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 770 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, ground water, spring water, flashy rivers and streams, brackish water and sea water.

The ACTIFLO® Process with Turbomix™ for Drinking Water Treatment

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.

Typical ACTIFLO Performance

<table>
<thead>
<tr>
<th>Parameter</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>
</tbody>
</table>

*depending on raw water quality

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 35 MGD, package plant single train capacities of 0.2 to 7.0 MGD
Advancements to Reduce the Volume of Sludge Produced

To reduce the volume of sludge produced by any ACTIFLO® process train (existing or new) a hydrocyclone concentration system (HCS) can be installed or retrofitted. The HCS system is a simple sludge recirculation loop, which reduces sludge production by 50 – 80%.

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

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
ACTIFLO® CARB

Keeping Pace with Today’s Regulatory Demands

To enhance the removal of Natural Organic Matter (NOM), Endocrine Disruptors 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

**Comparative Footprints and Rise Rates**

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

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**ACTIFLO® CARB Diagram**

1. Fresh PAC Addition
2. PAC Pre-Contact Tank
3. Coagulant Addition and Floc Formation
4. Floculation Tank with Turbomix™
5. Settling Tank with Lammella and Scraper
6. Separation of Sand from Sludge and PAC with MA Hydrocyclone
7. PAC Recirculation

**Step-by-Step Process**

- **Step 1**: Fresh PAC addition
- **Step 2**: 5 - 10 minute contact time with fresh and recirculated PAC
- **Step 3**: Coagulant addition and floc formation
- **Step 4**: Polymer and microsand addition with Turbomix mixing
- **Step 5**: Rapid settling and material recirculation
- **Step 6**: Separation of sand from sludge and PAC with MA hydrocyclone
- **Step 7**: PAC recirculation
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.

- **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

- **Little Falls, NJ**
  Passaic Valley Water Commission Treatment Plant
  110 MGD facility with ACTIFLO 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

- **Lucien Grand, France**
  Municipal Drinking Water Treatment Plant
  17 MGD facility with ACTIFLO followed by ACTIFLO CARB plus Ultrafiltration for organics and pesticides removal

- **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

- **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)

- **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