



## Clarifier Maintenance Procedures

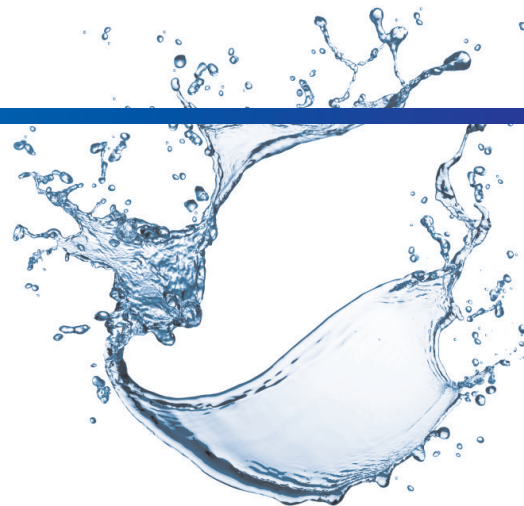
The Water and Wastewater Equipment Company inclined plate clarifier is designed for ease of maintenance and when operated properly will require minimal control and operator time. Periodic maintenance of the inclined plate clarifier should be done to assure proper operation. The following steps can aid in the inclined plate clarifier operation and control:

Cleaning inclined plate clarifier:

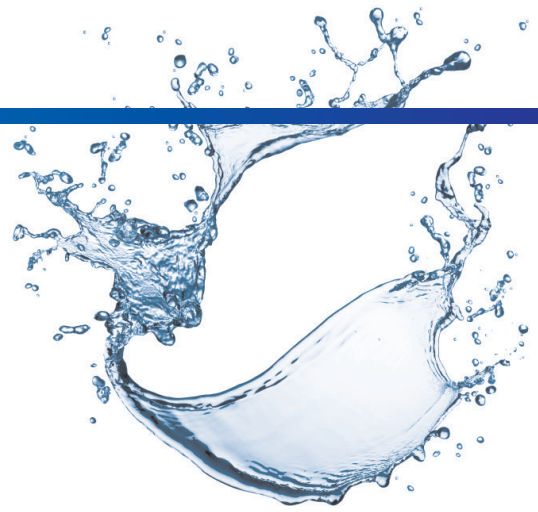
1. Open sludge draw-off valve for three (3) minutes on the inclined plate clarifier, until sludge is totally evacuated and water is predominate discharge. Note: SLUDGE TANK SHOULD BE EMPTY!
2. Open plate pack drain on the side of the inclined plate clarifier.
3. Using a pressure nozzle on a hose, hose down all visible surfaces, weirs, launderers and flow chamber of collected, caked solid deposits in the inclined plate clarifier.
4. Hose down plate pack and inclined plate clarifier area of all visible solids.
5. Once thoroughly rinsed, close plate pack drain. The inclined plate clarifier is now ready for normal operation.

## Trouble Shooting

Problem	Possible Cause
Poor floc formation in flash mix chamber and inlet trough of the inclined plate clarifier	<p>Polymer problems due to:</p> <ol style="list-style-type: none"> <li>1. Valve closed</li> <li>2. Chemical pump not operating</li> <li>3. Improper dosage</li> <li>4. Polymer aged, un-reactive, and decomposed</li> </ol> <p>Improper pH.</p> <p>Improper wastewater pretreatment due to:</p> <ol style="list-style-type: none"> <li>1. Overfeed of MBS</li> <li>2. Poor CN oxidation</li> <li>3. Alkaline cleaner overdose</li> <li>4. Phosphate overdose</li> </ol>



<p>Floating Solids (floaters) in the inclined plate clarifier</p>	<p>Air entrainment due to suction leak in pump supply line.</p> <p>Chemically induced gas generation.</p> <p>Oil in system.</p> <p>Sludge build-up into and through plate pack due to:</p> <ol style="list-style-type: none"> <li>1. Improper blow down sequence</li> <li>2. Closed valve on sludge draw-off</li> <li>3. Solenoid valve not opening the pinch valve</li> <li>4. Inoperable sludge blow down valve</li> </ol> <p>Hydraulic overloading.</p>
<p>Solids build-up on plate pack of the inclined plate clarifier</p>	<p>Check above for floating solids.</p> <p>Increase inflow/contaminate (TSS) loading.</p> <p>Blow down timer turned off.</p> <p>Rat holing; solids have built-up on side of cone.</p> <ol style="list-style-type: none"> <li>1. Air agitating below plate pack at ½" sample port will clear the caked solids. See maintenance for incline plate clarifier cleaning.</li> <li>2. Sometimes paint solids are inadvertently directed to the inclined plate clarifier and this results in congealing in the cone.</li> <li>3. If hose-down of plate packs does not rectify the situation in this case, the removal of plate pack may be necessary in drastic cases. Instructions for the removal of packs is as follows: <ol style="list-style-type: none"> <li>1. Open plate pack drain valve</li> <li>2. Open sludge draw-off valve</li> <li>3. Remove launderer trough</li> <li>4. Remove plate pack (winch/hoist may be necessary)</li> <li>5. Hose down, break up sludge</li> <li>6. Look for objects in cone bottom and remove</li> </ol> </li> </ol>



