Configurations

The basic design of Actiflo allows for many configurations that meet the diversity of treatment contexts and needs:

<table>
<thead>
<tr>
<th>CONFIGURATIONS</th>
<th>MAIN CHARACTERISTICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTIFLO® Duo</td>
<td>Operational flexibility with or without microsand depending on the flow rate.</td>
</tr>
<tr>
<td>ACTIFLO® Carb</td>
<td>With Powered Activated Carbon (PAC) addition in order to eliminate non-floculable organics, marker pollutants and emerging micropollutants.</td>
</tr>
<tr>
<td>ACTIFLO® Softex</td>
<td>With lime and/or soda addition for decarbonation and water softening.</td>
</tr>
<tr>
<td>ACTIFLO® HES</td>
<td>For the reduction of the sludge volume and the associated water losses.</td>
</tr>
<tr>
<td>BioACTIFLO®</td>
<td>For the online stormwater treatment and the reduction of the soluble BOD.</td>
</tr>
<tr>
<td>ACTIFLO® Rad</td>
<td>For the removal of radioactive elements from contaminated water at nuclear sites.</td>
</tr>
<tr>
<td>ACTIFLO® Dec</td>
<td>Actiflo followed by Hydrotech disc filters for treated water polishing.</td>
</tr>
<tr>
<td>ACTIFLO® Pack</td>
<td>Standardized units for the treatment of any flow rate up to 2,500 m³/h (11,000 gpm).</td>
</tr>
</tbody>
</table>

ACTIFLO® Green: Actiflo configurations with use of biosourced products

Veolia has developed, through its Hydrex™ water treatment additives brand, a product line based on renewable resources, such as activated starch, to replace traditional polyacrylamide flocculants, as a response to increasing demand from local authorities and industry in this area.

This range of biosourced products is perfectly suited for optimal Actiflo operation and its various configurations.
Coagulation / ballasted flocculation and settling for the production of drinking water, process water and the treatment and reuse of wastewater.

**A universal process, always at the forefront of innovation**

Actiflo is a compact process for high rate clarification, developed and patented by Veolia Water Technologies. The specificity of Actiflo resides in the use of microsand, which acts as a ballast for flocculated matter and accelerates its settling. Actiflo benefits from constant improvements and innovations in order to respond to new environmental requirements from public authorities and industry. 25 years of operational experience and more than 1,000 references around the world make Actiflo the most universal and the highest performing clarification process.

**Major advantages**

- Exceptional treatment performance, regardless of the field of application.
- Operational stability: no impact on treatment efficiency during sudden flow or raw water quality fluctuations.
- Quick response to treatment adjustments.
- Operational flexibility: possibility of frequent shutdowns and restarts without affecting treated water quality.
- Reduction in construction costs thanks to the compactness of the process.
- Process can be adapted and integrated into all treatment schemes that require a clarification step.
- Full automation and remote monitoring possible.
Actiflo, the ultimate clarifier

References

25 years of operational experience and more than 1,000 references around the world. Actiflo treats more than 50 million m³ (13 billion gallons) of water every day.

Actiflo is characterized by:

- **Very high settling rates:**
  - Drinking water: 60-80 m/h (25-35 gpm/sf)
  - Municipal wastewater and stormwater: 60-150 m/h (25-60 gpm/sf)
  - Industrial process water and wastewater: 60-200 m/h (25-80 gpm/sf)

- **Increased compactness:** Actiflo is the ideal response where there are space restrictions for rehabilitating existing installations or building new ones. Its footprint is 4 to 8 times smaller than lamella or dissolved air flotation (DAF) clarifiers and up to 50 times smaller than conventional clarification systems.

