

Hydro Vortex Drop™ Shaft

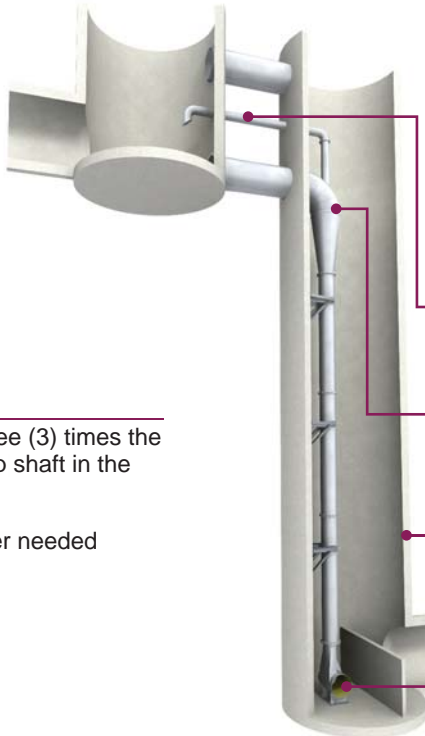
Energy Dissipating Flow Control

Product Profile

The Hydro Vortex Drop™ Shaft, is a self-activating energy dissipation system with no moving parts, designed to safely drop water or sewage from virtually any height in order to prevent noise, vibration, and infrastructure damage.

Applications

- Controlled drop of flow into deep tunnels
- Odor and corrosion control
- Flood control
- Combined / sanitary sewer systems
- Stormwater systems



Advantages

- Self-activating with no moving parts
- Irtthane coated components resist abrasion
- No air vents or auxiliary maintenance shafts
- Efficient, safe, controlled, and quiet
- Flexible design can accommodate multiple pipes in a single structure
- Fully enclosed system aids visual inspection to facilitate maintenance

Key Components

Air Switch - Controls the amount of air entering into the falling flow from the Drop Pipe to eliminate 'glugging' and therefore the damaging effects of water hammer or hydraulic shock.

Top Bend - Safely transitions the flow into the vertical section of the pipe. A taper may be required depending on site circumstances.

Drop Structure - A full depth chamber housing the Drop Pipe, a control weir, maintenance access and the outlet structure

Energy Dissipation Unit - Developed using the latest scientific techniques, this component is designed to disperse the energy created by falling water in addition to effectively preventing erosion and controlling the onward flow.

Performance

- Design allows up to three (3) times the flow of a traditional drop shaft in the same pipe size
- No de-aeration chamber needed

How it Works

Flows enter the system via the main horizontal inlet, around the carefully designed top bend and, if appropriate, taper. After dropping the desired height, flow enters into the Energy Dissipation Unit before continuing downstream.

The Hydro Vortex Drop™ Shaft uses a unique Air Switch to enable a safe transition into the full pipe mode where it can operate at maximum capacity without the need for an air core. This allows it to accommodate as much as three times the flow as compared to a traditional drop shaft solution in the same pipe size.

The Hydro Vortex Drop™ Shaft system's simple design facilitates easy retrofit into existing chambers while its integrated access and small pipe sizes reduce excavation cost and shaft diameters and eliminate the need for a separate access / vent shaft. The system also benefits from a compact and simple to construct inlet chamber with no complicated curves or benching.

Odor & Corrosion Control

The Hydro Vortex Drop™ Shaft unit's wide range of operation in the air entrained flow mode combined with the enhanced and powerful mixing at the outlet by the energy dissipation unit ensures rapid oxidation of flow to prevent the release of noxious gases such as H₂S.

Small Pipe Size Results in Cost Savings

Traditional vortex drop shaft designs require the preservation of a finite sized air core while maintaining a specific terminal velocity of the water over a wide range of flows for proper operation. The resulting effect is oversized drop shafts with complicated influent structures and separate air vents to transfer entrained air out of the structure.

