



KRÜGER

**ACTIFLO® Process
For Wet Weather and
Wastewater Treatment**

ACTIFLO® Microsand Ballasted Clarification Process

ACTIFLO® is a high rate, compact process developed by Veolia Water Solutions & Technologies. The process operates with microsand which enhances floc formation and acts as a ballast to aid in rapid settlement of coagulated material.

The ACTIFLO® process can be used at various stages of wastewater treatment including: enhanced primary treatment, wet weather clarification, high rate secondary clarification and final polishing for the removal of solids, phosphorus and metals.

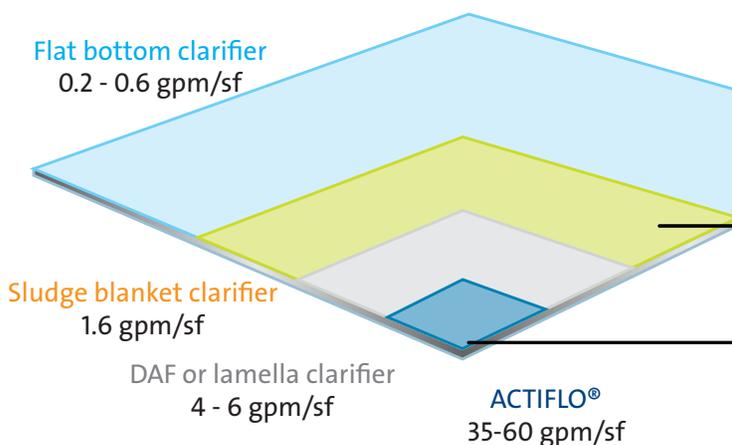
Typical ACTIFLO® Performance

| Application | Loading Rates gpm/sf | Phosphorus (mg/l) | sBOD (mg/l) | BOD ₅ (mg/l) | TSS (mg/l) | UV Transmittance (%) |
|--------------|-------------------------|----------------------|----------------|----------------------------|---------------|-------------------------|
| Wet Weather | 60 | 0.5 - 1.5 | 10 - 20 | < 30 | < 20 | 50 - 70 |
| *BIOACTIFLO™ | 45 | 0.1 - 1.0 | 1 - 10 | < 20 | < 15 | 60 - 70 |
| Secondary | 20 | 0.5 - 1.5 | 1 - 10 | < 10 | < 10 | 65 - 75 |
| Tertiary | 45 | as low as 0.05 | < 10 | < 10 | ≤ 5 | 75 - 90 |

*Pathogen removal, post disinfection, is equivalent to or exceeds that of a conventional activated sludge plant

ACTIFLO®: Compactness Displaying Its True Potential

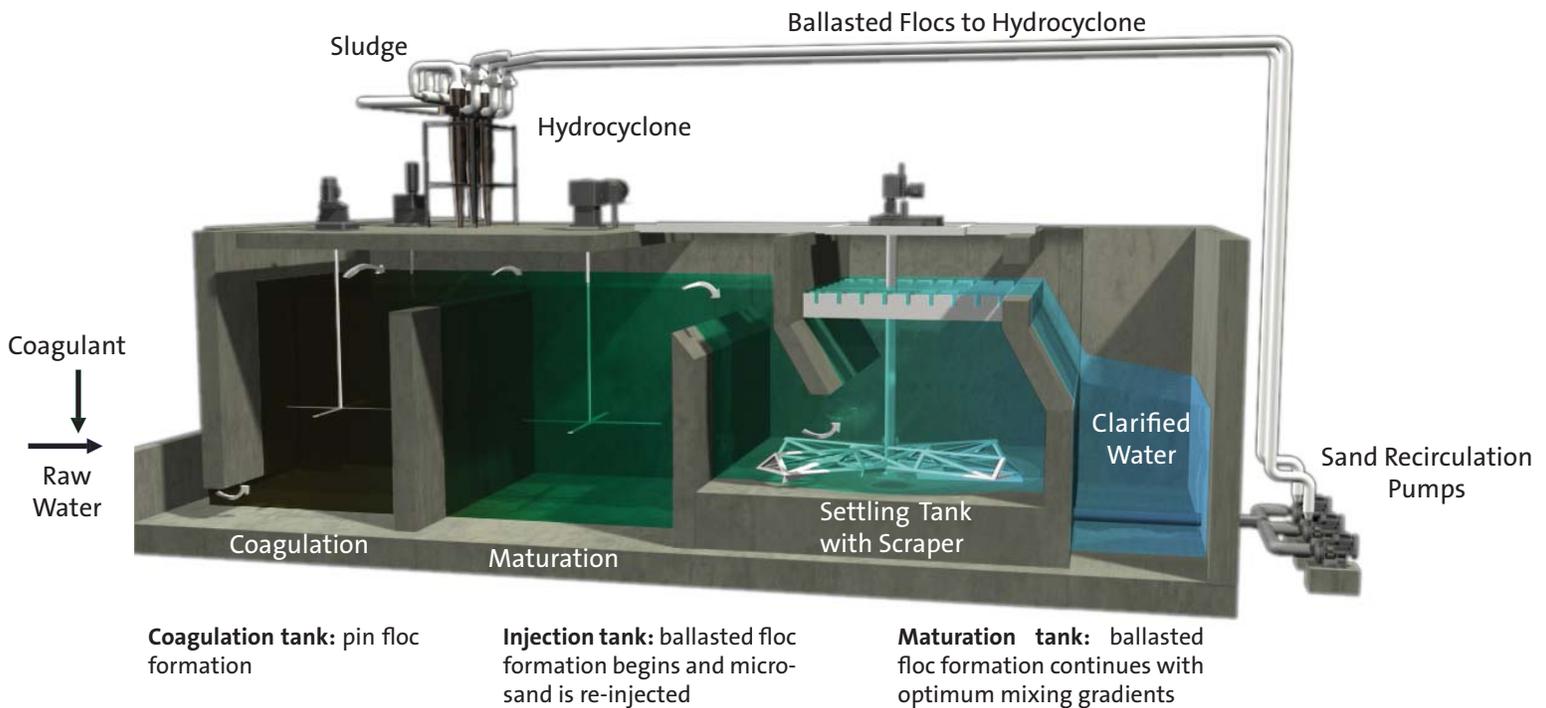
The microsand ballasted flocs display unique settling characteristics, which allow for clarifier designs with very high overflow rates and short retention times. These designs result in footprints that are 5 times smaller lamella clarifiers or dissolved air flotation (DAF) and up to 20 times smaller than conventional clarification systems.