- **Very short residence times resulting in great reactivity and user-friendly operation.**

### Comparison of Clarifiers

<table>
<thead>
<tr>
<th>Clarifier Type</th>
<th>MIN</th>
<th>MAX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional clarifiers</td>
<td>0.5-1.5 m/h (0.2-0.6 gpm/sf)</td>
<td></td>
</tr>
<tr>
<td>Sludge blanket clarifiers</td>
<td>3-5 m/h (1-2 gpm/sf)</td>
<td></td>
</tr>
<tr>
<td>Actiflo</td>
<td>60-200 m/h (25-80 gpm/sf)</td>
<td></td>
</tr>
<tr>
<td>Lamella or DAF clarifiers</td>
<td>10-30 m/h (4-12 gpm/sf)</td>
<td></td>
</tr>
</tbody>
</table>

© Veolia Water Technologies Communications - 11/2014 - Photo credits: Veolia Photo Library / Majani d'Inguimbert.

Visit us at: www.veoliawatertechnologies.com/actiflo
Contact: contactcom.watertech@veolia.com

References
25 years of operational experience and more than 1,000 references around the world. Actiflo treats more than 50 million m³ (13 billion gallons) of water every day.

Actiflo is characterized by:

- **Very high settling rates:**
  - Drinking water: 60-80 m/h (25-35 gpm/sf)
  - Municipal wastewater and stormwater: 60-150 m/h (25-60 gpm/sf)
  - Industrial process water and wastewater: 60-200 m/h (25-80 gpm/sf)

- **Increased compactness:** Actiflo is the ideal response where there are space restrictions for rehabilitating existing installations or building new ones. Its footprint is 4 to 8 times smaller than lamella or dissolved air flotation (DAF) clarifiers and up to 50 times smaller than conventional clarification systems.

- **Very short residence times resulting in great reactivity and user-friendly operation.**

### Comparison of Clarifiers

<table>
<thead>
<tr>
<th>Clarifier Type</th>
<th>MIN</th>
<th>MAX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional clarifiers</td>
<td>0.5-1.5 m/h (0.2-0.6 gpm/sf)</td>
<td></td>
</tr>
<tr>
<td>Sludge blanket clarifiers</td>
<td>3-5 m/h (1-2 gpm/sf)</td>
<td></td>
</tr>
<tr>
<td>Actiflo</td>
<td>60-200 m/h (25-80 gpm/sf)</td>
<td></td>
</tr>
<tr>
<td>Lamella or DAF clarifiers</td>
<td>10-30 m/h (4-12 gpm/sf)</td>
<td></td>
</tr>
</tbody>
</table>

© Veolia Water Technologies Communications - 11/2014 - Photo credits: Veolia Photo Library / Majani d’Inguimbert.

Visit us at: www.veoliawatertechnologies.com/actiflo
Contact: contactcom.watertech@veolia.com
**A very wide range of applications**

Available in standardized modular solutions (100 to 60,000 m³/day) or custom designed, Actiflo covers all municipal and industrial treatment applications.

**Drinking water and process water**
For the production of drinking water and process water, Actiflo treats surface water, ground water, sea water and brackish water. It is particularly effective in eliminating turbidity, natural organic matter, color and algae.

For the specific needs of industry, Actiflo is also suitable for the treatment of cooling tower make-up water and boiler feed pre-treatment.

**Municipal and industrial wastewater**
Actiflo can be implemented at all stages of the treatment of municipal effluents: primary and secondary clarification, tertiary polishing, and reuse of wastewater.

Real-time treatment of stormwater flows.

Phosphorus removal: compliant with the strictest standards, with reductions exceeding 95%.

Actiflo can be used for the treatment of most industrial effluents. It is suitable, for example, for the treatment and recycling of cooling towers blowdowns.

It is also particularly suited for eliminating heavy metals, ash and coal fines in power plants or steel mills effluents.

