increased risk of scaling as well as unwanted microbial growth. Additionally, some components of the dispenser may be more sensitive to chemical compatibility. For example, it is desirable to protect the blackflow prevention device from contact with the solution. It is therefore desirable to quickly remove as much excess solution as possible after use both upstream and downstream from the solid product chemistry.

One way to remove excess solution is to do so automatically. Current apparatuses, methods and systems that automatically remove excess solution have long drainage times. Long drainage times negatively impact the consumer experience. These long drainage times can be caused by systems that have a relatively large footprint in the dispenser.

Current ways to evacuate a dispenser after the inlet fluid is turned off include floats, balls or umbrella valves. These systems are typically large relative to the surrounding components. They are also typically complex, making manufacturing and installation both difficult and expensive. It is therefore desirable to have a small footprint system to drain excess solution which is easier to manufacture and lower in cost.

Current small footprint valves typically operate by opening upon the application of pressure. For example, as shown in Publication EP1958883B8 filed by Avesto Tech B.V., a typical dispensing valve may have a flexible membrane which is deformable from a closed position to an open, dispensing position upon application of pressure to the fluid in the container. While such a valve may work for dispensing applications, its typically closed position is counter to the operation of a drain, which preferably has a typically open position. It is therefore desirable to have a system, apparatus and method that will have a small footprint, but work in drainage systems.

Therefore, there exists a need in the art for an apparatus, method and system for draining excess solution which addresses these problems.

SUMMARY OF THE INVENTION

Therefore, it is principal object, feature, and/or advantage of the present disclosure to provide an apparatus that overcomes the deficiencies in the art.

It is another object, feature, and/or advantage of the present disclosure to provide an apparatus, system and method to drain solution from the dispenser supply lines.

It is yet another object, feature, and/or advantage of the present disclosure to provide an apparatus, system and method to drain solution from the dispenser supply lines which is efficient and removes as much excess solution as possible.

It is still another object, feature, and/or advantage of the present disclosure to provide an apparatus, system and method to drain solution from the dispenser supply lines which works automatically.

It is a further object, feature, and/or advantage of the present disclosure to provide an apparatus, system and method to drain solution from the dispenser supply lines quickly.

It is still a further object, feature, and/or advantage of the present disclosure to provide an apparatus, system and method to drain solution from the dispenser supply lines in a small footprint relative to the other components in the dispenser.

It is yet a further object, feature, and/or advantage of the present disclosure to provide an apparatus, system and method to drain solution from the dispenser supply lines which is easier to manufacture than today's systems.

It is another object, feature, and/or advantage of the present disclosure to provide an apparatus, system and method to drain solution from the dispenser supply lines which is lower in cost than today's systems.

These and/or other objects, features, and advantages of the present disclosure will be apparent to those skilled in the art. The present disclosure is not to be limited to or by these objects, features and advantages. No single embodiment need provide each and every object, feature, or advantage.

In an aspect, there is provided an apparatus for controlling the flow of a fluid, the apparatus comprising: a fluid supply source; a fluid supply line in communication with the fluid supply source, wherein the fluid supply through the fluid supply line can be turned on or off; a downstream supply line; a single piece three-way elastomeric valve secured ahead of the downstream supply line, the elastomeric valve including: a moveable first wall, the moveable first wall having a first position when the fluid supply is on and a second position when fluid supply is off; a second wall connected to the moveable first wall, the second wall engaging a drain sealing surface when the first wall is in the first position; a drain in fluid communication with the downstream supply line when the moveable first wall of the elastomeric valve is in the second position.

In another aspect, there is provided a method of controlling the flow of fluid to a solid product chemistry, the method comprising: turning on a supply of fluid to a fluid supply line; deforming an elastomeric valve secured between an upstream portion of the fluid supply line and a downstream portion of the fluid supply line, the deformation of the elastomeric valve sealing a drainage path; turning off the supply of fluid to the fluid supply line; opening a drainage path by allowing the elastomeric valve to return to an original position; and draining excess fluid from the downstream portion of the fluid supply line.

In another aspect, there is provided a dispenser system for creating a solution by dissolving a solid product chemistry in a fluid, the dispenser system comprising: a dispenser housing; a fluid inlet connected to a fluid supply source; a product support grate; a solid product chemistry supported on the product support grate; a fluid supply line, the fluid supply line including an upstream portion in communication with the fluid inlet and an downstream portion directing fluid towards the solid product chemistry, wherein the fluid supply through the fluid supply line can be turned on or off; and a drainage component in fluid communication with the fluid supply line, the drainage component including: a drain channel leading to a drain, the drain channel defined by an inner wall and an outer wall, the inner wall including a sealing surface; and a single piece three-way elastomeric valve, the elastomeric valve including: a moveable first wall, the moveable first wall having a first position when the fluid supply is on and a second position when fluid supply is off; and a second wall connected to the moveable first wall, the second wall engaging a drain sealing surface when the first wall is in the first position.

