



Storm King®

Sedimentation, Screening, & Disinfection in One Device

Product Profile

The Storm King® is an advanced hydrodynamic vortex separator that incorporates an optional self-cleaning, non-powered Swirl Cleanse screening system to provide screening to 4mm in diameter. The Storm King® is a proven technology which combines grit removal, primary treatment equivalency (TSS and BOD removal), floatables control and in-vessel disinfection within a single unit process. The system is ideal for satellite or centralized treatment at overflow sites because it is self-activating, has no moving parts and requires no power to separate solids.

Applications

- Floatables control, primary treatment equivalency and disinfection of combined sewer overflows (CSOs) and wet weather induced flows
- Remote or unmanned treatment facilities
- Treatment of excess wet weather flows at centralized facilities or POTWs
- Retrofit or new wet weather treatment facilities
- Preliminary treatment prior to storage or equalization

Advantages

- No power and no moving parts
- Self-activating with a small footprint
- Fine grit removal and primary treatment equivalency
- Combines three unit processes in a single device
- Higher effluent standards can be achieved with the addition of coagulants and flocculants
- Captured material returned to sanitary flow thereby eliminating the need for residuals handling capabilities at remote sites

How it Works

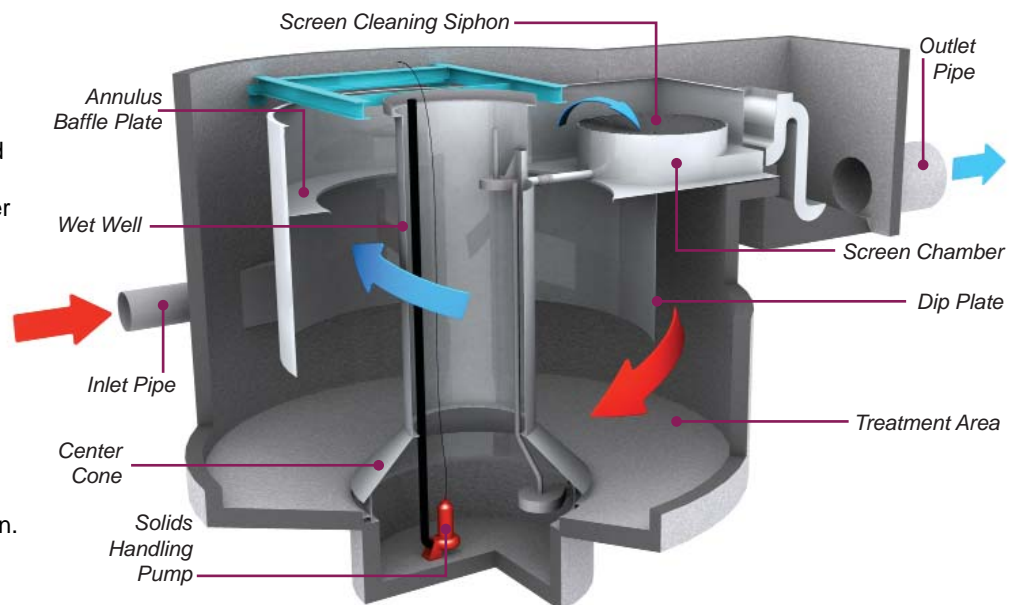
Flow is introduced tangentially into the side of the Storm King® barrel causing the contents to rotate slowly about the vertical axis. The flow spirals down the perimeter allowing solids to settle out by gravity. This process is aided by rotary forces, shear forces and drag forces at the boundary layer on the wall and base of the vessel.

The internal components direct the main flow away from the perimeter and back up the middle of the vessel as a broad spiraling column, rotating at a slower velocity than the outer downward flow. A dip plate locates the shear zone, the interface between the outer downward circulation and the inner upward circulation, where a marked difference in velocity encourages further solids separation. Settled solids are directed to the helical channel located under the center cone and are conveyed out of the main chamber through the underflow outlet.

