



Multiflo[®]

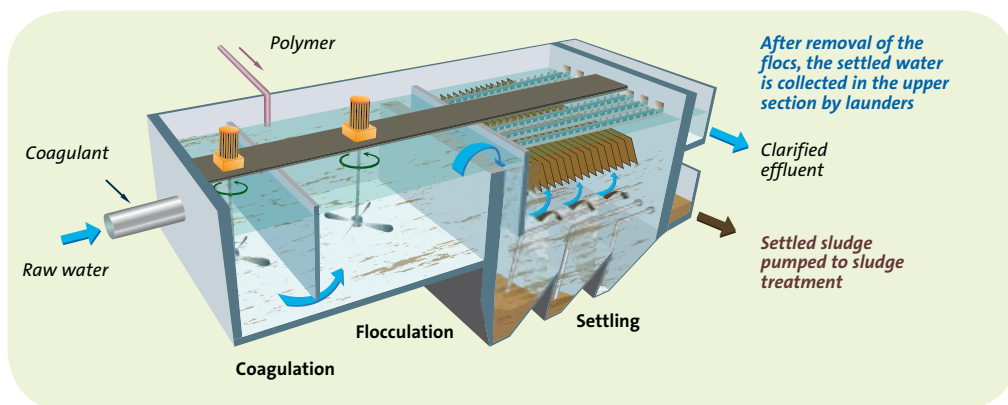
Enhanced clarification
and lamella settling

WATER TECHNOLOGIES

MULTIFLO® CLASSIC, A PROVEN TECHNOLOGY

Veolia's MULTIFLO technology is a universal and multi-purpose clarification process that can be adapted under different forms to meet the various needs of our municipal and industrial clients.

In the municipal market, MULTIFLO classic is recommended for surface water and seawater treatment, but also for primary, secondary and tertiary wastewater treatments.



The coagulation / flocculation stage

Reagents injected into the coagulation tank come into contact with organic matter and suspended solids and precipitate to form microflocs.

Polymers in the flocculation tank combine with these microflocs to form large, easily settled flocs.

The lamella settling stage

The flocculated water enters the bottom of the lamella settling tank. The water flows upward, in the opposite direction to the settling flocs, which are deposited along the lamella plates and settle downward under the effect of gravity.

The sludge that accumulates in the bottom of the tank is regularly removed utilizing either a suction draw-off or scraper mechanism.

Following the launch of the MULTIFLO classic, two significant developments in the technology have proven efficient for other applications:

▾ **MULTIFLO Softening:** for carbonate removal and softening of drinking water, process water and wastewater before reuse.

▾ **MULTIFLO Carb:** drinking water polishing process capable of removing pesticides, organic matters and new emerging pollutants, such as endocrine disruptors.

AN OPTIMIZED DESIGN

The **MULTIFLO** process combines the **coagulation**, **flocculation** and **counter-current lamella settling stages** in a single unit.

Inclined lamella plates located side-by-side create modular sedimentation units. Compared with conventional settlers **this configuration provides a larger settling surface area within a similar footprint**. Moreover, the lamella plates enhance settling of the less solubles flocs by improving the hydraulic distribution of the water and reducing turbulence.

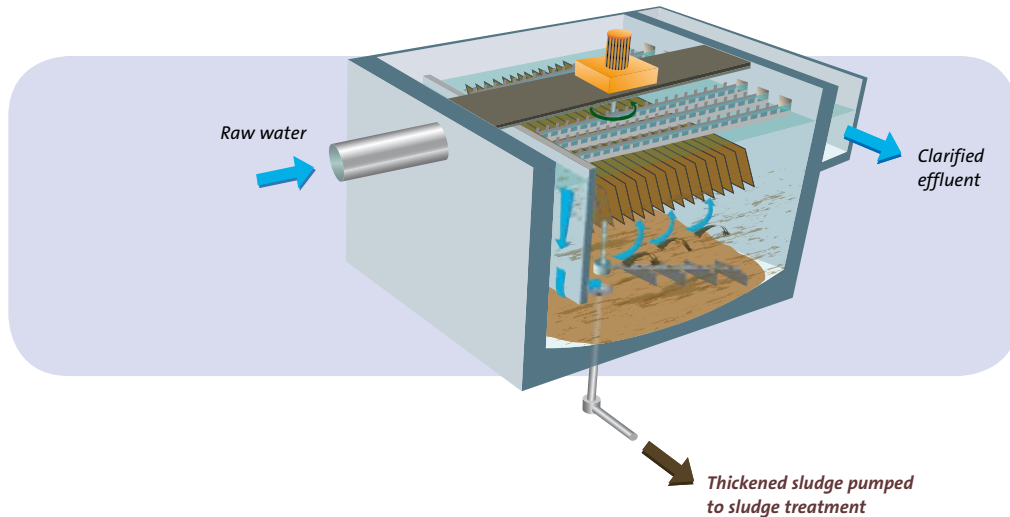
MULTIFLO is suitable for applications such as:

