ACTIFLO® Process For Drinking Water Treatment
**ACTIFLO® Microsand Ballasted Clarification Process**

**Unparalleled Experience in Flocculation/Settling**

Since its introduction in 1989, ACTIFLO® has been on the forefront of drinking water clarification. With over 900 installations worldwide, the ACTIFLO® process can be found efficiently treating low turbidity mountain runoff, reservoirs, with algae, warm/cold water sources with high levels of organic carbon, hard water, soft water, groundwater, spring water, flashy rivers and streams, brackish water and sea water.

**The ACTIFLO® Process with Turbomix™ for Drinking Water Treatment and Softening**

ACTIFLO® is the compact clarification system that sets the bar for high rate clarifiers. The combination of 20 years of design experience and advanced flocculation results in an ACTIFLO® process train with 8 minutes of hydraulic retention time and a clarifier loading rate greater than 30 gpm/ft².

**ACTIFLO® Cylinder Demonstration**

A = Conventional  B = Polymer Assisted  C = Ballasted Settling

**ACTIFLO® process consists of:**

- Coagulation tank with mixing to promote chemical floc formation
- Maturation tank with Turbomix™ mixing that combines floc with recirculated microsand and polymer to form a dense ballasted floc
- Lamella settling tank to capture residual solids and collect settled material
- Sand recirculation pumps withdraw the settled material and convey this material to the hydrocyclones
- The hydrocyclones separate the sludge from the microsand and return the clean microsand to the process with the sludge being discharged to waste or to the HCS system
- Concrete single train capacities of 3 to 45 MGD, package plant single train capacities of 0.2 to 7.0 MGD

**Typical Actiflo Performance**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Raw water</th>
<th>Settled water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turbidity, NTU</td>
<td>treats upwards of 2,000 NTU</td>
<td>≤ 2-3 NTU*</td>
</tr>
<tr>
<td>Total Organic Carbon, mg/l</td>
<td>3 - 25</td>
<td>2 - 3 Actiflo Carb 1 - 2</td>
</tr>
<tr>
<td>Color, PCU</td>
<td>20 - 300</td>
<td>10 - 15</td>
</tr>
<tr>
<td>Algae, counts/ml</td>
<td>1,000 - 3,000</td>
<td>75 - 95% removal</td>
</tr>
<tr>
<td>Iron, mg/l</td>
<td>0.2 - 2.0</td>
<td>Filtered Water &lt;0.05</td>
</tr>
<tr>
<td>Manganese, mg/l</td>
<td>0.1 - 1.7</td>
<td>Filtered water &lt;0.04</td>
</tr>
<tr>
<td>Softened Water</td>
<td>150 - 500 mg/l as CaCO₃</td>
<td>&lt; 35 mg/l Ca as CaCO₃</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt; 50 mg/l Mg as CaCO₃</td>
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</tbody>
</table>

*depending on raw water quality
Reducing the Volume of Sludge Produced

The HCS System

- The ballasted material in the settling tank is pumped to the MA Hydrocyclone and the overflow of the Hydrocyclone is sent into the recirculation loop

- The hydrocyclone overflow enters the repartition device and a portion of it is maintained within the recirculation loop and a portion is discharged to waste

- The portion being recirculated does not re-enter the ACTIFLO settling tank, it stays within the sand recirculation circuit

- The control of the proportions of recirculated flow versus discharged flow is maintained by a flow meter and/or a TSS probe and a modulating valve

- The MA hydrocyclone is specifically designed for the HCS system and incorporates a small amount of flush water to enhance the sludge recovery rate

- The HCS system is a simple sludge recirculation loop, which reduces sludge production by 50 – 80%.

ACTIFLO® Softening

ACTIFLO Softening is designed to reduce Hardness, Alkalinity, Silica and Heavy Metals by addition of lime and/or Soda Ash.

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<table>
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<tbody>
<tr>
<td>Inlet Hardness</td>
<td>150 - 500 mg/l as CaCO$_3$</td>
</tr>
<tr>
<td>Rise Rate</td>
<td>35 gpm/sf</td>
</tr>
<tr>
<td>Clarified Water</td>
<td>&lt; 35 mg/l Ca as CaCO$_3$</td>
</tr>
<tr>
<td></td>
<td>&lt; 50 mg/l Mg as CaCO$_3$</td>
</tr>
<tr>
<td>TSS</td>
<td>&lt; 10 mg/l</td>
</tr>
<tr>
<td>Turbidity</td>
<td>&lt; 1 NTU</td>
</tr>
</tbody>
</table>

Recommended chemicals for ACTIFLO®

3,000 Series  Drinking water production
4,000 Series  Effective membrane antiscalants and cleaners approved by major membrane manufacturers
6,000 Series  State-of-the-art clarification and wastewater chemistry and application experience
9,000 Series  Formulated Microsand
ACTIFLO® CARB

Keeping Pace with Today’s Regulatory Demands

To enhance the removal of Natural Organic Matter (NOM), Endocrine Disruptors, Taste and Odor and Pesticides the ACTIFLO® Carb process combines the benefits of ballasted clarification with the adsorption capacities of powdered activated carbon (PAC).

Key Features and Benefits

- Recirculation of PAC = minimizes PAC dose
- Maximizes use of PAC adsorption sites
- Reduces sludge volume and increases sludge solids content
- TOC removal rates improved up to 50% versus clarification alone
- Ideal for direct or indirect potable reuse applications

Comparative Footprints and Rise Rates

- Flat-bottom Clarifier: 0.2 - 0.6 gpm/sf
- ACTIFLO®: > 30 gpm/sf
- Sludge Blanket Clarifier: 2 gpm/sf
- DAF or Lamella Clarifier: 4 - 6 gpm/sf
Worldwide References

The ACTIFLO® process is currently in operation worldwide in small communities and large metropolitan areas, as well as in various installations for the treatment of industrial process water and effluents.

Parker, CO
Parker Water & Sanitation District
Drinking Water Treatment Plant

10 MGD, first of its kind utilizing ACTIFLO + ACTIFLO CARB as pretreatment to Ceramic Microfiltration for treatment of both surface and reclaimed water

Albuquerque, NM
Albuquerque Bernalillo County Water Utility Authority (ABCWUA)

92 MGD drinking water facility that is the cornerstone of the San Juan-Chama Drinking Water Project for ABCWUA

Little Falls, NJ
Passaic Valley Water Commission Treatment Plant

110 MGD drinking water treatment upgrade completed within the limited space available at the existing plant

Somersworth, NH
City of Somersworth Drinking Water Treatment Plant

6 MGD facility that treats high TOC and high turbidity to improve disinfection by-products levels

City of Tampa, FL
David L. Tippin Water Treatment Facility

40 MGD ACTIFLO plant with intermediate ozonation treating high influent organic levels (> 20 mg/L TOC)

Drinking Water
Municipal WW
Industrial W & WW
Resourcing the world