

Trident[®] HS

Multi-Barrier Package Water Treatment System



WESTECH[®]

 SWIRE WATER

The Trident[®] HS Package Water Treatment System

The Trident HS package treatment system provides multi-barrier protection for difficult-to-treat surface water, groundwater, industrial process water, and tertiary wastewater. The multi-barrier design of the Trident HS package consists of high-rate settling, adsorption clarification, and mixed media filtration.

Individually and collectively, the multiple treatment stages of the Trident HS system maintain superior effluent performance. The multi-barrier process is extremely well-suited for:

Water sources with:

- **High turbidity and color**
- **"Flashy" rivers and streams**
- **Reduction of High TOC/DBP precursors**
- **Cold waters**

Tertiary treatment in:

- **Water reclamation**
- **Phosphorus removal**



Trident HS Design Criteria

	Raw Water	Finish Water
Turbidity (NTU)	< 400	< 0.1
True Color (Pt-Co Units)	< 100	< 5
Combined Turbidity + Color	< 400	
Iron & Manganese (mg/L)	< 10	< 0.3 / 0.05
TOC (mg/L)		50 - 70% Removal
Phosphorus (mg/L)	< 5	< 0.1

Multi-Barrier Protection

Stage 1 - Chemical Conditioning / Tube Settling

Before water enters the treatment unit, coagulant and polymer are added to begin the coagulation and flocculation process. A sludge recycle flow is introduced near the coagulation point to aid in floc formation. This recycle flow also serves to maintain a steady-state solids concentration, minimizing variations in influent solids concentration.

For plants incorporating enhanced coagulation, the tube clarification stage reduces influent solids concentration prior to the Adsorption Clarifier® stage, leaving the majority of coagulated particles in the tube settler clarifier. For cold water conditions, the tube clarifier provides added detention time.

Stage 2 - Enhanced Clarification

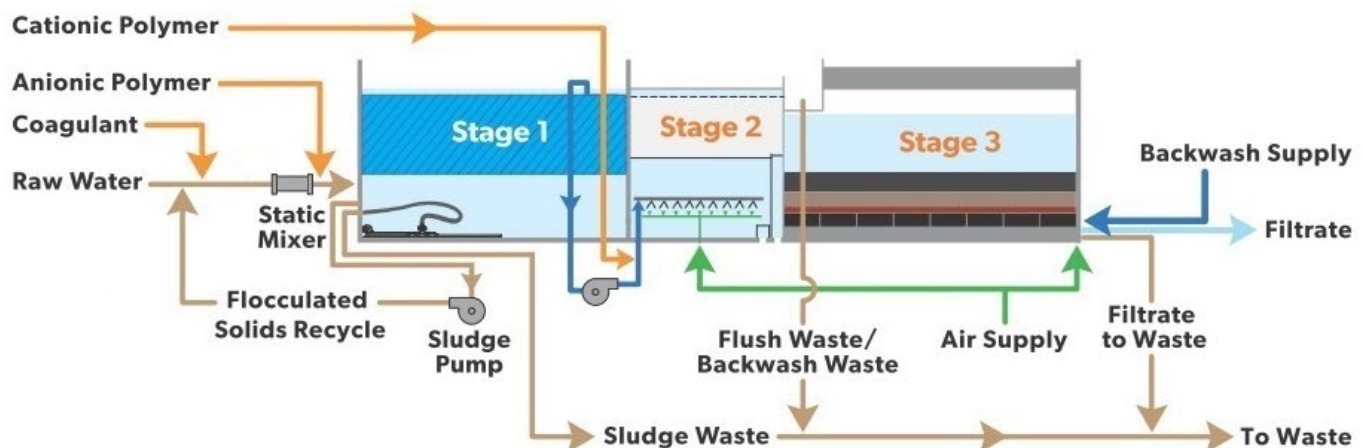
A combined bed of both compressible and buoyant bead adsorption media provides second-stage clarification. The Adsorption Clarifier media further reduces solids prior to filtration. Captured solids are periodically flushed from the clarifier using an air/water combination. Tube-clarified water is used for the flushing process.