## Principle Of Operation

The wastewater being introduced to the inclined plate clarifier must be:

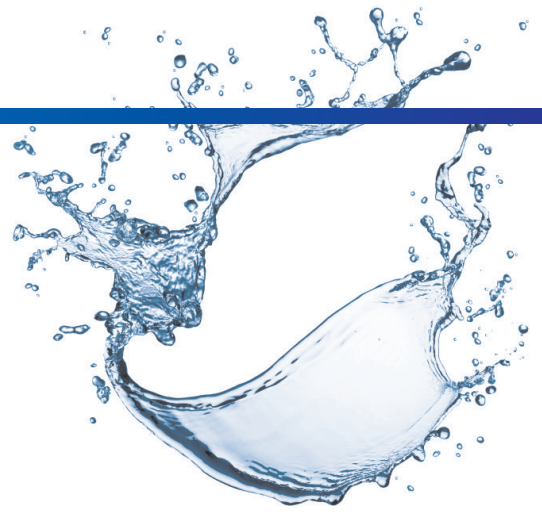
1. Treated
2. Adjusted to optimum pH range to insure insolubility of metal
3. Properly dosed Polyelectrolyte to insure large particle formation of metal hydroxides

The water enters the inclined plate clarifier by gravity from the flocculation tank through a disperser pipe located above the cone to uniformly disperse the solution in the inclined plate clarifier. The ports in the disperser pipe are installed with the ports on the bottom of the pipe forcing discharge of the solution downward. Upon entering the inclined plate clarifier, the velocity of the solution is reduced sufficiently to allow for the gravity separation of the metal hydroxides from the water. The metal hydroxides move downward and the clear water moves upward being displaced by the new solution entering the inclined plate clarifier. Clear water overflows the weir for discharge or further filtration.

The linear length of the weir is designed to minimize the water head over the weir. This also reduces the velocity of the water and restricts the capillary action of the decanting solution that might pull light particles of floc along with the water.

"Snowing" in the clear water may be attributed to improper dosages of Polyelectrolyte, improper pH range or insufficient height of the sludge blanket. Air bubbles entrapped in the water along with the floc may also be attributed to this condition.

It is Important that the height of the sludge blanket be maintained over the disperser when drawing off sludge for dewatering. It is recommended that this height be maintained to approximately 10 to 12 inches. Do not allow the sludge blanket to rise too close to the decant weir. Capillary action of the decanting water may track some of the sludge over the weir.



Sludge draw-off for dewatering may be done continually or periodically to maintain the sludge blanket maximum and minimum levels discussed. It is important that the sludge be removed slowly to eliminate a rat-holing effect through the sedimentation tank, thereby removing mostly water and only small amounts of sludge. This condition also restricts the downward movement of sludge along the sides of the cone. Natural compaction of the sludge in a gelatinous condition is harder to move. This condition is evident when a coning condition is detected in the center of the sludge bed. This condition requires air lancing and agitation of the sludge bed.

To correct this situation it is necessary to take the inclined plate clarifier out of service temporarily.

1. Pre-mix one (1) gallon of flocculent diluted to five (5) gallons of water.
2. Using air lance, vigorously agitate sludge bed, especially along cone sides. Control agitation rate to insure sludge is not allowed to overflow decant weir.
3. Add pre-mixed flocculent to inclined plate clarifier.
4. Agitate inclined plate clarifier slowly to achieve floc formation.
5. Allow inclined plate clarifier to settle for about 10 minutes.
6. Place inclined plate clarifier back in service.

Should mistreated water be detected in the inclined plate clarifier and sludge bed becomes contaminated, it would become necessary to batch treat the inclined plate clarifier. Use of the air lance technique described may be used for mixing the treatment chemicals added to the inclined plate clarifier. Curdling is another condition that may require the air lancing of the inclined plate clarifier, especially in sludge that has been allowed to compact. Gas development impregnates the sludge particles and eventually breaks a portion loose and floats to the top. Gas formation can be formed naturally in sludge that has become septic or from an excess of treatment chemicals used in the treatment stages of the wastewater stream. These chemicals continue to react and may form gas products.