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Duckbill Check Valve Design And Backflow Prevention

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Check valves are engineered to allow the flow of fluid across a pipeline system or port in one direction only. They are reactive valves, meaning that they are activated by the amount and the pressure of the fluid present in the system environment. These valves are typically used in backflow prevention applications, flood prevention environments, and wastewater treatment entities.

In 1984, the Environmental Protection Agency (EPA) commissioned the testing of a new kind of check valve; one that stood out as a clear alternative to flapgate valves. The new valve featured a duckbill-shaped inner elastomer sleeve that responded keenly to changes in fluid pressure. The valve sleeve closed in response to backflow pressure, forming a tight seal that blocked debris from entering waterways.

Further testing proved that the duckbill-shaped design also offered superior performance in pollutant entrapment, durability, the stopping of leakage, and various self-cleaning capabilities. Now, the duckbill elastomer check valve is routinely used in backwater prevention and waterway applications. The curved shape of the interior valve bill can regularly achieve a tight closed position, providing an excellent seal against debris in backflow applications. Various duckbill models have been engineered for low pressure applications, and for pollution prevention efforts on larger waterways.

How does a check valve work?

Check valves are designed to respond to pressure differences. Throughout the life cycle of the valve, there are instances where the pressure of the fluids traveling through the valve is greater than the pressure across the valve mechanism. The force of upstream water creates high differential pressure across the interior valve body, so the valve opens, allowing forward streams to pass through. However, back-flowing water lowers differential pressure across the valve body, so the duckbill elastomer valve flexes closed, sealing debris out.

Modern valves are engineered to respond to modest pressure changes. These newer valves respond to slight changes in differential pressure from forward- or backflow, making them useful for a variety of environments. Unlike check valves with metal components, such as disc check valves, duckbill elastomer valves require significantly less maintenance – they lack interior metal components that can rust or become corroded.

For what applications might check valves be used?

Duckbill valves can be used in a variety of wastewater, stormwater, and backflow prevention applications. One excellent case study involved a large, well-known retail store in St. Petersburg, FL. This store had a large retention pond, or man-made pond designed to collect rainwater. The pond was decorated with fresh water vegetation, as are many retention ponds in this part of the American Southeast. The pond was fitted with three drainage pipes that terminated in Tampa Bay.

Turbulent weather proved to be a problem for this store. During periods of heavy rain and high tides, the waters of Tampa Bay reverse-flowed into the pond, causing the vegetation to wither and die. The pond was fitted with three 36-inch check valves. Since these valves responded to subtle pressure differentials, they proved to be an excellent solution in preventing salt water

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backflow.

Duckbill valves are suitable for a variety of other applications, as well. Some models are ideal for manhole and end-of-pipe outfall installations. Others are installed for the purposes of sewer system control and sewer backflow prevention. Still others are used for stormwater control, as the retail store case study illustrates; or, for wastewater treatment applications. Certain duckbill models can be used in industrial applications, such as corrosive slurry handling, caustic chemical applications, and high-temperature chemical reactions.

The design and structure of duckbill check valves make them widely applicable in pressured fluid environments. The elastomer bill design is low-maintenance, rust-free, and can be highly responsive to very subtle pressure changes across line fluid. These valves do not require a power source or any exterior action to operate. As a result, they are highly versatile and highly durable.

Tideflex Technologies, a division of Red Valve Company, Inc., engineers a variety of [duckbill check valves](#) for backflow prevention applications. In addition, this company offers a complete line of [inline check valves](#), potable water mixing systems, and air diffusers. Visit Tideflex Technologies online at tideflex.com.

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