- surface water clarification
- polishing for drinking water
- carbonate removing and water softening
- seawater clarification
- urban wastewater purification
- stormwater treatment
- primary, secondary and tertiary wastewater treatment
- biofilter backwash treatment
- wastewater reuse

THE MULTIFLO® RANGE, AN ADAPTED ANSWER FOR

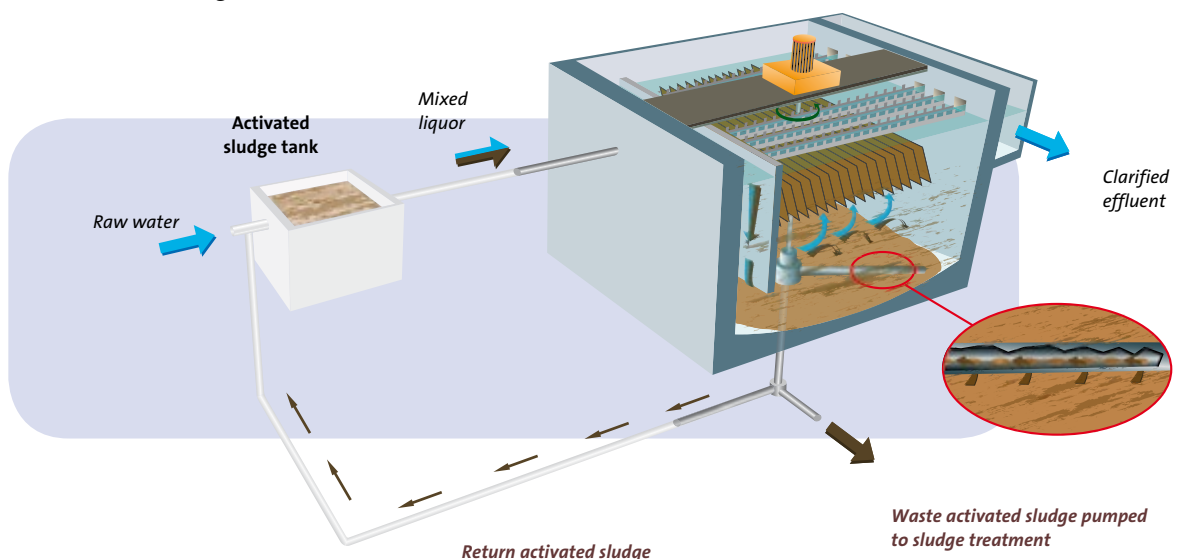
MULTIFLO® MONO: FOR CONVENTIONAL CLARIFICATION

- **MULTIFLO Mono** is designed to meet the needs of **clarification combined** with sludge thickening **without the addition of chemical reagents**.
- This configuration is recommended for:
 - Partial silt removal of surface water
 - Partial stormwater treatment
 - Partial primary treatment of wastewater



MULTIFLO® MONO PLUS: FOR ACTIVATED SLUDGE CLARIFICATION

- **MULTIFLO Mono Plus** addresses clarification needs after **biological treatment with activated sludge**.
- Based on the same principle as MULTIFLO Mono, the **MULTIFLO MONO PLUS** provides a sludge draw-off system based on suction, which controls both extraction and sludge bed level in the settling tank.
- Online turbidity measurements are used to control the return sludge concentration.



