Settlometer Use and Application

Settlometer Basics

The Settlometer shows the solids liquid separation capability in the secondary clarifier. Sludge must separate from the liquid for settling to occur. Settling of sludge in the clarifier is a critical part of the activated sludge process. Poorly settling sludge is a strong indication of process problems and solids loss in final effluent.

The scale printed on the Settlometer measures how far a sample has settled. "SSV" is the abbreviation for Settled Sludge Volume. "%" shows the settled sludge volume as a percentage of the entire sample.

The sample to the right has a SSV of 350 which is also 35% of the total sample volume.

Use of Settlometer

Worksheet

Have the Process Control Worksheet ready to record settling progress.

Gather Sample

Collect sample from the aeration tank effluent to fill the Settlometer to 100% and transport immediately for testing indoors or out of direct sunlight. Use lid to prevent spillage.

Mix Sample

Using the wide paddle, gently mix back and forth until sample is thoroughly mixed. Leave paddle in Settlometer briefly to help calm any turbulence. Remove paddle.

Begin Timing

The first five minutes of settling is very informative. If the sludge doesn't settle to 800 or less in five minutes, the operator can be sure that separation in the clarifier is failing. Record the SSV at each time interval on the worksheet.

Observe Settling Characteristics

Normal sludge forms a floc and gently squeezes the water out of the blanket forming on the bottom. Settles between 800 and 700 in five minutes. If there are excess solids in the final effluent with Normal sludge, a clarifier mechanical problem may exist.

Rapid sludge settles like dark grains of sand leaving behind a turbid supernatant with suspended solids. Settles to 700 or less in five minutes.

Slow sludge appears to be stuck in the settling process with little or no progress but with very clear supernatant. Does not settle to 800 in five minutes. Perform the Multi-Dilution test to determine if slow settling is caused by density or concentration. See Troubleshooting Slow Sludge below.

Troubleshooting Slow Sludge

Slow settling sludge can be caused by high density sludge or high concentrations of sludge. The Multi-Dilution Test is perfomed with two Settlometers.

Multi-Dilution Test

One Settlometer is filled to 100% with aeration tank effluent. The second Settlometer is filled 50% with aeration effluent and 50% with final effluent.

Density Issue

If the sludge in the diluted Settlometer settles the same as the sludge in the pure Settlometer, this indicates a density issue. Density is related to quantity. Reducing the pure sample by 50% allowed the sludge to settle further. In other words, the sludge was simply piling up in the pure sample.

Concentration Issue

If the sludge in the diluted Settlometer settles significantly more than the sludge in the pure Settlometer, this indicates a concentration issue. Concentration is related to sludge character. Reducing the pure sample by 50% did not affect the settling characteristic. In other words, the amount of sludge in the sample did not affect the settling. A density issue should be tested further with microscopic evaluation to determine if filamentous sludge is a problem.

Application to Process Control

The Settlometer is used in wastewater plants for primarily four applications:

1. Settling characteristics – Rapid, Normal or Slow settling.
2. SSV is used in calculating return sludge flow rates.
3. Troubleshooting settling problems to determine a density or a concentration issue.
4. Timing when denitrification occurs and sludge rises to surface of Settlometer.