Stage 3 - Mixed Media Filtration

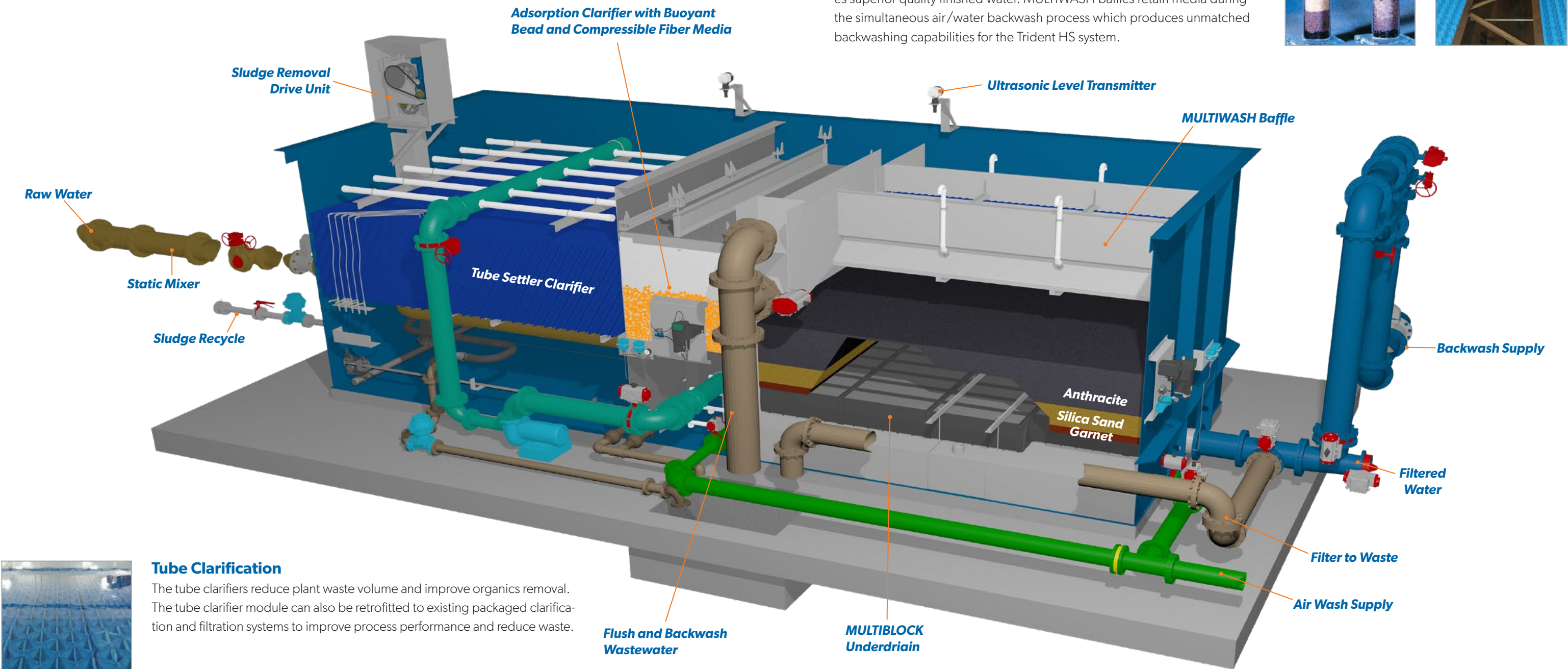
Mixed media filtration removes the remaining solids using a bed of anthracite, sand, and high-density garnet supported by a direct retention underdrain. For improved filtration, the media surface area per volume increases from top to bottom and the backwashing process incorporates simultaneous air/water backwashing and baffled washtroughs to prevent media loss and assure clean media.



Trident HS Process Flow Diagram

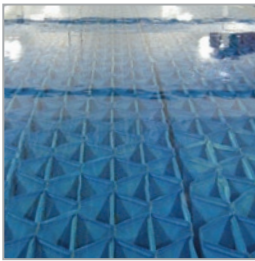
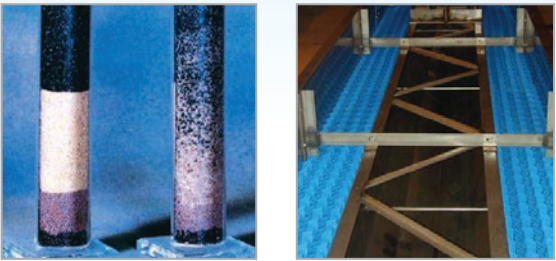


Complete Package Plant



Mixed Media Filtration and MULTIWASH® Baffling

This Microfloc™ pioneered mixed media technology has become the industry standard for filtration. 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. MULTIWASH baffles retain media during the simultaneous air/water backwash process which produces unmatched backwashing capabilities for the Trident HS system.



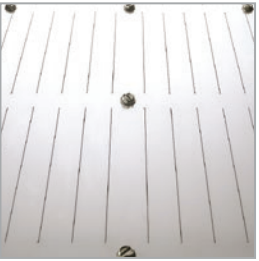
Tube Clarification

The tube clarifiers reduce plant waste volume and improve organics removal. The tube clarifier module can also be retrofitted to existing packaged clarification and filtration systems to improve process performance and reduce waste.



Adsorption Clarifier System

The unique design of the Adsorption Clarifier eliminates the need for settleable floc formation. Therefore, floc size and settling time are not factors. Because of this, Trident systems, as a whole, use significantly less coagulant and polymer than conventional settling clarifiers. 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.



MULTIBLOCK® Underdrain with Laser Shield™

MULTIBLOCK underdrains offer the proven effectiveness of compensating dual lateral underdrain technology, which evenly collects filtered water. The MULTIBLOCK compensating orifice design also uniformly distributes backwash water and air to keep filters running at peak performance.

At less than one-tenth of an inch thick, the Laser Shield design reduces underdrain surface area per filter area by as much as 200 times when compared to porous bead designs, thus minimizing fouling potential.

