Waukesha Cherry-Burrell, An SPX Brand
W75CP Mix Proof Valve White Paper
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Clean Bill of Health For Mix Proof Valve

Simple design solves complex cleaning problem

Mix Proof valve technology increases production

For the U.S. Dairy Industry and users of dairy ingredients, changes to the Pasteurized Milk Ordinance (PMO) regulations in March 2007 allowed seat-lift cleaning of Mix Proof valves while milk or milk products were in the opposite housing. This change dramatically reduced cleaning times by allowing piping to be cleaned with the equipment without requiring separate Clean-In-Place (CIP) circuits to clean the valve seat. Reductions in cleaning times can result in additional production time for dairy processors.

Automation / Modernization Benefits

Mix Proof valves are used to automate distribution piping in liquid and gas systems involving multiple processing steps or multiple products. Revenue goals justifying such projects are:

1. Increase annual capacity
2. Lower processing costs
3. Enhance production flexibility

Key to achieving the increased capacity goal for food processors is to minimize pipeline-cleaning (CIP) times while still cleaning all product-contact surface areas.

Mix Proof valves are used for safe separation of dissimilar liquids in an automated piping system, allowing production to continue while cleaning equipment. This flexibility together with the benefits of automation are used to increase production efficiency and

lower costs. Mix Proof technology has been a fixture in the beverage and juice industries since the 1980's.

But it wasn't until the late 1990's that the FDA allowed the use of Mix Proof technology in Grade A Dairies. This revision was detailed in the Pasteurized Milk Ordinance (PMO). For the first time, dairy processors could take advantage of automated cleaning and production systems – turning over the piping continually and gaining valuable production time.

Prior to the change, all production and tank functions had to be shut down during CIP. Most systems required manual operations to set up product routing and CIP, opening the door to human error. Even with a properly executed CIP procedure, dead legs in piping were difficult to clean. Cleaning solution had to be flushed through piping and each valve had to be opened and closed.

Seat-Lifting Injunction (The "15p" concerns)

Prior to March of 2007, the PMO allowed mix proof valves in dairy operations, however, processors were still prohibited in Section 15p from performing seat-lift cleaning while milk was in the opposite housing. An extra cleaning step was required to ensure that all product contact areas were properly cleaned, again reducing production time.

Finally in March 2007, the PMO was revised again to allow single seat-lift separation while product is in the opposite housing. Valve manufacturers rolled out newly designed Mix Proof models to allow independent cleaning without full stroking, with the promise of saving valuable production time for dairy processors.

Uncleaned surfaces (the '12p' concerns)

But the race toward more automated CIP and production systems soon encountered another hurdle. Part of the valve stem that is exposed to product when the valve is open is withdrawn below the stem seal when closed. Regulators realized that these surfaces weren't being properly cleaned and were out of compliance with Section 12p of the PMO. This section, which details requirements for cleaning and sanitizing containers and equipment, is the backbone of all sanitary industries, especially Grade A dairy.

While seat-lifting was achievable, this discovery threatened the requirements processors needed to achieve the savings goals because an additional cleaning step was necessary. Valve manufacturers had to take a step back and soon came up with solutions to the problem.

One solution was to pulse the valve open to bring the suspect surface back into the cleaning solution. While this worked, it added an additional cleaning step and detracted from the inherent time-saving features that made Mix Proof valve technology attractive in the first place. . Another solution involved installing an external flushing system. Special flush adapters routed cleaning solutions into contact with those surfaces retracted below the stem seal. This strategy worked, but at the price of extensive external flush piping, greater cost and complexity. It was a different solution that ultimately provided the most efficient ability to clean, as detailed below.

The importance of verification

A key benefit of single-body, double-seat Mix Proof valves is the ability of seat leakage to exit the piping system through the internal drain. This provides visual indication that a leak condition exists. Switches mounted to the valve give feedback the stems are in the proper position at all times. Proper switch signals and the absence of leaks verifies proper valve operation.

In the March 2007 regulations, it was required to have zero pressure or less in the internal vent cavity and that there be no direct impingement of cleaning sprays on the milk-protecting valve seals during cleaning.

Yet on several of the new generation of PMO Mix Proof valves, no verification the direct spray (impingement) protection is provided. The only way to monitor the status on these designs is to remove the valve and inspect the internals. It was a different solution that ultimately provided direct verification on these protections, as detailed below.

The Waukesha Cherry-Burrell Solution

The simplest, least costly solution is a valve designed to have the ability to clean all surfaces during normal operations. The FDA Compliant Waukesha Cherry-Burrell W75CP PMO Mix Proof Valve is designed to provide the ability to clean all product contact surface areas without requiring the valve to be cycled open and closed. Thus, the increased production capacity goal can be achieved.

<u>Addressing the '12p' concerns</u>

Using a combination of upper and lower seat-lifts, all product-contact surfaces are exposed to cleaning solutions. During lower seat-lifting, cleaning solutions are also routed to the lower stem surfaces below the seal. Therefore, no extra pulsing or cycling of the valve is required and the need for external flush piping or complexity is eliminated.

Dairy processors save valuable production time because the valve is cleaned without pulsing it open. In fact, product contact surfaces are cleaned without requiring a full open/closed actuation. Seat lifting cleans the valve cavity and seats plus the areas other designs didn't clean: the product contact portion of the lower balancer.

Addressing the ‘15p’ concerns

The W75CP is a double-seat mix proof valve with two blocking seats separated by a full-ported, atmospheric vent cavity. Between the valve plugs, a radially-sealed Spray Blocker operates to physically block impingement of seat-lifting sprays from one seat onto the opposite held seat.

Addressing the verification issue

If the blocker is damaged, impaired or missing, visual leakage out of the internal drain results. This design uniquely provides positive verification that the mandated protections on impingement are in place during valve operation.

In automation / modernization projects, reliability and simplicity are essential elements in achieving long term gains in efficiency and capacity. .