THE COMAG® SYSTEM FOR ENHANCED PRIMARY AND TERTIARY TREATMENT

SETTLES FLOC UP TO 30 TIMES FASTER THAN CONVENTIONAL TREATMENTS WHILE EXTENDING EQUIPMENT SERVICE LIFE
ABOUT EVOQUA WATER TECHNOLOGIES

For more than a century, Evoqua Water Technologies has helped consulting engineers and municipalities clean and purify the world’s most precious resource — our water. We excel in disinfection, membrane treatment, high-rate clarification, biological processes, low energy biosolids solutions, odor control and seamless controls across process equipment. Our Wallace & Tiernan®, MEMCOR®, Envirex®, Jet Tech and DAVCO™ brands are well established. And our experts, experience, technologies, integrated approach and services make us a reliable source for the municipal water and wastewater treatment needs of today and tomorrow.
THE COMAG® SYSTEM — ENHANCED CLARIFICATION THAT EXTENDS EQUIPMENT SERVICE LIFE

The CoMag® system uses magnetite — fully inert iron ore particles — to settle chemical floc up to 30 times faster than conventional treatments. Primarily used to improve primary and/or tertiary treatment, the CoMag system easily integrates with planned or existing facilities, making it easier than ever to solve today’s operational and environmental challenges.

Key benefits of the CoMag system:

- **Extends equipment service life**
  Recovers and continuously reuses magnetite ballast (up to 99%), which is less abrasive and 75% smaller than sand particles.

- **Superior contaminant removal**
  Total suspended solids (TSS), total phosphorus (TP), turbidity, color, pathogens and metals can be reduced to levels far below conventional treatment.

- **Low costs**
  High-rate, ballasted clarification allows for smaller reaction and solids separation tanks, minimal power consumption and moderate chemical use.

- **Improved productivity**
  The system minimizes the risk of upsets and handles a wide range of flows and loads — including peak flow events — with no backwashing, plugging or fouling, no media filters required and almost no effect on contaminant removal performance or operational stability.

- **Ultraviolet enabling**
  The high transmissivity of the system effluent reduces energy and operating costs of final purification.

- **Stormflow management**
  During storms, the system can go online in less than 15 minutes to handle hydraulic surges. Once the rain event subsides, the system can go offline or serve as a tertiary treatment unit during dry weather.

- **Fast, cost-effective retrofits**
  Because the system is compatible with virtually all types of tankage and clarifiers, significant cost savings are achieved by reusing existing infrastructure.

Magnetite: The little compound that pulls a lot of weight.

Magnetite is a readily available, fully inert form of iron ore (Fe₃O₄), and the ballast that powers the CoMag system.

**Benefits of Magnetite:**

- **Extends equipment service life**
  Less abrasive and 75% smaller than sand particles.

- **Hydrophobic**
  Shuns water and naturally bonds with chemical floc and biological solids.

- **Dense**
  Specific gravity of 5.2 means increased floc density, faster settling and higher surface overflow rates (SOR) and solids loading rates (SLR).

- **Fully oxidized and insoluble**
  Will not rust, degrade or easily dissolve like some ballasting agents.

- **Inexpensive**
  A readily available commodity that helps keep operational costs low.

- **Reusable**
  Attracted to magnets, not components, allowing for easy recovery and reuse.
INSIDE MAGNETITE BALLASTED TECHNOLOGY

A. THE REACTION TANK:
Familiar process with one simple change

With the CoMag® system, the traditional process of flocculation, coagulation and clarification remain the same. The benefits result from the simple infusion of magnetite.

Inside the reaction tank:
- Alum, ferric or poly-aluminum chloride (PAC) is added to the influent
- The resultant chemical floc is infused with magnetite, quickly increasing solids density through simple mixing
- The magnetite ballasted floc then travels to a conventional clarifier

B. THE CLARIFIER:
Where the proof is clear

The high-density, magnetite ballasted floc that flows into a conventional clarifier settles rapidly and reliably, resulting in remarkably clear effluent. It also allows for a much smaller clarifier, substantially reducing capital costs in new facilities or expansions and providing a particularly effective solution for sites with a tight footprint.

The enhanced settling capabilities of the CoMag system can help plant operators:
- Increase SOR up to 10x
- Increase SLR up to 20x
- Achieve turbidity < 1 NTU
- Expand or build new with 1/10th of the traditional clarifier footprint
- TP < 0.05 mg/L

In addition to high-rate clarification, the CoMag system employs a sludge recycle function to increase system performance and the clarity of its effluent. Approximately 85% of clarifier underflow is recirculated into the system’s reaction tanks. The resulting high-density slurry allows the application to easily manage upsets and variations in the influent flow stream and sweep up any fine particulate remaining in the system.

C. RECOVERY AND REUSE:
A sustainable process for lower OPEX

In addition to the low capital expense associated with installation, the CoMag system offers the cost-effective ability to continuously recover and reuse 99+% of the injected magnetite.

Here’s how it works:
- Sludge moves from the clarifier via a waste sludge line to an inline high-speed shear mixer where magnetite is liberated from floc
- The resulting two-part slurry is then passed under a magnetic recovery drum
- Permanent and stationary magnets inside the drum help to capture 99+% of the magnetite and deposit it back in the system
- Sheared sludge, minus the magnetite, then flows to sludge disposal
PRACTICAL USES FOR THE COMAG® SYSTEM

The CoMag® system competes effectively with all forms of media and membrane filtration and conventional clarification for multiple applications, including:

- Primary treatment (chemically enhanced)
- Stormwater/CSO (combined sewer overflow)/wet weather control
- Tertiary treatment for polishing secondary effluent
- Ultra-low nutrient removal
- Recycle-reuse
- RO pretreatment
- Drinking water
The CoMag® system can produce effluent quality far superior to conventional alternatives, at lower life-cycle costs, and has been proven at multiple municipal and industrial facilities to deliver the following results:

- TP < 0.05 mg/L
- TSS < 2.0 mg/L
- Color 2 Pt-Co Units
- Turbidity < 1 NTU
- Fecal Coliform < 200 Col/100 mL
- Copper ≤ 8 µg/L
- Aluminum ≤ 80 µg/L
- Arsenic < 5 µg/L
- UV Transmittance > 75%
- Oil and Grease Removal
EMBRACE GRAVITY. DEFY CONVENTION.

Learn more about how the CoMag® system harnesses the force of gravity to eliminate clarifier bottlenecks and enhance the performance of primary and tertiary treatment.

Visit www.evoqua.com/comag to access settling videos, case studies, recorded webinars and FAQ’s.

MAGNETITE-BALLASTED CLARIFICATION ENABLES THIS 18-FT DIAM. CLARIFIER TO HANDLE 2.3 MGD. DENSE FLOC SETTLES IMMEDIATELY BENEATH THE CENTER WELL, RATHER THAN DISSIPATING THROUGHOUT THE CLARIFIER.