

Trident[®] HS Multi-Barrier

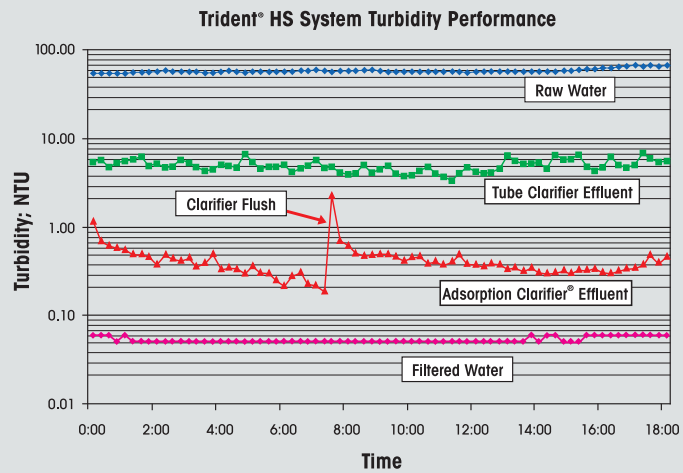
Packaged Water Treatment System

Water Technologies

SIEMENS

Trident® HS System Applications:

- High turbidity and color water supplies
- Variable influent water conditions
- Plants practicing enhanced coagulation treatment
- Cold waters
- Wastewater phosphorus removal



Proven Technology with More Power

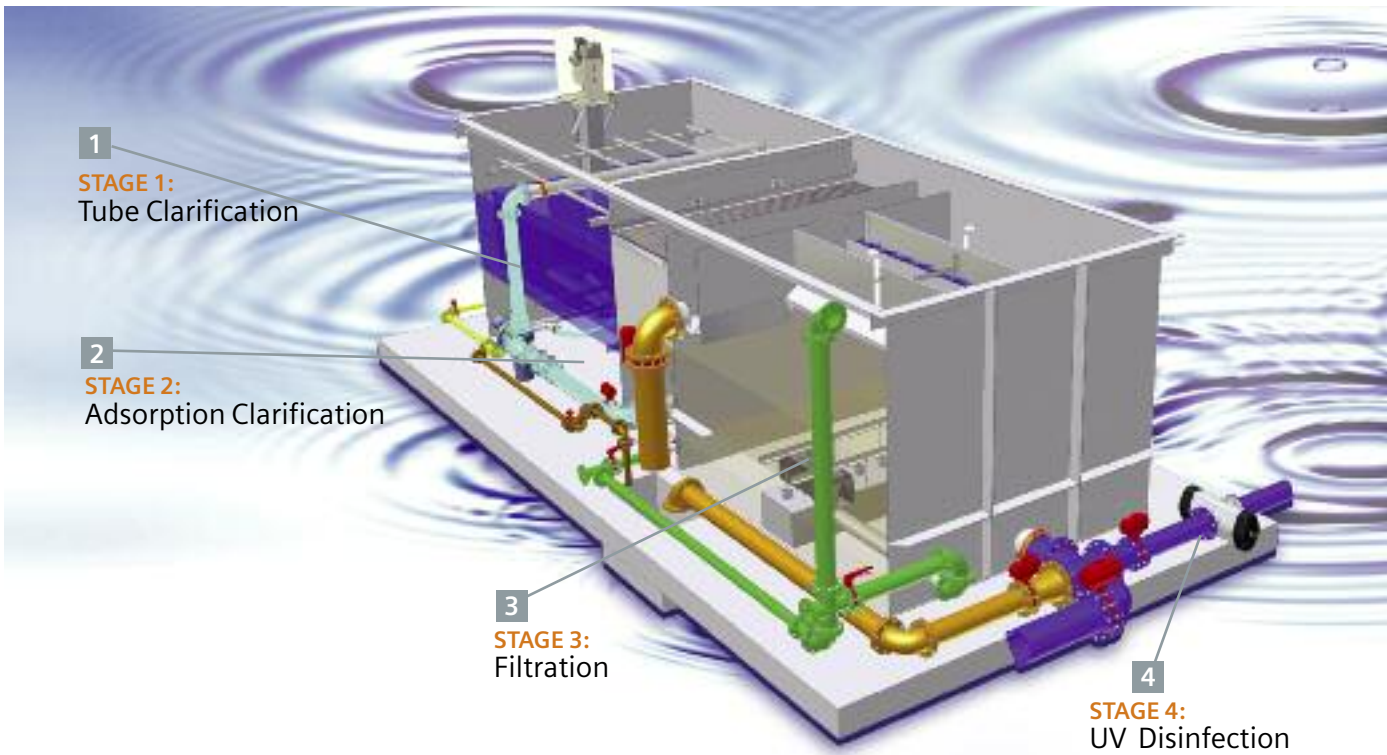
The Trident® HS packaged treatment system provides multiple-barrier protection for surface water, groundwater and industrial process water treatment. The Trident® HS system design, which consists of packaged high-rate settling, adsorption clarification, mixed media filtration and UV disinfection, is the latest improvement of the original Trident® system.

Proven at hundreds of installations worldwide, the Trident® process serves as the basis of the new packaged treatment system. By integrating a specialized high-rate pretreatment tube clarifier for removal of gross solids and a downstream UV disinfection system for final effluent treatment, the unique HS design is complete. Individually and collectively, the four major treatment stages of the new Trident® HS system maintain superior effluent performance. The multiple-barrier process is extremely well-suited for all surface and groundwater applications, including high turbidity and color, variable water conditions, enhanced coagulation operation and cold water conditions.

High Efficiency—Simple Operation

The Trident® HS unit provides consistent performance in a compact footprint without the need for external ballast or specialty chemicals. External sludge recirculation maintains a steady-state solids concentration in the first clarification stage to minimize variations of influent water quality. The second clarification stage ensures a well-conditioned effluent for filtration with the downstream UV system providing the final treatment prior to distribution. Automatic cleaning systems and chemical dosing minimize operator attention.





**Multiple-Barrier Protection:
Stage 1**

Before water enters the treatment unit, coagulant and polymer are added to begin the 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 and to minimize 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 clarifier. For cold water conditions, the tube clarifier provides added detention time. Overall, the tube clarifier reduces plant waste volume and improves organics removal. The tube clarifier module can also be retrofitted to existing packaged clarification and filtration systems to improve process performance and reduce waste.

**Enhanced Clarification:
Stage 2**

A buoyant adsorption media bed 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.

**Filtration:
Stage 3**

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 guarantee clean media.

**Ultraviolet (UV) Disinfection:
Stage 4**

Each unit is equipped with another Siemens Water Technologies Barrier® M UV system—for additional disinfection treatment. The use of UV technology expands the multi-barrier protection offered by the Trident® HS system, ensuring complete inactivation of waterborne pathogens including *Cryptosporidium* and *Giardia*. Unlike chemical disinfectants, UV does not form harmful disinfection by-products. Using a compact in-line design and characterized by a small footprint, the self-contained reaction chamber houses powerful medium-pressure UV lamps and is controlled and monitored by an integrated control system.



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