The Trident® Package Water Treatment System

When Microfloc™ products first introduced the Trident technology, it represented a significant advancement in water and wastewater treatment for plant owners and operators. Not only did it remove turbidity, suspended solids, color, iron, manganese, odor, taste, and pathogens such as Giardia lamblia and Cryptosporidium, but it did so at a lower capital cost than conventional systems, in a smaller space, and at higher flow rates per unit area.

Today, more than 800 Trident technology systems, large and small, are at work all across North America and the world. Our Trident systems continue to evolve as we constantly strive to find ways to produce even higher quality treated water at higher flow rates per unit area and further reduce installation and operating costs.

**Surface Water Treatment**
- Turbidity reduction
- Color removal
- Reduction of High TOC/DBP precursors

**Groundwater Treatment**
- Iron and manganese removal
- Arsenic
- Groundwater under the influence of surface water

**Tertiary Treatment**
- Water reuse
- Phosphorus removal

**Industrial Process Water**

<table>
<thead>
<tr>
<th>Trident Design Criteria</th>
<th>Raw Water</th>
<th>Finish Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turbidity (NTU)</td>
<td>&lt; 75</td>
<td>&lt; 0.1</td>
</tr>
<tr>
<td>True Color (Pt-Co Units)</td>
<td>&lt; 35</td>
<td>&lt; 5</td>
</tr>
<tr>
<td>Combined Turbidity + Color</td>
<td>&lt; 75</td>
<td></td>
</tr>
<tr>
<td>Iron &amp; Manganese (mg/L)</td>
<td>&lt; 0.3</td>
<td>&lt; 0.05</td>
</tr>
</tbody>
</table>
Proven and Efficient

The Trident water treatment system utilizes a two-stage configuration consisting of an up-flow buoyant bead and compressible media Adsorption Clarifier® system followed by a conventional down-flow mixed media filter to produce high quality water.

**Filtration Mode**

The treatment process is started when chemically dosed raw water enters the Adsorption Clarifier near the bottom of the tank where an upflow treatment process combines flocculation and clarification. From the Adsorption Clarifier, flow continues over a weir into the collection trough where it is distributed into the mixed media filtration chamber, after which it is collected by the MULTIBLOCK® underdrain with Laser Shield™ media retainer and exits the tank.

**Buoyant Media Flush Mode**

The Adsorption Clarifier is engineered to automatically initiate a flush cycle once headloss indicates that cleaning is required. When the cleaning is initiated, the waste gate and air scour valves are opened as raw water continues to flow. The air/water flush aggressively separates and removes the solids from the media. Solids are then discharged out through the waste pipe.

**Backwash Mode**

Like the Adsorption Clarifier flush, the backwash cycle is initiated when dirty bed headloss is reached in the mixed media filter section. The Trident inlet and outlet valves are closed and the air scour valve is opened to allow an air scour cycle. Solids from the backwash are then removed by water flowing up into the collection trough and discharged out through the waste pipe. A filter-to-waste sequence follows to ripen the filter media before returning the unit to service.
Complete Package Plant

Adsorption Clarifier System
Trident systems use less coagulant and polymer than conventional settling type clarifiers. Within the Adsorption Clarifier system, it is not necessary to form a settleable floc, which means floc size and settling time are not factors. The buoyant media is rolled and scarified to greatly improve particulate removal. The compressible fiber media is used to capture more solids. The buoyant and compressible fiber media are NSF-61 certified and typically will last the life of the system.

Mixed Media Filtration
Microfloc pioneered mixed media technology, which has become the industry filtration standard. By using three or more granular materials of differing size and specific gravity, the progressive coarse-to-fine mixed media produces superior quality finished water.

Trident Process Flow Diagram

Standard Components
- Epoxy-coated steel tanks
- Media
- Internals
- Actuated and manual valves
- Inlet magnetic flow meter
- Pressure transmitters
- Ultrasonic level transmitter
- Effluent turbidimeter
- Automated PLC controls
- Backwash control valves
- Blower package
- Chemical feed packages (coagulant and polymer)

Optional Components
- Air compressor package
- Integrated plant PLC controls package
- Backwash magnetic flow meter
- Interconnecting walkways and platforms
- Aluminum or stainless steel tanks
- Inlet turbidimeter
- pH monitor
- Streaming current monitor
- Static mixer
Highly Efficient, Simple Operation

MULTIBLOCK
MULTIBLOCK underdrains provide a high-quality, low-cost, engineered product that is economical and versatile. MULTIBLOCK underdrains are fitted with the unique Laser Shield media retaining system that eliminates the need for support gravel. Combined air and water backwash is provided using this system.

