



Flocculation Systems: A Comparison of Flash/Floc Tanks vs. Floc Tubes

Parameter	Flash/Floc Tank System	Floc Tube System
System Description	<p>A Flash Tank is a tank with mixer system used for rapid mixing of coagulant and/or acid/alkaline chemicals to facilitate either pH control or coagulation prior to flocculation.</p> <p>A Floc Tank is a tank with mixer system used for gentle mixing of flocculant (i.e., polymer) to facilitate flocculation of coagulated particles prior to flotation.</p>	<p>A Floc Tube is a length of piping arranged in a serpentine fashion on a frame with multiple 180° turns to provide mixing zones of chemicals dosed along the length of the tube. The typical configuration involves the injection of a coagulant at the beginning of the tube for coagulation followed by injection of a polymer between the middle and end section to facilitate flocculation.</p>
Retention Time	Has higher retention time, typically > 4 minutes, better for slower chemical reactions. The longer retention time also buffers changes in wastewater characteristics (i.e., pH, contaminant concentrations, etc.).	Has a lower retention time typically of < 1 minute; not adequate for moderate to slow chemical reactions. Not well suited for automated pH control.
Process Control	Mixing is not dependent on flow; has capability of controlling mixer speed and energy to optimize mixing of chemicals to form strong floc.	Has capability of multiple injection ports which allow for sequential addition of multiple chemicals. Mixing energy is flow dependent. Flows outside operating range can result in poor mixing (wasted chemicals) or violent mixing (sheared floc).
Process Inspection	Coagulation and flocculation effectiveness can be viewed almost instantaneously in each tank by operator.	Requires pulling multiple samples directly from Floc Tube to determine if chemical location and dosing rate is adequate.
pH Control	Flash Tank provides more than adequate retention time for rapid response to pH control changes; mixing energy is not flow dependent. It is much easier to facilitate pH control in a Flash Tank.	Floc Tube provides little retention time for in-line pH control; technically feasible, but generally not advisable due to difficulty in maintaining steady-state pH control under non-steady state influent conditions in essentially, a plug-flow process.
Energy Requirements	Flash/Floc Tanks typically have mixer motors in the 1/4 to 1 hp range which typically are under VFD control. The Tanks are typically used in gravity flow situations where flow from the wastewater source (i.e., equalization tank) is transferred to the DAF by gravity.	Floc Tube depends on the energy from the pumped transfer of wastewater to the DAF system and has no moving parts. It does represent a head loss of 2-5 psi which must be accounted for in pump sizing and usually precludes the use of gravity flow from the wastewater source (i.e., equalization tank) to the DAF system.
Space Requirement	Has larger footprint; although does not have to be arranged linearly before DAF.	Has smaller footprint, can be placed adjacent to DAF.
Capital Cost	Generally, slightly more expensive if Flash Tank is required. Some processes may only require the use of a Floc Tank.	Generally, slightly less expensive than Flash Tank/Floc Tank combination.