Trident HS Efficiencies



Space Efficient

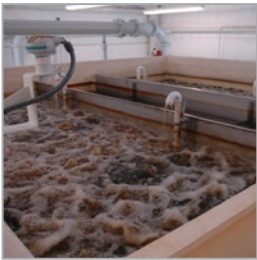
- The package design of the Trident HS system significantly reduces space between different treatment processes in your flow sheet, thus reducing floor space required.
- Operates at higher hydraulic loading rates than conventional systems.

Chemically Efficient

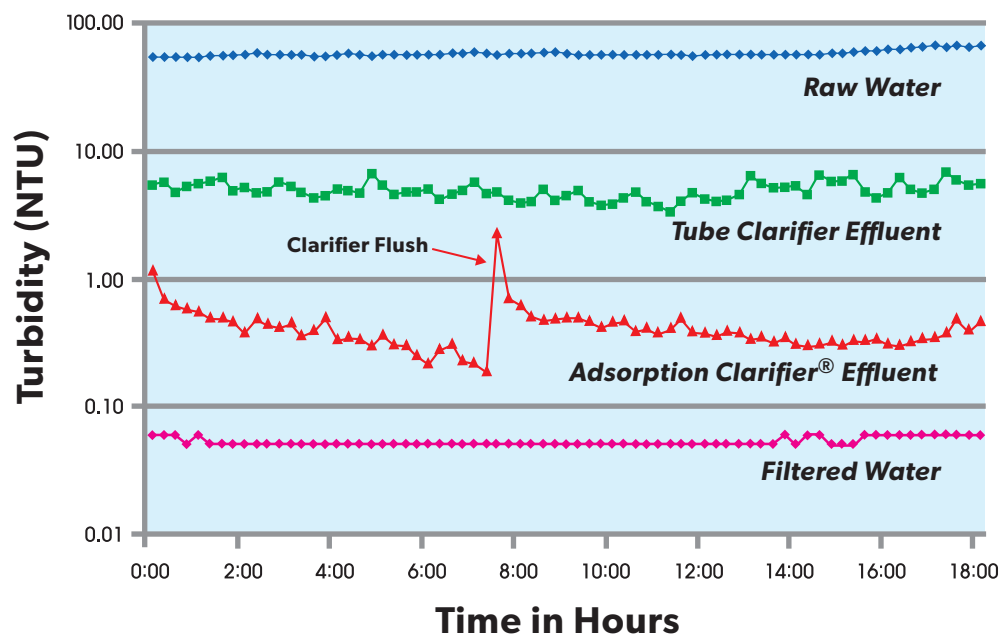
- The Aquaritrol® III process controller uses inlet and outlet turbidity signals to automatically adjust chemical dosage. This results in a more efficient use of chemicals than a simple flow pacing.
- Keeps previously-reacted solids in the system to build floc in incoming water.
- Keeps a high solids inventory in the tube settler to compensate for sudden changes in raw water.
- Reuses partially-reacted chemicals.

Waste Efficient

- MULTIWASH systems provide a sustained air/water backwash at high rates, resulting in a vigorous backwash unmatched in the market.
- Proprietary MULTIWASH troughs retain media in the system.
- Can offer cleanliness and media-loss prevention guarantees.
- Tube settler leads to longer duration between Adsorption Clarifier flush sequences, reducing waste.
- Combined tube settler sludge blowdown, Adsorption Clarifier flush, and MULTIWASH backwash will generally be <5% total waste.



Trident HS System Turbidity Performance



Trident HS Standard Sizes

Trident HS Tank Sizes				
Model	Length	Width	Height	Flow/Tank
HS - 700	21' 6"	9' 0"	10' 0"	350 gpm
HS - 1050	25' 7"	11' 0"	10' 0"	525 gpm
HS - 1400	30' 10"	12' 0"	10' 0"	700 gpm
HS - 2100	36' 1"	15' 0"	10' 0"	1,050 gpm
HS - 2800	47' 9"	15' 0"	10' 0"	1,400 gpm
<i>Stretched models are available for applications that require larger filtration areas.</i>				



Standard Components
Epoxy-coated steel tank
Media
Internals
Actuated and manual valves
Inlet magnetic flow meter
Pressure transmitters
Ultrasonic level transmitter
Turbidimeters
Automated PLC controls
Backwash magnetic flow meter and control valve
Blower package
Transfer pump
Recirculation pump
Chemical feed packages (coagulant and polymer)

Optional Components
Integrated plant PLC controls package
Air compressor package
Interconnecting walkways and platforms
Aluminum or stainless steel tanks
Streaming current monitor

Getting the Right Fit



Trident HS Pilot and Lab Work

Trident HS package treatment pilots are available for onsite test work and can be used in a variety of treatment applications. Pilot testing may follow bench-scale testing as the final step in determining full-scale design and projected performance. WesTech's fully equipped sedimentation/filtration lab performs testing of site-sourced water samples to help determine the appropriate treatment for any given water.

WestTECH[®]



SWIRE WATER

Tel: 801.265.1000
westech-inc.com
info@westech-inc.com
Salt Lake City, Utah, USA

© WesTech Engineering, LLC 2023