“Actiflo covers all municipal and industrial treatment applications”

**State-of-the-art equipment**

1. **Chemicals:** a coagulant, such as an iron or aluminum salt, is added to the raw water.
2. **Coagulation:** hydroxide flocs are formed during the coagulation phase.
3. **Turbomix® flocculation:** the flocs formed during the coagulation phase are ballasted with microsand with the help of polymer.
4. **Clarification:** the ballasted flocs settle quickly thanks to the specific weight of the microsand.
5. **Recirculation:** the sludge and microsand slurry is pumped to a hydrocyclone where the sludge is separated from the microsand via centrifugal force. The clean microsand is recycled back to the flocculation tank while the sludge is continuously discharged.
**ACTIFLO® CARB**
Optimum treatment for natural organic matter and micropollutants/Water purification and refinement

---

**Highly effective treatment**

Designed to treat and refine water, Actiflo Carb combines the fast flocculation and sedimentation performance of Actiflo with the adsorption capacity of Powdered Activated Carbon (PAC) to eliminate substances resistant to the clarification process.

The adsorbent properties of PAC offer an effective solution for the elimination of non-flocculable Natural Organic Matter (NOM), micro-algae, flavors and odors, pesticides, endocrine disruptors and other emerging micropollutants in the water to be treated.

The unparalleled performance of Actiflo Carb produces water of very high quality.

---

**The Actiflo Carb process**

The operating characteristics of Actiflo Carb are identical to those of Actiflo, giving it the advantages of fast, high-performance treatment. Upstream of the coagulation, flocculation and sedimentation basins, Actiflo Carb has a PAC contact tank to adsorb pollutants resistant to chemical clarification.

A recirculation circuit with a specific hydrocyclone recovers clean microsand, returns the PAC to the contact tank and purges excess sludge from the process.
Advantages

- Advanced PAC treatment
- Maximum elimination of NOM and emerging micropollutants
- Refinement of the treated water
- Compatible with other clarification processes upstream: Actiflo, Multiflo™, Spidflow® and other sedimentation flotation tanks
- High sedimentation speed: ≥ 30 m/h
- Small footprint
- Simple to commission: start-up in a few minutes
- Easy, low-cost upgrading of existing installations

Applications

Actiflo Carb is recommended for:

- Drinking water: for the treatment of NOM resistant to clarification, pesticides, emerging micropollutants, micro-algae, flavors and odors
- Process water: for refining and treating resistant NOM
- Sewage: to eliminate hard Chemical Oxygen Demand (COD) and other compounds resistant to chemical or biological treatment systems
- "Reuse": for the advanced tertiary treatment and refinement of treated sewage

Actiflo Twin Carb, a dual-stage treatment

Depending on the quality of the water to be treated and the performance to be achieved, the Actiflo Carb process is also available in an Actiflo Twin Carb version. This unique configuration consists of a dual-stage treatment in series, amplifying the elimination of NOM and reducing the footprint.

This dual-stage treatment involves an Actiflo clarification stage followed by an Actiflo Carb refinement stage. Particularly well-suited to treating water with a high pollutant content, Actiflo Twin Carb can reduce a Total Organic Carbon (TOC) level of 15 mg/l in the raw water to less than 2 mg/l in the treated water.

REFERENCES

ACTIFLO® Carb

- Harpeth Valley UD, Nashville, TN, USA - 90,000 m³/day (2015)
- DSM Nutritional Products, Village-Neuf, France - 2,400 m³/day (2014)
- Raffineria di Milazzo, Italy - 7,200 m³/day (2014)
- La Chesnaie, France - 12,000 m³/day (2013)
- Fuyang, Zhejiang, China - 250,000 m³/day (2012)
- Medias, Romania - 16,000 m³/day (2012)
- TW Moses, Indianapolis, IN, USA - 91,000 m³/day (2011)
- Montry, France - 11,000 m³/day (2010)
- Huntsman, Qingdao, China - 1,000 m³/day (2009)