* Surface water treatment reference

CSO/SSO Parallel Treatment with ACTIFLO®

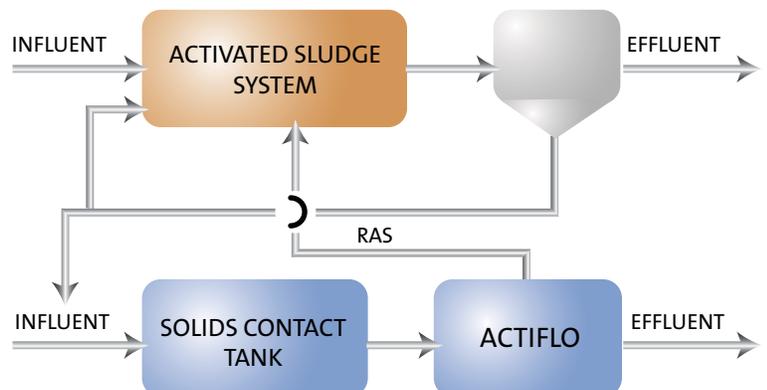
Recirculation: settled material is pumped to the hydrocyclone for separation and microsand recovery



During peak wet weather flow conditions, many plants need to divert a portion of the total plant flow around their biological treatment process. To achieve high levels of TSS and particulate BOD removal of these diverted excess flows, the ACTIFLO® process can be installed at the treatment plant or at a satellite facility within the collection system. The ACTIFLO® process can be fully automated and the process train(s) can sit idle for extended periods of time and still be fully operational within 15 minutes of start-up.