The flow passes down through the Swirl Cleanse screen which captures all floatables and neutrally buoyant material greater than 4mm in diameter. The air regulated siphon provides an effective backwash mechanism to prevent the screen from blinding. Screened effluent is discharged into a receiving watercourse, a storage facility, or continues on to receive further treatment. (light blue arrow).

The collected screenings and settled solids from the underflow are pumped or gravity fed from the base of the unit and returned to the sanitary flow to continue on to the wastewater treatment facility.

Bacteria reduction is achieved within the Storm King® by introducing chemicals such as Sodium Hypochlorite, Peracetic Acid, or Chlorine Dioxide into the upstream diversion structure or into the inlet pipe of the vessel. The spiraling action integral to the system combined with the predictable flow path of the separator allows the unit to combine its solids and grit removal duties with disinfection. Dechlorination (if applicable) is performed at the discharge of the siphon.



Performance



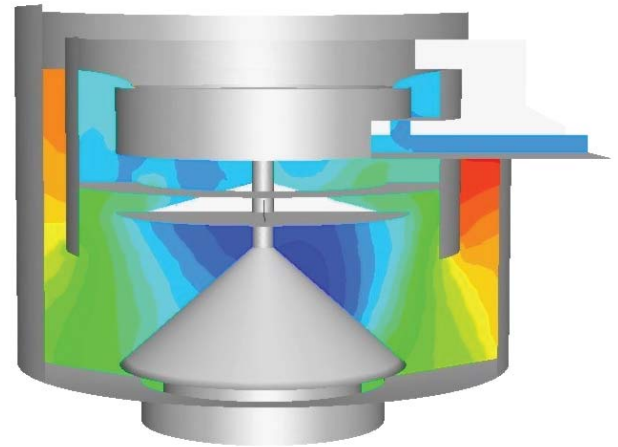
- Screening to 4mm in diameter
- Proven high rate disinfection in less than 8 minutes

Disinfection



The Storm King® has a long history of providing protection to watercourses. However, it is not widely known that the Storm King® can provide solids removal and disinfection in the same vessel. Taking advantage of the separator's complex flow paths created by the unique internal components, the Storm King® can provide excellent efficiencies while occupying less than 30% of the area required for conventional disinfection solutions.

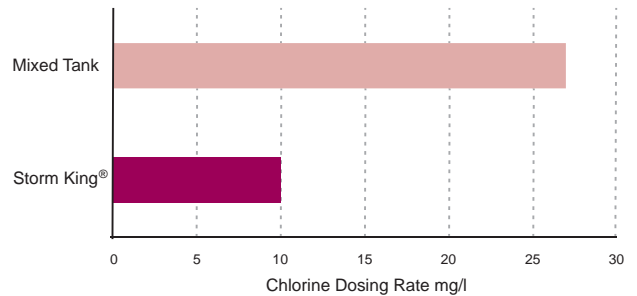
The Storm King® is able to achieve 3 to 4 log kills of total or fecal coliform bacteria within an 8 minute hydraulic retention time and handle commonly available disinfectants such as Sodium Hypochlorite, Peracetic Acid, or Chlorine Dioxide.



CFD simulation showing predicted fecal coliform kills in Storm King® (survival color code: Red is alive and blue is dead).



Chlorine Dosing Rate Comparison



 <p>Storm King® 5,600 gal</p>	<p>Mixed Tank 17,360 gal</p>
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Comparisons of Disinfection Area Required for Storm King® and Conventional Disinfection Tanks



Maintenance



The Storm King® with Swirl Cleanse has no moving parts and typically requires no higher maintenance commitment than the sewer system in which it is placed.

The maintenance requirement is dependent upon the influent characteristics, which in turn are dependent upon the nature of the contributing system.

Once the device has been brought on-line, the Storm King® and Swirl Cleanse screen should be visually inspected after the first two spill events. After the initial inspections, visual inspection of the equipment should be carried out twice per year, or as deemed appropriate for the location.