ACTIFLO® Twin Carb

- Nantes La Roche, France - 160,000 m³/day (2016)
- Parker WSD, CO, USA - 38,000 m³/day (2015)
- Vitré La Grange, France - 14,000 m³/day (2014)
- Cholet, France - 34,000 m³/day (2014)
- Mervent, France - 24,000 m³/day (2013)
- Pont-Scorff, France - 6,000 m³/day (2012)
- Durcal, France - 4,800 m³/day (2011)
- Aire-sur-la-Lys, France - 109,000 m³/day (2010)
- Perros-Guirec, France - 10,000 m³/day (2009)
- Lucien Grand, La Rochelle, France - 72,000 m³/day (2009)
ACTIFLO® SOFTENING
High-speed decarbonation and/or softening solution

Designed to improve the quality of hard water, Actiflo Softening combines the operations of clarification and decarbonation/softening in a single compact unit to reduce the alkalinity and hardness of water. At the same time, the process also eliminates other undesirable components such as silica, heavy metals, fluorides and phosphates together with suspended solids and organic matter.

Fast and effective, Actiflo Softening produces very high-quality water for industrial and municipal applications.

The Actiflo Softening process

The operating characteristics of Actiflo Softening are identical to those of Actiflo, giving it the advantages of fast, high-performance treatment.

Upstream of the coagulation, flocculation and sedimentation basins, Actiflo Softening has a Turbomix™ reaction tank into which chemical products are injected to form insoluble compounds.

A recirculation circuit with a specific hydrocyclone recovers clean microsand, returns the decarbonation and softening sludge to the reactor and purges excess sludge from the process.
**Advantages**

- Small footprint: up to 10 times more compact than conventional decarbonation or softening processes
- High upward flow rate: up to 120 m/h
- Easy installation in existing tanks
- Improved mixture and accelerated chemical precipitation reaction thanks to the Turbomix tank
- Reduced coagulant consumption due to the recycling of carbonate sludge in the Turbomix tank
- Sludge characteristics: up to 8% dry matter; can be easily thickened and dried
- Easy to commission: start-up in a few minutes
- Can be fully automated and deployed in existing plants at reduced cost

**Applications**

Actiflo Softening, an ideal solution for:

**Industrial applications**

- Pre-treating water to avoid membrane fouling
- Production of make-up water for cooling towers and water recycling
- Treating water used in oil and gas production
- Treating SAGD (Steam Assisted Gravity Drainage) water in condensate circuits
- Treating wastewater from combustion gas desulfurization and acidic mining effluents
- Reusing wastewater in iron, steel and other metal industries
- Phosphorus co-precipitation

**Municipal applications**

- Decarbonation and softening of surface or borehole water to produce drinking water

**REFERENCES**

- Chelyabinsk Power Plant, Chelyabinsk, Russia - 9,000 m³/day (2015)
- Athy, Kildare, Ireland - 29,000 m³/day (2014)
- EDF Bouchain, France - 26,000 m³/day (2014)
- ENEL, Porto Tolle, Italy - 27,000 m³/day (2014)
- Grande Raffinerie Oranaise de Sucre (GROS), Oran, Algeria - 1,000 m³/day (2014)
- Vale, Long Harbour Processing Plant, NL, Canada - 29,000 m³/day (2013)
- Abengoa Solana, Gila Bend, AZ, USA - 23,000 m³/day (2013)
- JIFCO sulfuric and phosphoric acid plant, Eshidiya, Jordan - 13,000 m³/day (2013)
- Kerry Ingredients & Flavors, Listowel, Ireland - 3,600 m³/day (2013)
- Laurier Station, QC, Canada - 2,000 m³/day (2013)
- Gahard, France - 2,000 m³/day (2011)
- Coca-Cola, FEMSA, Acapulco, Mexico - 2,400 m³/day (2009)
ACTIFLO® Disc
Polishing treatment for water reuse

Designed to achieve high removal levels of suspended solids and phosphorus in municipal and industrial wastewater for water reuse, Actiflo® Disc’s configuration combines two efficient and compact treatment processes: an Actiflo® followed by a rotating disk filter polishing system.

