

Expert Advice To Maximize Clarifier Performance

Clarifiers are an important component of the wastewater treatment process. However, between corrosion, maintenance, and changes in flow, it can be difficult to keep a clarifier operating at peak performance. In addition, changes in effluent regulations may require upgrades to meet new, more stringent requirements.

To learn more about clarifiers and their maintenance, we spoke with two engineers from [Evoqua Water Technologies](#), Jeff Schneider and Mike Targos. They provided expert advice on how to identify some common issues with clarifiers, how to maximize performance, and how to decide whether you should upgrade or replace your existing unit.

How would someone know if their clarifier is working properly?

There are a couple key indicators of a problem, most of which can be identified by taking the time to listen and observe the clarifier in operation. Is the clarifier making strange noises? Is it operating smoothly?

“Snap, crackle, and pop” noises originating from the drive unit can indicate there is a broken ball in the main bearing. Vibration of the circular drive unit is also an indication of issues. A good, economical method to test the drive is to personally sit on the drive’s main or intermediate housing for a full revolution.



Please exercise caution in following safety procedures when performing this evaluation. There may be some vibration when the skimmer assembly is in contact with the scum trough. But if the drive unit continually vibrates, it is an indication that there is a problem with the bearing, and you should call the manufacturer to have it inspected. Ignoring these signs could lead to a catastrophic failure, which leads to significantly higher costs than rebuilding the drive.

Next, watch to see if the clarifier is operating smoothly by monitoring the non-submerged depth of the scum blade for an entire revolution. If the depth changes in certain portions of the rotation, it could be an indication

of pending clarifier issues. The skimmer assembly and scum blade arrangement may be out of proper adjustment, have deformed members from past hang-ups, or the skimmer wipers may need to be replaced. For older installations, corrosion of just one truss member can also be an issue.

How can an operator check for corrosion?

Corrosion is pretty easy to detect if you know where to look. Most frequently, corrosion occurs at the waterline where there is a fluctuation of water level. This fluctuation with cycles of wet/dry surfaces and exposure to oxygen creates an excellent environment for corrosion to occur.

The clarifier basin should be drained and cleaned, including the structural components of the mechanism, in order to effectively check for corrosion. Operators should position a ladder against the side of the center cage, allowing access for a closer look at where the waterline interfaces with the cage and the center pier. Many times, there will be a six- or eight-inch-long area where corrosion has reduced the thickness of the structural components. Operators should also check for corrosion on the influent well, bolted connections at the drive (all three connections: drive to pier, drive to center cage, and drive to bridge), manifold, truss arms, and pay particular attention to skimmer/scum blade support attachments.

Many times, the walkway bridge — providing access from the tank wall out to the drive unit for maintenance — looks to be in great condition because of the ease of maintaining the above-surface coating system. But if you investigate the underside, you will most likely observe a considerable amount of corrosion due to lack of paint maintenance and a constant wet/dry environment caused by the rising moisture from the clarifier water surface.

What is the typical lifespan for a clarifier, and what preventive maintenance can utilities do to extend the life of their clarifiers?

The clarifier drive is the heart of the unit and has the most impact on clarifier lifespan. A typical clarifier drive can last around 20 years, but this can vary greatly based on maintenance practices.

I've seen some clarifiers that are only 15 years old, and they need a bearing to be replaced because routine preventive maintenance has not been performed. With that being said, if the drive unit is maintained properly — keeping condensate to a minimum and changing the oil — it should last a lot longer. I was just on the phone today with a person that had a drive unit installed in 1971, and they are just now ordering a new one. After 45 years of service, clearly the plant personnel must have adhered to a strict maintenance schedule.

We recently published an article on our website, "[3 Simple Ways To Increase The Life Of Your Clarifier Drive](#)," that describes simple maintenance tips to get the best performance from your clarifier drive.

When should a plant owner consider upgrading a clarifier?

The first thing to consider is whether your treatment process has changed. There is typically a flow chart in the operating manual that indicates the design flow ranges for the clarifier. This should be compared to the present-day flow rates to see if there has been a significant change. If the answer is yes, then you may need to upgrade or replace your clarifier. Our technical experts can help you evaluate the process and provide a cost-effective solution to meet your application needs.

What is an option you offer to improve effluent quality and meet increasingly strict regulations?

Evoqua offers several retrofit products that can significantly improve the effluent quality and help the plant to meet regulations, such as phosphorus removal.

Evoqua, through its Envirex® brand, is the inventor of the [Tow-Bro® Hydraulic Sludge Removal System](#), which features a unitube suction header for uniform sludge removal. This technology quickly and effectively removes sludge, oftentimes maintaining a zero sludge blanket, which allows the clarifier to handle higher concentrations and prevents the release of soluble phosphorus. The Tow-Bro system is a simple retrofit for secondary treatment that improves performance while reducing maintenance and capital costs.

Evoqua also offers an advanced energy dissipating inlet (EDI) system, called [FEDWA](#). FEDWA stands for flocculating energy dissipating well arrangement. The FEDWA system is a unique open-channel design with a series of tangential baffles that redirect the flow as it comes into the influent well from the center pier inlet ports. The flow is redirected at 90-degree turns, multiple times, to reduce the incoming kinetic energy and enhance the flocculation of solids. The FEDWA system is

a simple retrofit for primary or secondary treatment that can improve settling and increase the capacity of your clarifier.

Is there anything else that Evoqua offers to help plants with their clarifiers?

Evoqua has been a leader in wastewater clarification for over 100 years through Envirex and other trusted brands. We have thousands of installations and a large database of original equipment manufacturer (OEM) drawings to provide faster, more cost-effective, and responsive project execution. We can also retrofit or replace competitor equipment.

Evoqua offers clarifier inspection services at no charge in order to help plants identify areas that require maintenance or upgrades. We have developed a comprehensive inspection checklist, based on our experience, to help walk you through the process. In addition, our technical experts can help provide cost-effective solutions to keep your clarifier operating at peak performance. ■

For more information, contact:

Jeff Schneider
Evoqua Water Technologies
(262) 521-8266
jeffrey.schneider@evoqua.com
www.evoqua.com/retrofit