Modes of Operation



Air Entrainment Mode

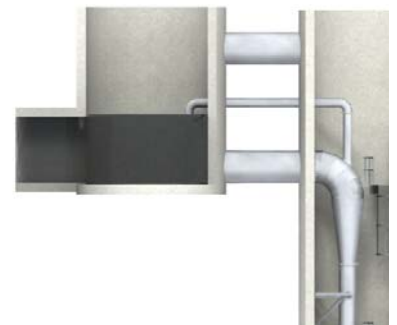
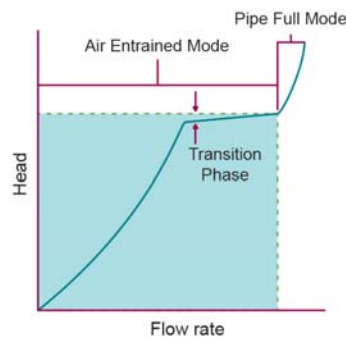
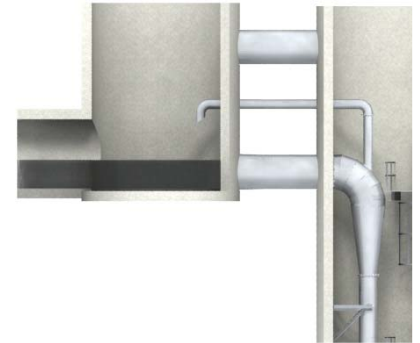
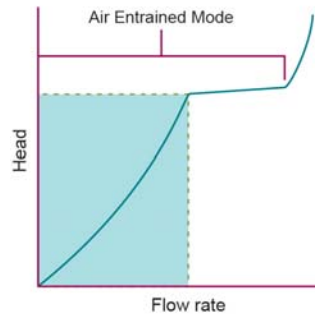
At low flow water passes through the Hydro Vortex Drop™ Shaft inlet pipe and drops as a film, maintaining contact with the inside surface of the drop pipe. This results in the formation of a central air core through the drop pipe. Water then enters the top of the Energy Dissipation Unit and exits the system through the side openings into the bottom of the drop chamber. A weir at the bottom of the chamber creates a stilling area to absorb the energy from the water exiting the Energy Dissipation Unit. This ensures a smooth operation with minimal turbulence. At increased flows, the water level in the inlet chamber submerges the inlet pipe of the Hydro Vortex Drop™ Shaft. At this stage, air is fed into the Hydro Vortex Drop™ Shaft via the Air Switch, maintaining the stability of the air core and a smooth flow regime.

Pipe Full Mode

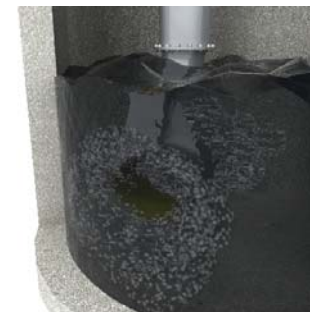
If the flow rate continues to increase, the water in the upstream inlet chamber rises until it begins to enter the transition to Pipe Full Mode. At this stage any increase in flow has a much lower impact on the upstream water level due to the high flow capacity during Pipe Full Mode. The Air Switch is designed to smoothly and efficiently regulate the transition phase, eliminating any glugging and vibrations, until Pipe Full Mode is reached completely and there is no more air flow through the system.

Energy Dissipation Unit

The Energy Dissipation Unit was specifically designed to minimize the damage that can be caused by falling water and also to avoid the effects of cavitation. During Air Entrainment Mode air is carried down the shaft and released in the outlet chamber to ensure that water hammer cannot occur. During Pipe Full Mode no air is carried and therefore the drop pipe can operate at full capacity pulling water from the inlet chamber until air is introduced.



Energy Dissipation Unit during Air Entrainment Mode



Energy Dissipation Unit during Pipe Full Mode

Hydro Vortex Drop™ Shaft Design



Configuration

The Hydro Vortex Drop™ Shaft is completely configurable and can be designed to suit either the smallest flow or the longest drop. Its compact nature means that two or more shafts can fit into the same chamber, further enhancing its versatility and ensuring the best solution can be found for each project.

Construction

The Hydro Vortex Drop™ Shaft is constructed from durable and corrosion resistant stainless steel. Furthermore the inlet bend, reducer, and Energy Dissipation Unit are treated with an Irathane coating to protect them from wear and ensure an extremely long component life.