This process helps to improve the treated water quality and adds a mechanical filtration screen to the physico-chemical treatment chain. This allows for the treated water to be reused for irrigation, replenishing the groundwater table or for urban use.

Thanks to its unique equipment design, this high-performing solution is applicable in several situations.

With a total removal rate in excess of 95% for phosphorus and up to more than 99% for suspended solids, Actiflo Disc’s performance exceeds most discharge and reuse standards.

Used in pre-treatment upstream of the membranes, Actiflo Disc’s configuration is equally suitable for producing process water and drinking water.

Operating principle

The first phase of the Actiflo Disc treatment process is a conventional Actiflo phase, namely coagulation-flocculation ballasted by microsand, which allows for high-performance clarification 60 times quicker than other conventional processes.

After the clarification, clear water is sent to the Hydrotech™ rotating disk filters for tertiary treatment. Efficient, highly flexible with a compact design, Hydrotech filters enhance the polishing process.

Finally, the Actiflo Disc solution guarantees exceptional quality water production with a footprint up to 80% lower than other conventional processes.
**Advantages**

- Very compact solution, easy to adjust to present facilities or sites to be refurbished.
- Very low water losses: <3%.
- Provides a protective barrier against parasites (ex: Helminth eggs).
- Lower turbidity, suspended solids and reduces residual phosphate contents.
- Gravity filtration
- Continuous supply with no shutdown to wash filters.

**Some references**

**Municipal wastewater/Reuse**

- El Prat (Baix Llobregat), Barcelona, Spain, 2006, 346,000 m³/day Tertiary treatment for reuse, aquifer recharge, irrigation, urban cleaning, salt wedge and in industry
- Hefei Binhu Beilaowei (Ph. I), China, 2014, 30 000 m³/day Tertiary treatment, settling velocity
- Manawatu District Council, Feilding WWTP, New Zealand, 2013, 7,500 m³/day Tertiary treatment of biological filtration effluents,
- TOM Prinsenland, Dinteloord, Netherlands, 2013, 2,400 m³/day pre-treatment of effluents and surface water upstream of an “RO”, reuse for greenhouse irrigation

**Industrial reuse/process water**

- Bäckhammars Bruk, Kristinehamn, Sweden, 2002, 48,000 m³/day Treatment of river water to produce Pulp & Paper process water
- Mankato, USA, 2006, 54,000m³/day Tertiary treatment for reuse as boiler water at the Calpine plant
- Vale, (Inco) Goro Nickel, New Caledonia, France, 2008, 70,000 m³/day Polishing treatment of mine effluents for disposal in sensitive natural environments.
- Corning Japan, Japan, 2010, 500 m³/day Primary treatment of effluents for microelectronics sector
- Stratford Peaker Power Project, Taranaki, New Zealand, 2010, 6,000 m³/day River water treatment for process water production
- Philips Lumileds, Bayan Lepas (Penang), Malaysia, 2012, 800 m³/day Primary treatment of effluents for microelectronics sector, reuse as process water

**Municipal potable water**

- Harpeth Valley UD, Nashville, TN, USA - 90,000 m³/day, (2015)
ACTIFLO® PACK
Standardized high-performance clarification units

Ideal for treating all types of drinking water, process water, sewage and reuse applications, Actiflo Pack standardized units are designed to be extremely compact.

Actiflo Pack units offer an economical solution, with minimal requirements for civil engineering and very short delivery and commissioning times.

The Actiflo Pack range

The operating characteristics of Actiflo Pack are identical to those of Actiflo – coagulation/flocculation and ballasted sedimentation – giving it the advantages of fast, high-performance treatment and great operational flexibility.

The systems are supplied with all equipment and accessories, from process reagent preparation to instrumentation and supervision tools.

