



ACTIFLO® Process For Drinking Water Treatment

WATER TECHNOLOGIES

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 800 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.

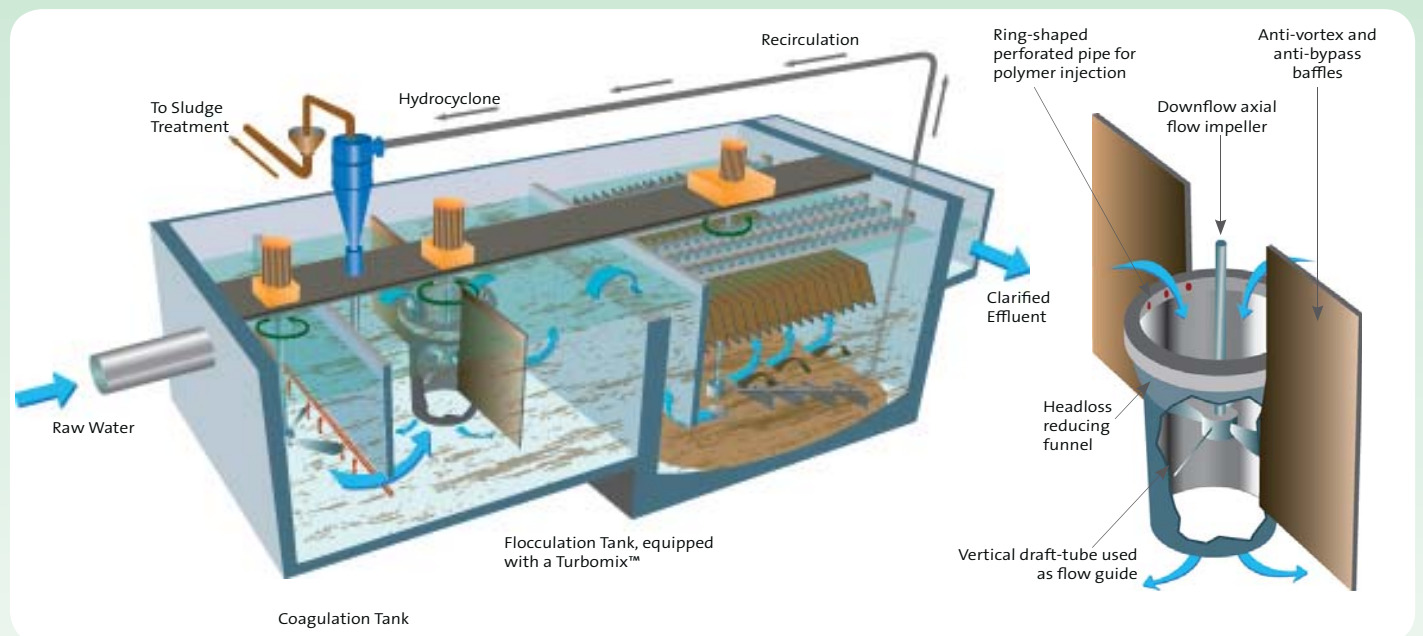
The ACTIFLO® Process with Turbomix™ for Drinking Water Treatment and Softening

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.

Typical Actiflo Performance

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

*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 45 MGD, package plant single train capacities of 0.2 to 7.0 MGD

