------|----------|---------------|-------------|----------------|------------------------------|-----------|
| Flow | Diameter | Pipe material | Pipe length | Discharge head | Required pump pressure (TDH) | Reset |
| US GPM | inch | HDPE | meter | meter | mwc | |
| 1500 | 6 | | 122 | 6 | 21.71 | Calculate |

The KS screw channel impeller

This specially developed, closed KS screw impeller is a real waste warrior. The pump also runs vibration-free at high speeds. Air or gas bubbles in the volume flow are no longer a problem. Further, if sand is present, you will have much less wear because the liquid is no longer guided along the cone.

Conclusion: The KS screw channel impeller is the best choice for sewage pump work.

Solids handling (Ø) ★★★★★

Fibrous material ★★★★★

Pump efficiency (%) ★★★★★

Head (ft.) ★★★★★

Air mixture (%) ★★★★★

Wear resistance ★★



- 4" solids handling for the 6-inch sewage pump
- 5" solids handling for the 8-inch sewage pump

The really great feature of the KS screw channel impeller is the head. Compared to the existing mobile sewer pumps, this pump delivers much more pressure.

Want to find out more?

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Tune in soon to see why the KS screw channel impeller is a real waste warrior.

Keep an eye on our socials!

Coming soon...