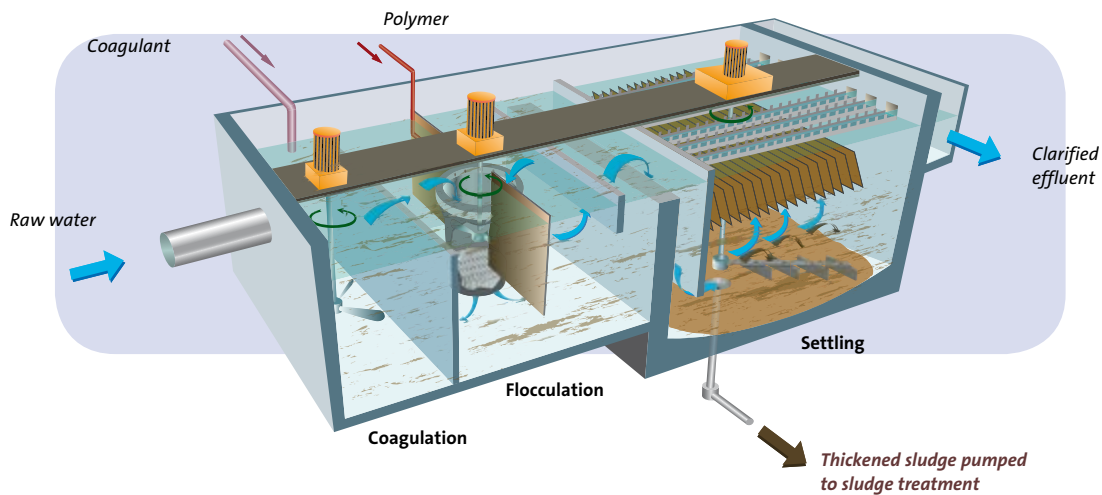
FOR EVERY NEED

MULTIFLO® DUO: FOR PHYSICAL-CHEMICAL CLARIFICATION

↳ Based on the same clarification principle as the MULTIFLO Mono, **MULTIFLO Duo** uses upstream chemical reagents in order to enhance the settling performances of the process.

↳ **MULTIFLO Duo** is particularly suitable for:

- Surface water turbidity removal for drinking water applications
- Advanced stormwater treatment
- Primary and tertiary wastewater treatment
- Treatment of sludge from biofilter backwashes



MULTIFLO® TRIO: FOR PHYSICAL-CHEMICAL CLARIFICATION WITH INTERNAL SLUDGE RECIRCULATION

↳ The **MULTIFLO Trio** range addresses a variety of specific needs:

- Reduction in raw water turbidity for drinking water
- Wastewater purification with primary or tertiary treatment

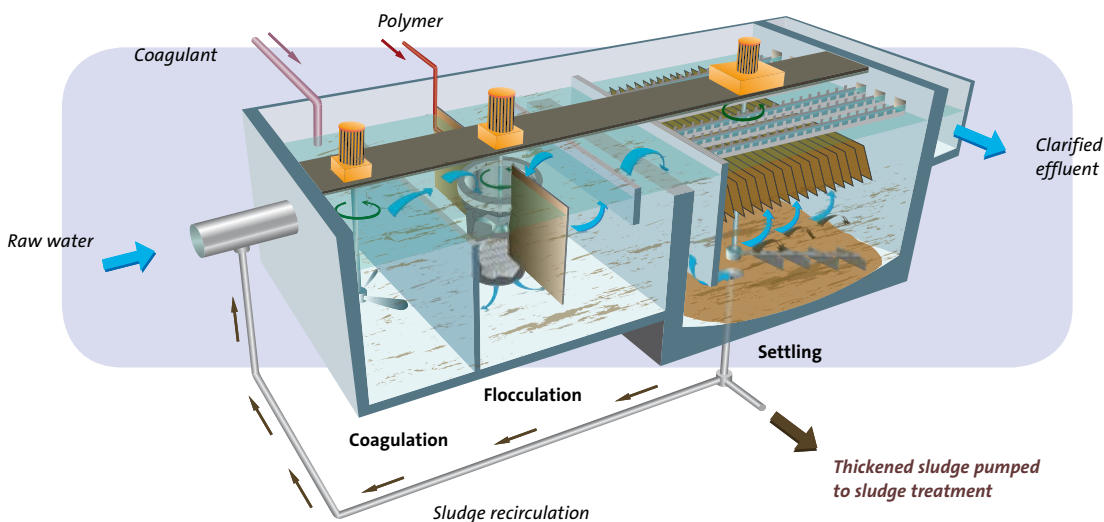
- Heavy metals removal from surface or well water
- Residual carbonate removal from effluent before recycling