The Actiflo Pack range offers a wide choice of configurations with unit treatment capacity of 2 to 2,500 m³/hour depending on the application.

The Actiflo Pack range is also available as a mobile unit for emergency solutions requiring temporary water treatment in the event of an unplanned downtime or to cover occasional additional water needs. Loaded onto trailers or in containers, they are available in a range of flow rates up to 350 m³/h. They can be started very quickly to guarantee continuity of production for clients.
**Advantages**

- Performance: constant production of high-quality water
- Flexible operation: possibility of fast and frequent stops and starts
- Very compact with small footprint: between 2 m² and 55 m² per unit
- Economical solution, pre-fabricated in our workshops
- Choice of construction materials
- Delivery on a chassis with very short lead times

**Applications**

The standardized Actiflo Pack unit covers all municipal and industrial water treatment applications (drinking water, sewage, process water, reuse).

**A varied range**

- Actiflo Pack Mini: up to 15 m³/h
- Actiflo Pack: up to 2,500 m³/h

Actiflo Pack is the ideal response to situations that require a low-cost solution with fast set-up.

**Associated services**

Our after-sales services and local technical support teams offer preventive and corrective maintenance programs that guarantee the effective commissioning and long-term operation of the installation.

For even greater performance and safety, Actiflo Pack can be offered with the Hydrex™ range of additives, coagulants and polymers and with Actisand™ microsand developed by Veolia.

**REFERENCES**

**Process water**

- DeBeers Diamond Mine, Snap Lake, NT, Canada - 420 m³/h (2014)
- New Boliden, Skelleftehamn, Sweden - 15 m³/h (2014)
- BP, Qarmat Ali, Basrah, Iraq - 8,750 m³/h (2012)
- Coca-Cola, FEMSA, Acapulco, Mexico - 2,400 m³/day (2009)
- Clariant (chemicals), France - 250 m³/h (2001)

**Drinking water**

- Maraba, Saudi Arabia - 2,500 m³/h (2014)
- Kikuxi, Luanda, Angola - 1,200 m³/h (2013)
- Sapporo, Japan - 20 m³/h (2012)
- Iserlohn, Germany - 480 m³/h (2006)

**Municipal sewage**

- Gibson Island (Western Corridor), Brisbane, Australia - 5,500 m³/h (2008)
- Copenhagen, Lake Emdrup, Denmark (lake water treatment - 250 m³/h - 1999)

**Reuse**

- Disney Land River, Shanghai Pudong - 1,200 m³/h (2014)
- Samsung Semiconductor, Suzhou, China (industrial reuse - 80 m³/h - 2008)
- Burj Khalifa, Dubai, United Arab Emirates - 2,600 m³/h (2008)
- Lago Casa de Campo, Madrid, Spain - 1,000 m³/h (2004)
BIOACTIFLO™
For treatment of stormwater and reduction of its soluble BOD

In periods of heavy rainfall, water flows entering a treatment plant may exceed its full wet weather capacity thereby preventing it from attaining the discharge quality standards required by local legislation. Such pollution peaks may cause purification efficiency losses and heavy damage to the receiving environment.

BioActiflo has been specifically designed to address this issue and provide additional biological treatment when the need arises.

Operating principle
Bioactiflo combines Actiflo’s advantages of quick and high-performance treatment with biological treatment. The return activated sludge flowing back from the secondary clarifiers mixes with the excess wet weather in the contact tank. The concentrations of activated sludge (Mixed Liquor) in the contact tanks are adjusted to facilitate a quicker absorption of the BOD than in conventional tanks, namely in 10 to 20 minutes. The Actiflo clarification phase then follows, ensuring outstanding reductions rates for both suspended solids, and carbon and phosphorus pollutions.

