



Water Quality & Pump Performance

Water quality is one of the most common contributors to early pump failure and will result in a warranty denial. The information below highlights key problems frequently observed during pump inspections and offers guidance on preventing them.

Common Water Quality-Related Issues

- **Suspended Solids:**

Materials such as dirt, sand, oxidation byproducts, biological growth, and insoluble organic matter act as abrasives inside the system. These particles are frequently discovered during teardown evaluations of failed pumps.

- **Air Remaining in the System:**

Trapped oxygen accelerates corrosion in ferrous components such as cast-iron volutes, reducing pump life.

- **pH Levels:**

Water that is too acidic or too alkaline can damage system components. According to the ASHRAE 2011 HVAC Applications Handbook, system water should remain within a pH range of 6.5 to 9.0. Low pH increases corrosiveness, while higher pH levels promote scaling.

- **Water Hardness:**

Harder water is less corrosive but more prone to creating scale. Scale buildup contributes to bearing failures, clogged valves, restricted orifices, and reduced heat transfer efficiency.

How Poor Water Quality Affects System Components

Inadequate water quality can lead to issues such as heat pump exchanger damage, corrosion in pump volutes, worn bearings, and buildup that limits system efficiency. pH imbalance is often the primary cause, though hardness and suspended solids also play significant roles.

Assessing Water Quality

A proper assessment requires laboratory testing of a water sample. Contractors can typically evaluate area conditions effectively with just a few key tests.

Recommended Water Quality Guidelines (Assuming Proper Filtration)

- Hardness: < 14 grains per gallon
- Total Dissolved Solids: Filtered to 1 micron
- pH: 6.5 – 9.0
- Sulfate: < 25 ppm
- Chloride: < 25 ppm
- Nitrate: < 75 mg/L

Corrective Actions for Improving Water Quality

There are two primary approaches to achieving proper water quality:

1. Treating on-site water
2. Transporting high-quality water to the jobsite

Many manufacturers require distilled or de-ionized water to maintain warranty protection. Treating poor-quality local water can be costly, making transported water or pre-mixed antifreeze solutions a more reliable option. Pre-mixes often include additives that help prevent corrosion.

When using pre-mixed fluids, it is essential to prevent dirt and debris from entering the system. Pipes should be capped during installation, and a flush cart should always include filtration. A 100-micron filter is suitable for removing large debris; a 1-micron filter should be used once purging is complete for final cleaning.

Flowcenter Installation Guidelines

Flowcenters may be installed vertically or horizontally, but the pump shaft must remain parallel to the ground. The terminal box must face upward, and the drain or condensate holes must point downward. If the terminal box is positioned downward, moisture can accumulate inside and damage electrical components.

Failure to adhere to these guidelines can result in pump failure. Water quality issues are not covered under warranty.