↳ The **MULTIFLO® Softening** version allows:

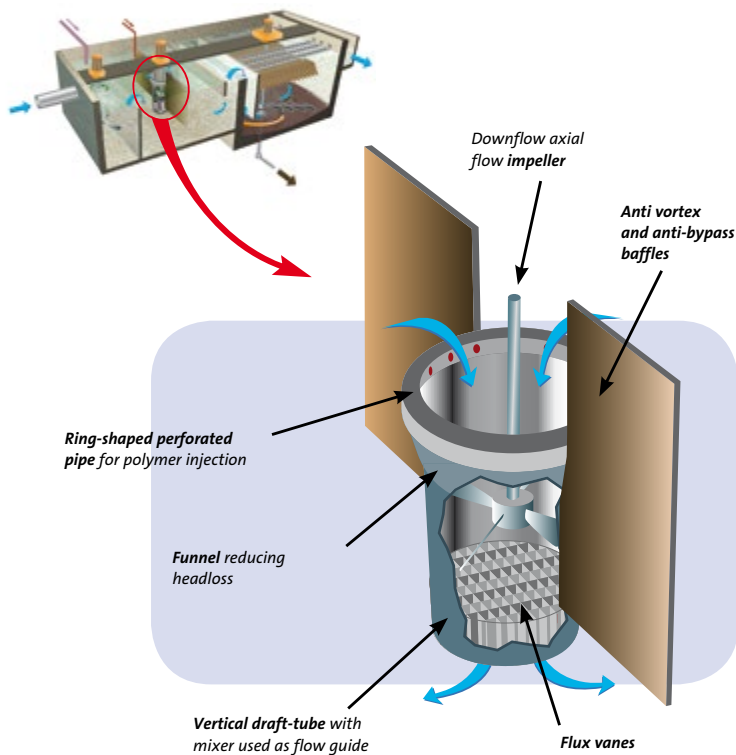
- Carbonate removal from surface or well water

↳ The **MULTIFLO® Carb** version treats:

- Pesticide removal from raw water



TURBOMIX™: THE MULTIFLO STRENGTH



Designed to optimize the efficiency of the MULTIFLO system in physical-chemical configurations, Veolia's patented TURBOMIX system ensures optimum utilization of all chemicals and a smaller flocculation tank footprint.

TURBOMIX provides:

- Removal of by-pass and dead zones to achieve classical flocculation efficiencies in a smaller tank
- Complete mixing of the influent water with the chemicals and the re-circulated sludge
- Increased pumping efficiency for a same power consumption
- Reduced polymer consumption

EQUIPMENT AND ASSOCIATED SERVICES

The following management tools are available:

- Re-circulated sludge flow according to the amount of sludge produced
- Excess sludge removal to achieve the desired sludge concentration
- Consistent treated water quality
- Temporary sludge storage without impacting the water and sludge quality
- Optimization of reagents consumption **with real-time predictive regulation of chemical products.**

The Predifloc™ advanced control system enhances a unique management for our clarification solutions.

It continuously calculates and adjusts the metering pump's flow and achieves an average savings of 15 to 20% on the injected reagents quantity.

- **Development and use of a complete range of Hydrex™ additives** have been adapted to MULTIFLO.
- The Hydrex™ range of polymers that Veolia has developed enriches itself with **biosourced products**: organic, **natural and biodegradable** flocculants and coagulants, composed of starch (flocculants) and tannin (coagulants).