It involves a biological treatment - in a pre-contact tank, polluted water (BOD) is treated by activated sludge - followed by a high-performance secondary clarification: Actiflo®. Thanks to its high operational flexibility and extreme compactness, this solution helps to cut down phosphorus, 60 to 80% of soluble BOD, and 85 to 90% of total BOD. It equally helps to maintain the integrity of the main treatment plant while avoiding sludge overflows.
Advantages

- High performance: pre-contact tank: 10 – 20 min combined with an Actiflo
- Removal of soluble BOD >60% and total BOD >85%
- Treated effluents comply with EPA (USA) discharge standards for suspended solids and BOD
- Ideal solution for «online» treatment of stormwater in combined sewer systems
- Highly economical with low footprint
- Effluent quality guaranteed even with high flow fluctuations

Performance

Pollutant reduction rates per aeration time
(results obtained from pilot, Fort Smith STEP)

Some references

- Wilson Creek, Lucas, Texas, USA, 2012, 121 000 m³/day
  Tertiary and SSO treatment - clarification velocity: 75m/h
- St. Bernard, LA, USA, 2012, 30 000 m³/day
  SSO treatment - clarification velocity: 95m/h
ACTIFLO® HCS
To reduce the volume of sludge produced and related water losses

Actiflo® HCS offers a unique design allowing for optimal use of installed equipment with lower operating costs. With less sludge and residue output on the way out, the investment required for treatment downstream is also reduced.

Operating principle

The operating characteristics of Actiflo HCS are the same as those of a conventional Actiflo, thereby ensuring all of the advantages of fast and high performance treatment. Its principal feature is that it comes with a specific hydrocyclone* and an external recirculation loop.

After settling, the sludge/microsand mixture is pumped to the hydrocyclone where the microsand is thoroughly washed. The flow of clean microsand is injected back into the flocculation tank.

The flow of sludge is directed in part towards the recirculation loop with the other part being discharged. Regulation for this system is based on the use of a control valve that precisely manages the proportion of sludge discharged out of the process and the proportion retained within the recirculation loop. Actiflo HCS therefore reduces the amount of sludge produced by 2 to 3 times, while still maintaining a high clarification level.

*An «MA» type hydrocyclone specially designed for Actiflo HCS
ACTIFLO HCS

Advantages

- A 50 – 80% reduction in sludge volume
- Water losses reduced to under 0.5%
- A reduction (in size and number) of the facilities used to treat dirty water/sludge from the Actiflo
- Easy to implement in refurbishing projects

Performance

<table>
<thead>
<tr>
<th></th>
<th>Flow m³/h</th>
<th>Turbidity</th>
<th>HCS Valve % open</th>
<th>Cyclone Feed m³/h</th>
<th>Sludge Discharge m³/h</th>
<th>mg/l</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actiflo HCS</td>
<td>43</td>
<td>7</td>
<td>0.8</td>
<td>2.5</td>
<td>2.4</td>
<td>980</td>
</tr>
<tr>
<td>Actiflo</td>
<td>44</td>
<td>6</td>
<td>0.8</td>
<td>42</td>
<td>0.26</td>
<td>9200</td>
</tr>
</tbody>
</table>

Some references

Municipal drinking water

- Chomedey, Laval (Greater Montreal), Canada, 2013, 273,000 m³/day
  Treating river water/high turbidity peaks, decanting rate: 68 m/h
- Pont Viau, Laval (Greater Montreal), Canada, 2013, 135,000 m³/day
  Treating river water/high turbidity peaks, decanting rate: 40 m/h
- Gitanmaax Band Village, Hazelton, Indian Reserve, Canada, 2012, 1,400 m³/day
  Treating river water, decanting rate: 55 m/h
- Okotoks Ground, Canada, 2011, 22,000 m³/day
  Treating turbidity peaks, decanting rate: 54 m/h

