

Monday, April 20th, 2020

# Non-Clog vs. Vortex Impeller Choices for Sewage Pump Applications

Monday Morning Minutes | by Norm Hall, April 20th, 2020

Plumbing engineers are hired to use their knowledge to provide the right building solution for the money their client is willing to spend. There is a decision when it comes to sewage pump applications. Should I use a submersible non-clog semi-open pump or a vortex pump? Maybe this is really a pump nerd's idea of a question, but it should be considered important by engineers and plumbers.



## Flushable Does Not Mean Pumpable!

Fifty years ago, the only thing flushed down the toilet was human waste, toilet paper, and the occasional Tinkertoy® or Barbie™ outfit. Today there are a multitude of bathroom cleaning and baby products identified as flushable.

Many products people flush down the toilet are very stringy. Some are designed to flush, and some are not. Some of these products are biodegradable and break down over time. The “time” they refer to is not the several seconds before the product meets up with a sewage pump impeller. In addition, people may put things down a toilet in a public restroom that they would never flush at home. All of this may be a disaster for the sewage lift pumps performance.

## Non-Clog Impeller Design

Bell & Gossett, along with many of the other Xylem brands, offers a semi-open non-clog impeller for sewage pumps. The engineers at



Xylem are constantly redesigning and improving these impellers. The goal is to improve efficiency, non-clogging ability while keeping the price reasonable. The B&G BFK series with the K-impeller is one example.

Non-clog impellers come in many shapes and sizes. Shown here is the multi-vane semi-open impeller. These impellers can pass solid spheres from 2" to 4" depending on the pump size. They are made to pump what is expected to be in a toilet.

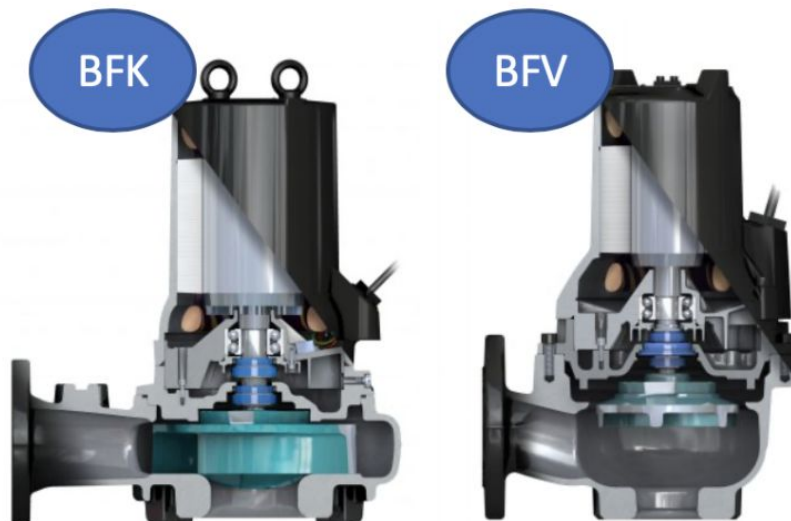
Non-clog pump impellers fling the sewage through the discharge pipe using centrifugal action. The sewage contacts the impeller so the highly engineered B&G no-clog designs become very important. The K-impeller mentioned above is non-clog and self cleaning. They can handle the spherical solids and some more stringy things, but large amounts of stringy cloth and paper and plastic products may still clog them up.

## Vortex Impeller Design

Vortex design pumps still use centrifugal action with one huge difference. In a vortex design, the impeller rotates and causes a tornado-like action that pulls the waste into the pump and then sends it into the discharge pipe with little or no contact with the impeller.



The vortex design gives the pump more of a chance against the stringy material it may encounter. Since the impeller is making little contact, there is less of a chance to clog in the impeller. Look at the B&G BFK and BFV pumps below. Notice the space in the BFV style volute. More area for product to move in and out of the pump without clogging.



## Why Aren't All Sewage Pumps a Vortex Design?

Besides the need for less clogging, there is a concern about efficiency and cost. These non-clog impellers already have half of the efficiency of a traditional B&G fully enclosed impeller used in potable water pressure boosters or in hydronics. The impeller loses efficiency when we open it up and make it non-clogging.

Once again, I ask you to look at the photos above. Look at the space between the inlet and impeller in the vortex design in the photo to the right. That space and the tornado it causes are great to avoid clogging but not so great on efficiency. Vortex pumps will have 25% to 30% less efficiency than the non-clog design on the left. This means larger motors and higher operating and first costs.

## When Should the Plumbing Engineer Use a Vortex Sewage Pump?

If vortex pumps cost more and are less efficient, when should we use them? That is a fair question. It's all about your client and their building. If the people using the restrooms have little to lose when flushing non-pumpable products, choose the vortex design.

If it is your house; your family will be careful. If it is a private office building; the boss may come down on them. In a public place such as an arena, a shopping center or a restaurant, it may be worth looking at a vortex design. You can request the representative to provide both selections along with the budget cost. You, as the plumbing professional can then make an informed decision.

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