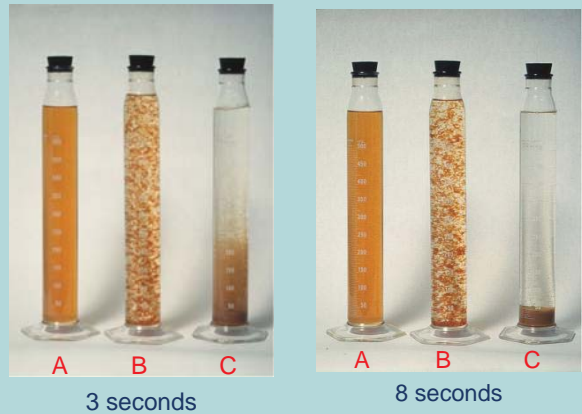
Reducing the Volume of Sludge Produced

The HCS System

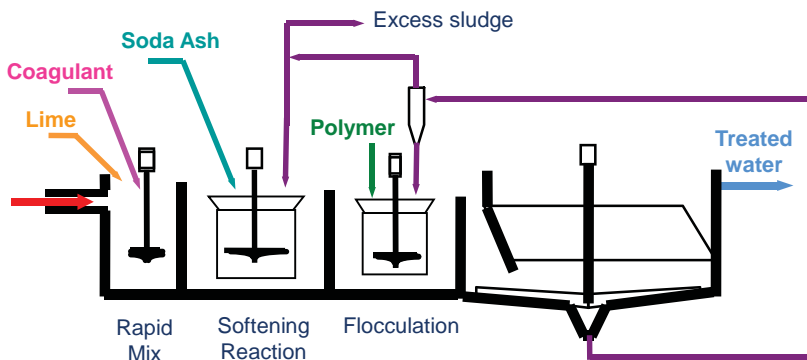
- The ballasted material in the settling tank is pumped to the MA Hydrocyclone and the overflow of the Hydrocyclone is sent into the recirculation loop
- The hydrocyclone overflow enters the repartition device and a portion of it is maintained within the recirculation loop and a portion is discharged 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® Cylinder Demonstration

A = Conventional B = Polymer Assisted C = Ballasted Settling



ACTIFLO® Softening



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

Inlet Hardness	150 - 500 mg/l as CaCO ₃
Rise Rate	35 gpm/sf
Clarified Water	< 35 mg/l Ca as CaCO ₃ < 50 mg/l Mg as CaCO ₃
TSS	< 10 mg/l
Turbidity	< 1 NTU

HYDREX

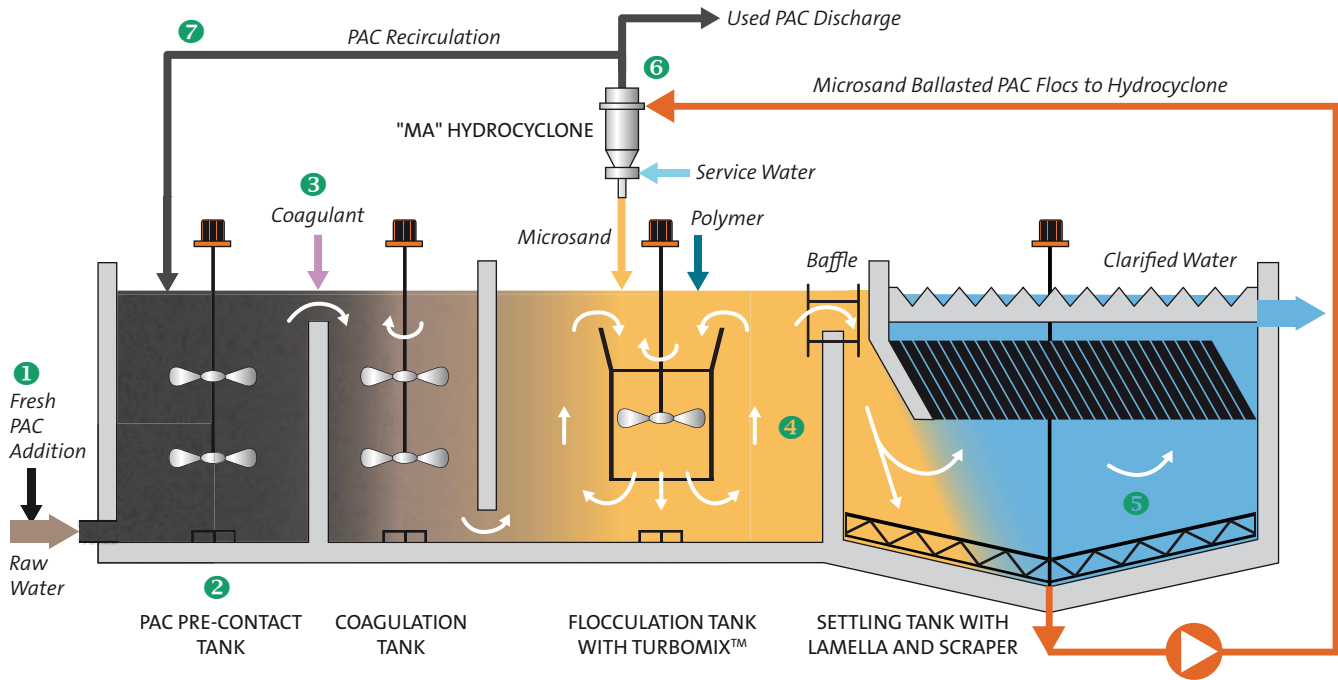
Recommended chemicals for ACTIFLO®

- | | |
|--------------|---|
| 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).



