

Why do we need to control air in Waste Water Systems?

Eng. Naftali Zloczower, Civil Engineer

The importance of proper control of air in waste water systems is not sufficiently recognized by many designers and operators. Control of air in the systems is very important and, both, the presence of air, and its absence, depending on the circumstances, can cause severe problems and damages.

Some of the problems and damages due to presence of air in pipelines are:

1. Impedance of flow in pipelines – obstruction up to complete stoppage, at times.
2. Serious head losses and, thus, energy losses.
3. Water Hammer damages to pipes, accessories, fittings, etc’.

4. Corrosion and cavitation.
5. Physical danger to operators from air-blown flying parts and from very strong streams of high velocity, escaping air.

Some of the problems and damages due to the absence of air, when and where it is needed, are:

1. Vacuum enhanced problems and damages
2. Pipe or accessory collapse, due to subatmospheric (negative) pressures.
3. In some cases, the absence of an air cushion can increase the damages of surge and slam phenomena.

The most efficient way to control air in

Waste Water Systems is by proper, rational use of AIR VALVES that are admitting and releasing large quantities of air when needed, and releasing air continuously when the lines are pressurized.

A.R.I. FLOW CONTROL ACCESSORIES, one of the world’s leading manufacturers of air valves, have developed an innovative air valve, especially suited for the waste water systems needs.

Regular air valves are not suited for wastewater (sewage) and for liquids containing suspended and/or dissolved solids that can cause a build-up on seals



Sewage pumping station “Hefer” project



D-025 installation in sewage treatment plant

(salt, etc'). Solids and/or build-up that cling to seals and sealing mechanism can cause leaking and/or damages.

In order to enable air valves to function properly and efficiently, the liquid carrying solids, or harmful chemicals, should be kept away from the sealing mechanism.

In the traditional sewage air valve, this was achieved by forming a pipe-like body, adding a second float connected to the first float by means of a rigid rod and increasing the distance between the intake opening and the discharge opening and sealing mechanism.

A manifold installation on a sewage main



Following, are some of the ways the A.R.I. MODEL D-020 waste water combination valve overcomes the problems experienced in the traditional sewage air valve .

1. The inverted cone-shaped body of the D-020 provides ample free space between the float and the body walls to prevent clogging and trapping of the float.
 2. The walls of the inverted cone-shaped body of the D-020 are slanted outward, thus, preventing dirt and solids to build up layer by layer on the walls, and from trapping the float and clogging up the valve. Under most conditions, dirt and solids drop down from the valve walls, and are guided, by the funnel-shaped bottom, back to the pipeline.
 3. The inverted cone-shaped body of the D-020 provides a very large initial air pocket. Since the area around the float is very large, it enables the air pocket to compress horizontally, as well as vertically, thus limiting the upward rise of the water level within the valve, under pressure. Water level does not rise to a level which allows sewage or dirt to splash and reach the seals or sealing mechanism.
 4. In the D-020, the rod that is connected to the float at the rod's bottom, is not directly connected to the top sealing mechanism.
- The top of the rod has a relatively large free space in the top float, in which to move freely, without lifting the top float. In this way, the bottom float can jump and swing under turbulence, without causing the seal to open, releasing air, and depleting the air pocket. Thus, the air pocket is guarded and sustained, keeping the sewage and dirt away from the sealing mechanism.
5. Due to the cavity in the top float, allowing freedom of movement, and due to the shock absorption provided by the spring, the flexibility of the rod connection prevents breakage.
 6. In addition to the above mentioned features, the D-020 has all the advantages of the D-040 combination air valve:

- Patented rolling seal mechanism that

dramatically reduces the possibility of obstruction by debris.

- One size orifice for a wide pressure range.
- Self cleaning mechanism.
- Dynamic design allows high velocity air discharge while preventing premature closing.
- One way options.

More about A.R.I.'s air valves for waste water:

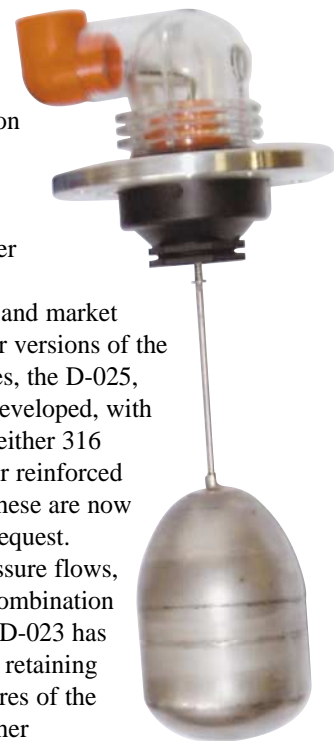
The D-020 is available in SAE 316 Stainless Steel to handle more corrosive wastewater. A special model is available, which can be used in mining applications, where extremely corrosive chemicals are used. This model, in addition to the 316 St features special, highly resistant plastic and rubber components.

Due to public and market demands, shorter versions of the sewage air valves, the D-025, were specially developed, with bodies made of either 316 Stainless Steel or reinforced nylon. Both of these are now available upon request.

For higher pressure flows, an innovative combination air valve model D-023 has been developed, retaining the special features of the D-020, with higher discharge flow rate.

It has a unique patented external lever that prevents contact between the sewage and the sealing mechanism and eliminates orifice clogging by floating solids, ensuring a drip tight seal.

The external system, allows for the levers and pins to be situated outside of the air valve body and away from it's corrosive atmosphere.



The air valve mechanism system

Circle 3 ON READER ENQUIRY SERVICE

