

Hydro-Brake[®] Drop



**Energy Dissipating
Flow Control**

Engineered by Hydro International

Hydro-Brake® Drop

Protect your infrastructure from water hammer caused by dropping water from heights.

The Hydro-Brake® Drop 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.



Performance

- Design allows up to three (3) times the flow of a traditional drop shaft in the same pipe size

Applications

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

Benefits

- Self-activating with no moving parts
- 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
- No de-aeration chamber needed
- No separate vent chamber required

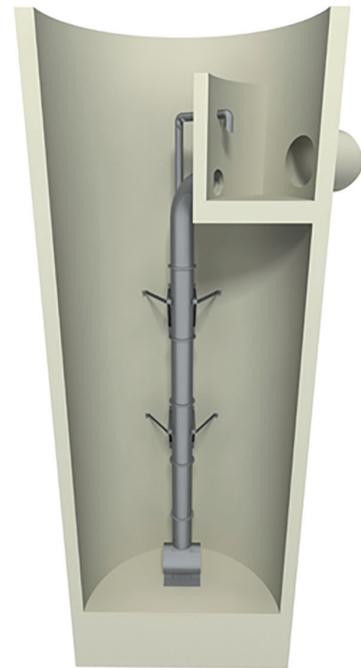
Hydro-Brake® Drop Design

Configuration

The Hydro-Brake® Drop 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-Brake® Drop 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.



Integral inlet chamber allows for a smaller footprint

Visit the Hydro-Brake® Drop Design product page to learn more. [Hydro-Brake® Drop](#)



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.

Engineered by Hydro International, the Hydro-Brake® Drop 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-Brake® Drop 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-Brake® Drop 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

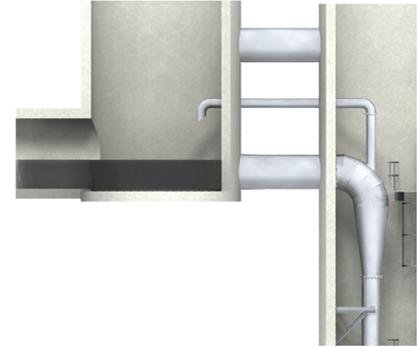
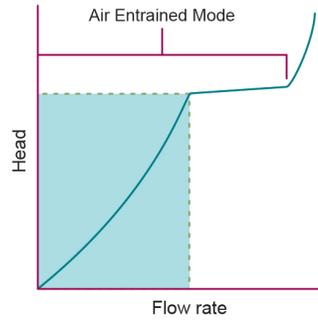
Traditional vortex drop shaft designs require the preservation of a finite sized air core while maintaining a specific terminal velocity of the water over a wide range of flows for proper operation. The resulting effect is oversized drop shafts with complicated influent structures and separate air vents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



Modes of Operation

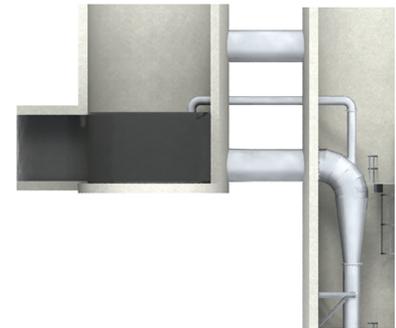
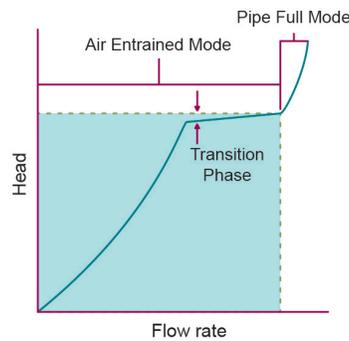
Air Entrainment Mode

At low flow water passes through the Hydro-Brake® Drop 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 release of 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-Brake® Drop. At this stage, air is fed into the Hydro-Brake® Drop 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.

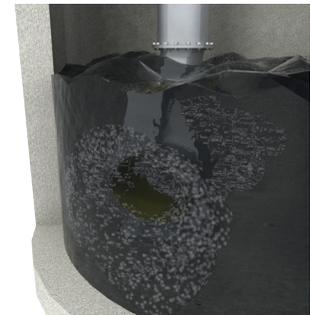


Energy Dissipation Unit

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 Pipe Full Mode



Energy Dissipation Unit during Air Entrainment Mode

Hydro-Brake® Drop Key to Undersea Sewage Line

Owner

Swansea, Wales Waterfront

Hydro Equipment Profile

Self-activating system

No moving parts

Space-saving design

Avoids noise and vibration that could damage network infrastructure

Objective

To convey sewage 46 feet (14 m) from street level down to the existing main sewage line below the water level in the dock.

Solution

The Hydro-Brake® Drop technology dissipates the energy of the falling liquid and protects the surrounding infrastructure from undue stresses, delivering an economical solution in terms of time, space and cost.

Background

As part of the \$270 million development of the Swansea docks known as SA1 Swansea Waterfront, a two-year sewage infrastructure redevelopment was undertaken by Welsh Water. Welsh Water's challenge to upgrade the sewage infrastructure within the multi-million dollar Swansea Waterfront re-development was facilitated with an innovative Hydro-Brake® Drop solution.



The Problem

Raw sewage needed to be conveyed down a 46' (14 m) drop in a constrained space within the former Prince of Wales Dock as part of an innovative and cost-saving solution, which enabled construction within a tight 14-week project window.

The Solution

The solution recommended to Welsh Water involved installing the Hydro-Brake® Drop in an existing 13' (4 m) bore access shaft within the dock. The Hydro-Brake® Drop takes the sewage 46' (14 m) from street level down to the existing main sewage line below water level in the dock.

The Hydro-Brake® Drop uses a hydrodynamic vortex to dissipate the energy of the falling liquid and protect the surrounding infrastructure from undue stresses. This solution was much more economical in terms of time, space and cost than trying to incorporate a new cascade or other alternative in the dock.

At Swansea, the 6" (150 mm) bore Hydro-Brake® Drop is designed for a maximum flow volume of 310 gpm (20 L/s). It is sited in a 13' (4 m) bore foul access shaft which had been located in the dock structure to access the sewage outflow pipeline installed following renewal of the area's sewage infrastructure in the 1990s.

The main sewer is now around 26' (8 m) below the mean tide level which complicated the overall installation. The Hydro-Brake® Drop was installed during a 14 week window within the two year sewage infrastructure project. Meticulous planning between the consulting engineer and Hydro International (now a part of Oldcastle Infrastructure) enabled the success of the installation.

In addition to the supply of new equipment, the expert equipment service teams provided plant condition assessment and planned maintenance programs for a wide range of water and wastewater treatment equipment through tailored Service Agreements to meet site specific needs.



Hydro-Brake® Drop Water Energy Dissipation System



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