

High Performance Ball Valve Technology: The 3 Piece Fire Safe Valve

Three piece fire safe valves offer a superior quality, rugged, and universal multi-purpose valve for all fluids. It is ideal for saturated or superheated steam, slurries, semi-solids, and corrosive services in repetitive industrial, chemical, petrochemical, power, gas, paper and original equipment applications.

By Bob Donnelly, Vice President of Business Development, Flo-Tite Valves & Controls

The popularity of the three piece valves arises from their ability to provide a number of features that benefit the user. Some of the primary benefits include:

- Ease of maintenance.
- Multiple combinations of different end connections.
- A variety of seat options. For example, 50-50 seating materials of Teflon and granular stainless steel are available. This type seat provides increased strength and temperature capabilities that allow for an increase the pressure rating to 3,000 PSI. This material provides a harder seat, but does not increase the overall torque of the valve.
- Weld-in-place capabilities.
- It can be offered as a 2,250 PSI WOG standard valve.
- Full port, as well as standard port options, are available. Standard port valves can be 'up rated' to 3,000 PSI for sizes through one inch.
- This type valve seat offers many of the same features and temperatures of metal seated valves and can still offer a full bubble tight shut off.

Advantageous Features

While all valve castings are investment cast, the bodies can be made of either stainless steel 316 CF8M with weld ends of 316 CF3M, or WCB A216 carbon steel. The ball and stem likewise can be 316 SS on stainless steel bodied valves or 304 SS or 316 SS on carbon steel bodies. Typically, stainless valve castings are solution annealed/normalized for the highest quality and added strength.

Valve stems are offered as 17-4 PH to handle various valve pressures. A blow out proof stem shoulder with a 45 degree bell shaped slope can be provided to offer a greater sealing surface effectively blocking all leak paths during rotation.

Valve balls can be precision machined and mirror finished for bubble-tight shut-off with low operating torque. They have the added feature of a hole in the stem slot of each ball to equalize pressure between the body cavity and the line media low, when the valve is in the open position. Other optional features, such as a vented ball for a positive release to the upstream side, are available to ensure that the bypassing of the upstream seat can be achieved through a hole drilled in the ball for unidirectional shut-off only.

The 3 piece valves can also utilize cap screws. These screws would be inserted from the outside ends and thread directly into the body of the valve. This creates a very tight connection and helps maintain the overall integrity of the valve. Using cap screws ensures that an end connec-

tion does not get 'cocked' during re-assembly, which is a common occurrence for through bolt designs.

Special seating materials (TFM, RTFE, 50-50, UHMWPP, PEEK, etc.) are also available. For example, TFM is a standard seating material that can also be used over Teflon; there are several formulations of TFM available today.

By being equipped with an internal TFM seal, the valves have a line of defense to ensure the integrity of the lock in body does not leak. An external seal made of spiral graphoil provides a secondary seal that also provides a very tight and stable sealing of the body and end connections. A unique stem seal design incorporating a triple live loaded stem seal with self-adjusting Belleville washers can also be added. This seal automatically adjusts for thermal contraction and expansion, as well as compensating for any stem seal wear. An O-ring in the stem bearing area helps maintain stem alignment and reduces packing side loading and wear. The compression of low-friction TFM V-ring seals also eliminates stem leakage by avoiding straight-line leakage paths.

Maintaining Integrity

The deep pocket design, which has a greater mass of seating surface, is one of the many ways to maintain the integrity of this type of valve. It provides greater overall strength when compared to a standard ball valve seating arrangement. The deeper pocket and recessed seating design offers a greater amount of protection for the seating on all three sides. Additionally, this seat design provides a pocket and a metal shoulder seat support that protects the seat as flow media passes through. This is an excellent design feature for high pressure and high flow velocity applications.

These valves can also be enhanced by adding socket weld ends to incorporate weld-in-place technology. This eliminates the need and cost to disassemble the valve when welding into a line. This feature offers a significant saving for end users as it provides a 'heat dissipation' feature that allows for the valve to be welded without any concern for the disintegration of the soft parts (seat and seals) in the valve.

Metal seating options are also available for high temperature applications. Seats and balls can be specially designed and specially matched for the most demanding services. They can withstand temperatures that exceed 1,150 degrees.

Cavity fillers are also available to eliminate the potential for media build-up or from hardening of some materials due to temperature changes or chemical reactions.

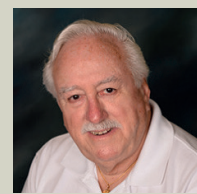


1" Tri-Pro HPS with threaded ends.

In Summary

The 3 piece design offers a wide selection of pipe end connections while the swing-out center body allows easy access to internal valve components. The fully protected body seals prevents seal ruptures in high pressure or steam applications, and the Live-Loaded-Blow-Out-Proof Bottom entry system is able to self-adjust with pressure and temperature fluctuations. Blow-out proof Bottom Entry Stem, antistatic grounds help prevent accidents and injuries. All of these features add versatility to the valves and make them the ideal choice for various applications.

ABOUT THE AUTHOR



Bob Donnelly is Vice President of Business Development for Flo-

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