CSO/SSO Treatment BIOACTIFLO™

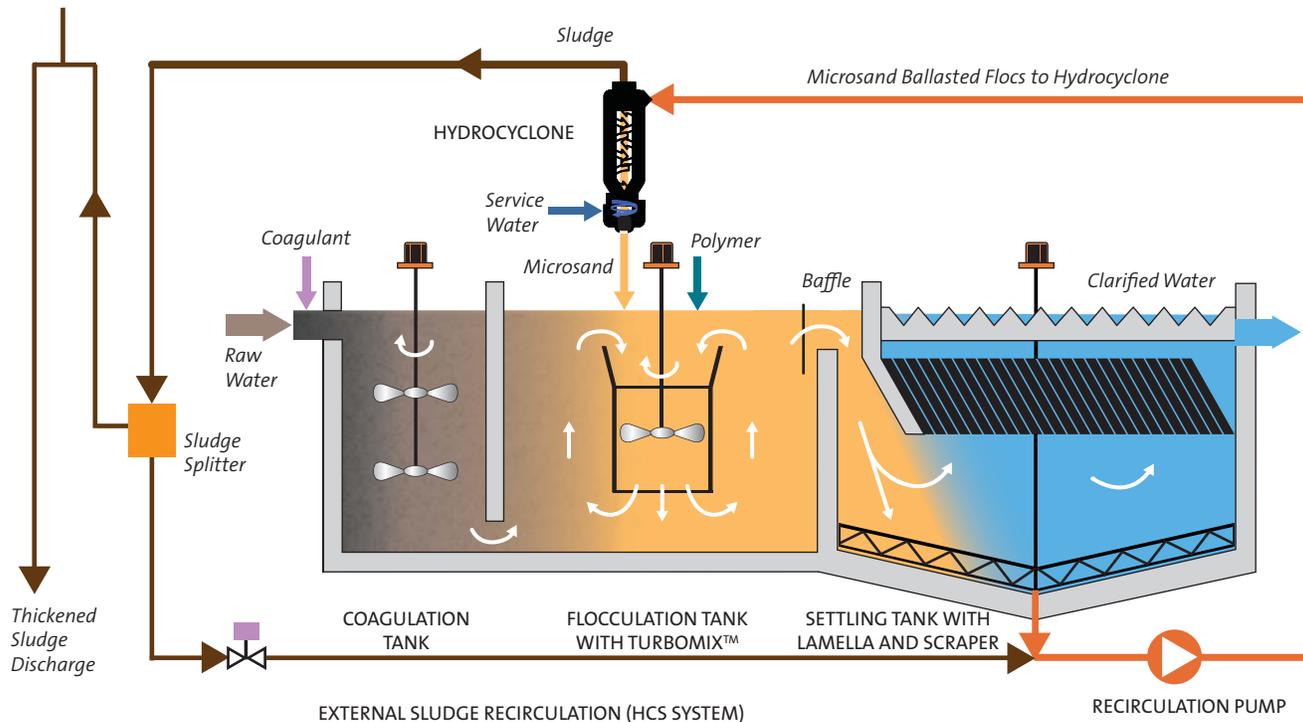
If flow diversion is not an option or the TSS and particulate BOD removal with ACTIFLO® alone are not enough, a biological solids contact tank can be incorporated into the treatment flow path to improve soluble BOD removal through the system.



Return activated sludge (RAS) from the existing clarifiers is combined with the excess flows into a solids contact tank. A targeted mixed liquor suspended solids (MLSS) concentration is maintained in the contact tank to facilitate rapid uptake of soluble biological oxygen demand (BOD) via contact stabilization. Clarification with ACTIFLO follows, producing exceptional TSS and total BOD removal rates that allow for efficient disinfection.

Tertiary Treatment with ACTIFLO®

With tighter discharge limits being imposed on wastewater treatment plants the need for a cost effective, flexible process has evolved. Over the years, the ACTIFLO® process has proven its effectiveness in meeting extremely low phosphorus, metals and TSS limits.



Process Benefits

- Small process footprint; suited for restricted spaces and existing basin retrofits
- Low system headloss, incorporates into most existing hydraulic profiles
- Reduced civil engineering costs
- High degree of operational flexibility
- Short start-up time < 15 minutes
- Minimum equipment to maintain, all easily accessible

For tertiary treatment applications, the ACTIFLO® process offers:

- Reduce coagulant demand by recirculating a portion of the sludge back to the coagulation tank
- Ability to treat a wide range of influent phosphorus levels to extremely low limits
- Flexibility to meet future limits (phosphorus, metals) without modifying the process train
- The same tertiary treatment trains can also be used to treat wet weather flows
- Treatment of flows with high solids concentration without impacting effluent quality (solids washout from secondary clarifiers during peak flow)
- Reduction in sludge volume by incorporating a HCS system

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.

Syracuse, NY
Onondaga County wastewater treatment plant



ACTIFLO® for tertiary polishing and phosphorus removal downstream of biofiltration (BIOSTYR®) 126 MGD achieving < 0.10 mg/L Total P

Kaukauna, WI
Heart of Valley wastewater treatment facility



SSO/Primary, ACTIFLO® followed by BIOSTYR®
 60 MGD Nominal, 2 x 30 MGD
 70 MGD Peak Capacity, 2 x 35 MGD

Geneva, Switzerland
Aire wastewater treatment plant



ACTIFLO® for primary, wet weather and biofilter backwash water treatment (BIOSTYR®) 137 MGD



Lawrence, KS
Lawrence wastewater treatment plant



ACTIFLO® for wet weather flow treatment 40 MGD

Barcelona, Spain
Baix Llobregat municipal wastewater reuse plant

Reuse of 5 millions m³/year of treated water for irrigation
 ACTIFLO® for tertiary treatment upstream of disc filtration 79.8 MGD

Paris, France
Seine-Aval wastewater treatment plant



ACTIFLO® for wet weather treatment or tertiary treatment (dry weather) 686.8 MGD

Sydney, Australia
Illawarra wastewater reclamation plant



ACTIFLO® for wet weather treatment upstream of UV disinfection 84.5 MGD

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