According to an embodiment of the invention, an apparatus for controlling the flow of a fluid is provided. The apparatus includes a fluid supply source and a fluid supply line in communication with the fluid supply source. The fluid supply through the fluid supply line can be turned on and off. The fluid supply line is operatively connected to a downstream supply line.

A single piece three-way elastomeric valve secured ahead of the downstream supply line, the elastomeric valve preferably includes a moveable first wall, the moveable first wall having a first position when the fluid supply is on and a second position when fluid supply is off. The elastomeric valve also includes a second wall connected to the moveable first wall, the second wall engaging a drain sealing surface when the first wall is in the first position.

The single piece three-way elastomeric valve preferably also includes an outer flange portion, an inner face portion and a hinge portion between the outer flange portion and the inner face portion. The inner face portion includes a front surface, a rear surface and a wall extending downstream from the rear surface of the inner face portion. The wall may be in the shape of a ring, may be a portion of a ring, in sections or otherwise shaped as desired, so long as the wall is capable of forming a seal with the drain sealing surface.

A drain is included where the drain is only in fluid communication with the downstream supply line when the moveable first wall of the elastomeric valve is in the second position. The drain preferably is a plurality of open holes located in a drainage component, but may be a single hole sized appropriately to accommodate the desired drainage. The drain may be formed in the downstream supply line, the fluid supply line or in a separate drainage component which is then secured between the fluid supply line and the downstream supply line.

In this manner a method of controlling the flow of fluid to a solid product chemistry is provided. Generally, the method includes turning on a supply of fluid to a fluid supply line. The pressure created by the flow of fluid on the elastomeric valve deforms the elastomeric valve secured between an upstream portion of the fluid supply line and a downstream portion of the fluid supply line, the deformation of the elastomeric valve thereby sealing a drainage path. By turning off the supply of fluid to the fluid supply line, the drainage path is opened by allowing the elastomeric valve to return to its original position and thus draining excess fluid from the downstream portion of the fluid supply line as well as the upstream portion up to the backflow prevention devide. By evacuating the upstream portion to the backflow device, the present disclosure protects the flow control device by minimizing potential for exposure to any chemistry solution and thereby minimizing the need to worry about chemical compatibility with such parts.

To further minimize costs, the fluid supply line is preferably assembled by securing the upstream portion of the fluid supply line to a first side of a drainage component and securing the downstream portion of the fluid supply line to a second side of a drainage component. The elastomeric valve is preferably inserted into the drainage component prior to assembling a fluid supply line. Preferably, the elastomeric valve centers itself upon insertion into the drainage component.

The apparatus accomplishing this method can be incorporated into a dispensing system. For example, a dispenser according to the present disclosure preferably includes a dispenser housing, a fluid inlet connected to a fluid supply source, a product support grate, a solid product chemistry supported on the product support grate and a fluid supply line. The fluid supply line preferably includes an upstream portion in communication with the fluid inlet and a downstream portion directing fluid towards the solid product chemistry. The fluid supply through the fluid supply line can be turned on or off.

A drainage component is in fluid communication with the fluid supply line and preferably includes a drain channel leading to a drain, the drain channel defined by an inner wall and an outer wall. The inner wall preferably has a sealing surface approximate a single piece three-way elastomeric valve. A preferred embodiment of the elastomeric valve includes a moveable first wall, the moveable first wall having a first position when the fluid supply is on and a second position when fluid supply is off and a second wall connected to the moveable first wall, the second wall engaging a drain sealing surface when the first wall is in the first position.

The elastomeric valve includes an orifice through which fluid may flow. When the pressure of the fluid on the elastomeric element increases, the second wall of the elastomeric valve engages the drain sealing surface. Generally, the orifice is circular, but preferably also includes radially extending slots. The elastomeric valve is preferably a fluoroelastomer to ensure both flexibility and resistance to a variety of chemical products.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a cross-sectional view of an embodiment of a dispenser.

Figure 2 is a close up view of a portion of the cross-sectional view of Figure 1.

Figure 3 is a perspective view of the front of an elastomeric valve according to an embodiment of the present invention for use in a dispenser such as shown in Figures 1 and 2.

Figure 4A is a cross-sectional view of the elastomeric valve of Figure 3 in the open drainage position.

Figure 4B is a cross-sectional view of the elastomeric valve of Figure 3 in the sealed position.

Figure 5 is a rear view of the elastomeric valve of Figure 3.