Veolia also offers **MULTIFLO solutions in a pre-fabricated compact modular version.**



MANY REFERENCES ACROSS THE WORLD

L'HAÏ-LES-ROSES

L'HaÏ-les-Roses, France

Underground water treatment and drinking water production for the city of Paris

2 MULTIFLO Carb units

Average flow: 160,000 m³/day
Commissioned: 2008



HERFORD

Herford, Germany

Primary treatment of municipal wastewater

2 MULTIFLO® Classic units

Average flow: 105,600 m³/day
Commissioned: 1998



CRIVINA

Crivina, Romania

River water clarification for drinking water production

4 MULTIFLO Trio units

Average flow: 285,120 m³/day
Commissioned: 2006



HUANGHUA

Huanghua, China

Pretreatment for thermal seawater desalination (MED) process

2 MULTIFLO Trio units

Average flow: 108,000 m³/day
Commissioned: 2006



- 10 process applications to date
- 4 decades of experience
- More than 500 equipped plants
- On every continent



SARAGOZA

Zaragoza, Spain

Primary treatment of municipal wastewater

42 MULTIFLO Classic units

Average flow: 518,400 m³/day
Commissioned: 1993



MARSEILLE

(underground WWTP)

Marseille, France

Primary treatment of municipal wastewater

18 MULTIFLO Classic units

Average flow: 324,000 m³/day
Commissioned: 1986



DURBAN

Durban, South Africa

Tertiary treatment for municipal wastewater recycling intended for industrial use

2 MULTIFLO Softening units

Average flow: 47,500 m³/day
Commissioned: 2001



NAGPUR

Nagpur, India

Clarification treatment for drinking water production

6 MULTIFLO Classic units

Average flow: 240,000 m³/day
Commissioned: 2010



BAILONGGANG

Shanghai, China

Primary treatment of municipal wastewater

12 MULTIFLO Duo units

Average flow: 1,890,000 m³/day
Commissioned: 2004

*Ginestous-Garonne
wastewater
treatment plant
in Toulouse,
France*



EXTENSIVE EXPERIENCE IN CLARIFICATION/SETTLING

For over four decades, the MULTIFLO process and its applications have been continuously improved. With more than **500 references worldwide** providing first-hand operational feedback, Veolia offers **efficient, broad applications knowledge** to improve and optimize the process in order to meet customers' needs.

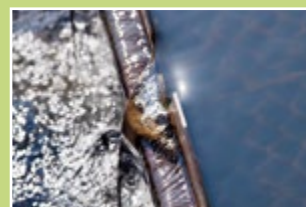
Through its various options, **MULTIFLO (Mono, Mono Plus, Duo, Trio, Softening, Carb and Packaged Solutions)** covers a full range of applications, thus allowing integration into many treatment lines.

MULTIFLO is ideal for small to large-sized plants. It can treat any kind of water characteristics and pollutant loads.

- MULTIFLO is an efficient process for removing total suspended solids (TSS), color, algae and heavy metal co-precipitates for **drinking water production** and softening.
- MULTIFLO is suitable for treating water with an **average to high turbidity** level (10-4,000 mg/l TSS) and produces water with a **turbidity of less than 3 NTU**, depending on the raw water characteristics.
- MULTIFLO can also be installed as primary, secondary, or tertiary treatment of wastewater and stormwater for partial to nearly complete removal of suspended solids, as well as carbonaceous pollutants and phosphorus.

MAJOR BENEFITS

- **Efficient treatment adapted to meet your needs:** The MULTIFLO range offers several treatment solutions depending on the required objectives (drinking water, water reuse, and discharge into the environment) and the inlet water quality (surface or underground water, stormwater, municipal wastewater, biofilter backwash, and mixed liquor).
- **Compact:** The lamella plates provide a very large projected settling area in a limited space. The footprint is **10 to 20 times less** than that of a conventional settler system.
- **Flexibility and reliability:** MULTIFLO takes changing raw water characteristics and consistently achieves high settled water quality.
- **Optimized control system:** The MULTIFLO process can be managed with the Predifloc™ advanced control system, which allows optimization of physical-chemical treatments and minimization of reagents consumption thus decreasing operating costs.
- **Simple installation and operation:** All units in the MULTIFLO range incorporate a lamella plate system which is both easy to install and maintain.



Resourcing the world

Veolia Water Technologies

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