Industrial applications

- Japan Nippon Steel & Sumitomo Metal, Kimitsu, Japan, 2014, 14,000 m³/day
  Treating effluents (metals, coke and coal dust), decanting rate: 120 m/h
- Nippon Steel & Sumitomo Metal, Kimitsu, Japan, 2014, 40,000 m³/day
  Treating effluents (metals, landfill leachate, urban rain water), decanting rate: 100 m/h
- CEZ Pocerady, Czech Republic, 2011, 24,000 m³/day
  Treating river water to produce process water for boiler cooling (in the energy sector) Actiflo Turbo HCS, 40 m/h
**ACTIFLO® Duo**
Two in one ready-to-use system for wastewater treatment depending on flow rates

Designed to adjust to substantial fluctuations in water flows to be treated, Actiflo® Duo can operate as a Multiflo® format (or conventional lamella clarifier) in times of low flow, such as in dry weather, or as an Actiflo®, i.e. coagulation/flocculation and settling ballasted with microsand in times of high flow, such as in wet weather.

Actiflo Duo offers a unique design and operating system allowing for optimal use of installed equipment with lower operating costs. It equally allows for unprecedented operational flexibility.

**Operating Principle**

Depending on the operating mode activated, Actiflo Duo has the same operating features as Actiflo or Multiflo (lamella clarification), giving it the advantage of high flexibility in treatment operations.

This operational flexibility is especially important in managing excess flows during periods of heavy rainfall.

---

**In high flows**, Actiflo Duo operates exactly as Actiflo, with microsand use and mixer speed allowing for ultra high speed and ultra high performance treatment.

**In low flows**, like during dry weather, the Multiflo (or conventional lamella clarifier) option can be enabled. Mixers then run at low speed while the microsand is stored in the injection and maturation tanks.

---

1. **Chemical**: a coagulant, such as an iron or aluminium salt, is added to the raw water.
2. **Coagulation**: hydroxide flocs are formed during the coagulation phase.
3. **Turbomix™ flocculation**: the flocs formed during the coagulation phase are ballasted with microsand with the help of polymer.
4. **Clarification**: the ballasted flocs settle quickly thanks to the specific weight of the microsand.
5. **Recirculation**: the sludge and microsand slurry is pumped to the hydrocyclone where the sludge is separated from the microsand via centrifugal force. The clean microsand is recycled back to the flocculation tank while the sludge is continuously discharged.

Floculate-free water is collected in the upper section in troughs.
**Advantages**

- Exceptional treatment performance regardless of field of application.
- Operational flexibility
- Optimization of installed equipment at lower operating costs.
- Lower reagent consumption: up to 50% savings compared to conventional processes.
- Lower civil engineering costs thanks to process compactness.
- Easy-to-use process: simply operation demanding little attention from operators.

**Comparison of working ranges**

<table>
<thead>
<tr>
<th>Operating procedure</th>
<th>Conventional clarifier</th>
<th>Conventional clarifier with reagents</th>
<th>ACTIFLO®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemicals</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Microsand location</td>
<td>Inactive at bottom of tanks</td>
<td>Inactive at bottom of tanks</td>
<td>In suspension</td>
</tr>
<tr>
<td>Scrapers and pumps</td>
<td>Operate intermittently</td>
<td>Operate intermittently</td>
<td>Operate continuously</td>
</tr>
<tr>
<td>Suspended solids removal</td>
<td>&gt;50%</td>
<td>&gt;90%</td>
<td>&gt;90%</td>
</tr>
</tbody>
</table>

**Some references**

- Illawarra, Sydney, Australia, 2006, 160 000 m³/day, CSO-120m/h treatment
- Hartevann (Bykle), Norway, 2011, 5 800 m³/day, secondary treatment, MBBR-70m/h clarification
- Tranemo, Sweden, 2004, 12 000 m³/day, CSO-89m/h tertiary treatment
- Port Clinton, USA, 2004, 91 000 m³/day, CSO - 88m/h primary and tertiary treatment
- Danang Beach Resort, Vietnam, 2011, 13 000 m³/day, secondary treatment /MBBR - 110m/h clarification