- Reduced profile underdrain
- Superior media retention capability
- Uniform distribution of water and air backwash
- NSF-61 approved
- Resistant to plugging and fouling

Trident Process Controller Including the AQUARITROL® III
Trident package treatment units are supplied with fully automated programmable logic controls (PLC). These controls allow plant personnel to easily monitor operational parameters and control all treatment equipment and processes.

Changes in raw water characteristics and flow rate are automatically detected by the AQUARITROL III program. This PLC-based, feed-forward, loop control system monitors the filter effluent quality and continually evaluates and regulates influent chemical feed to maintain desired effluent water quality parameters. The operator sets an adjustable effluent quality setpoint and the Trident controls, utilizing the AQUARITROL III program, do the rest.

WesTech’s electrical engineers and programmers can also integrate new whole plant operation or existing plant instruments into the Trident PLC controls. Complicated plant expansions are simplified by providing seamless integration of new and existing equipment.

- Optimized and flexible process controls
- Chemical usage is maximized while maintaining performance
Get More with Microfloc

Big Performance in a Small Water Treatment System
For lower flows, Microfloc offers the Tri-Mite® Package Water Treatment Plant. Using the same process as the Trident system, the Tri-Mite comes factory-assembled with pumps, controls, piping, valves, and an air scour blower mounted on the tank. These items are pre-plumbed and wired for simple, fast installation.

The Tri-Mite unit is available in five standard sizes as single units from 50 gpm to 350 gpm and as a two-unit system up to 700 gpm capacity. For flows less than 50 gpm, a single unit can be operated on an intermittent or reduced flow basis. These systems are perfect for new designs with future expansion in mind. The future additional tank would share the control panel, blower, and backwash pump of the first tank.

Equipment Upgrades and Expansions
If your unit is more than 10 years old, or has seen changes in raw water quality, it may be worthwhile to inquire about upgrading your Trident system. Common upgrades include enhanced PLC control systems, underdrain replacement accompanied with backwash upgrade, Trident HSR integrated presedimentation systems, and replacement of up-flow media. Retrofits are also available for other package treatment systems.

Stretch Customization
Some regulatory requirements may dictate a lower hydraulic loading through the filter cell. This is a simple change for the Trident system. An optional stretch filter cell is available to lower the hydraulic loading rate from 5 gpm/ft² to 4 gpm/ft². Other filter loading rates may also be achieved through custom design.

Standard Sizes

<table>
<thead>
<tr>
<th>Influent Flow Rate GPM</th>
<th>Tri-Mite</th>
<th>Trident</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>75</td>
<td>100</td>
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<tr>
<td>Tank Dimensions (Shipping)</td>
<td>Length: 9 ft 0 in</td>
<td>9 ft 2 in</td>
</tr>
<tr>
<td></td>
<td>Width: 5 ft 8 in</td>
<td>7 ft 10 in</td>
</tr>
<tr>
<td></td>
<td>Height: 8 ft 5 in</td>
<td>8 ft 6 in</td>
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<tr>
<td>Weights</td>
<td>Shipping (lbs): 6,300</td>
<td>8,100</td>
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<tr>
<td></td>
<td>Operating (lbs): 14,000</td>
<td>20,000</td>
</tr>
<tr>
<td>Tank Connections</td>
<td>Influent: 2 in</td>
<td>3 in</td>
</tr>
<tr>
<td></td>
<td>Effluent: 2 in</td>
<td>3 in</td>
</tr>
<tr>
<td></td>
<td>Backwash Supply: 3 in</td>
<td>4 in</td>
</tr>
<tr>
<td></td>
<td>Waste/Overflow: 4 in</td>
<td>6 in</td>
</tr>
<tr>
<td></td>
<td>Air Wash (Clarifier): 1.5 in</td>
<td>2 in</td>
</tr>
<tr>
<td></td>
<td>Air Wash (Filter): 1.5 in</td>
<td>2 in</td>
</tr>
<tr>
<td>Waste Production</td>
<td>Flushing Flow Rate (gpm): 50</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>Flushing Volume Per Cycle (gal): 500</td>
<td>750</td>
</tr>
<tr>
<td></td>
<td>Mixed Media Per Cycle (gal): 900</td>
<td>1,350</td>
</tr>
<tr>
<td></td>
<td>Filter to Waste Per Cycle (gal): 250</td>
<td>375</td>
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