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

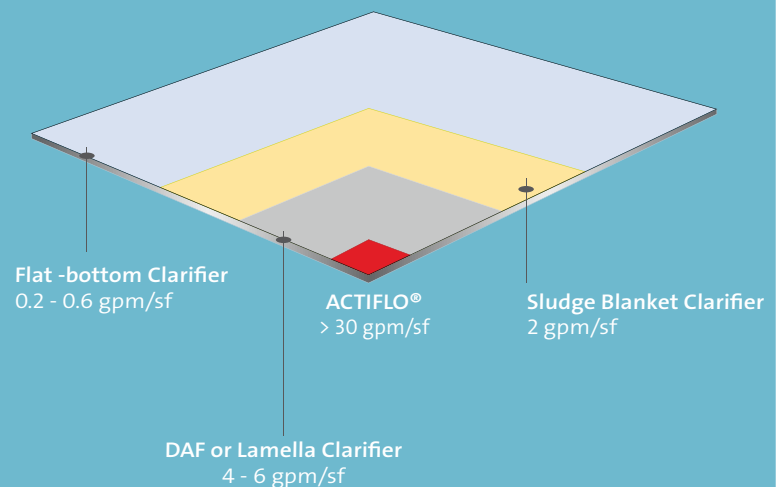
Step 6 Separation of sand from sludge and PAC with MA hydrocyclone

Step 7 PAC recirculation

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



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

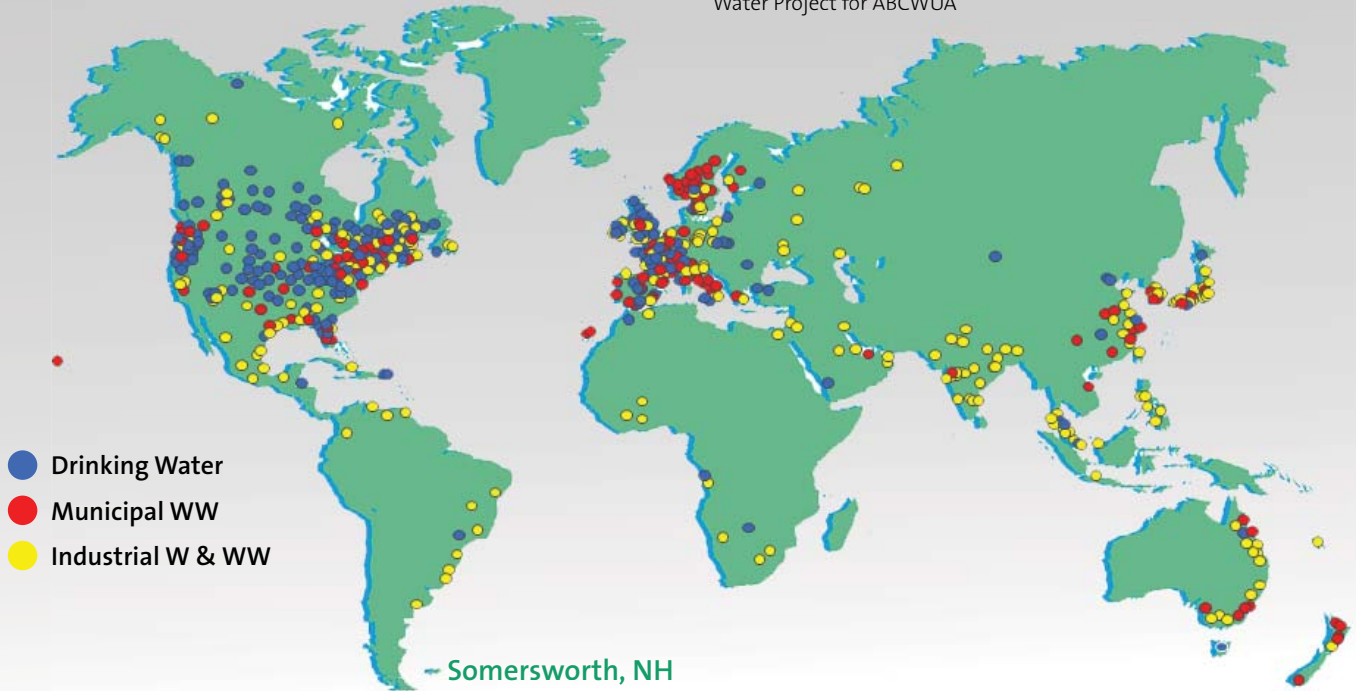


10 MGD, first of its kind utilizing ACTIFLO + ACTIFLO CARB as pretreatment to Ceramic Microfiltration for treatment of both surface and reclaimed water

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)

