

PVC and CPVC Bleach Ball Valves True Union

The Problem

Sodium hypochlorite, used in water treatment, aquatic centers, and paper and textile applications, can become trapped in the body cavity of a closed ball valve and create failure conditions as the unstable chemical decomposes.

The Chemtrol® Solution

The *Bleach Ball Valve* is a special factory modification to a PVC or CPVC True Union Model C Ball Valve that effectively vents sodium hypochlorite out-gassing to the pressure port. In addition, the inner valve surfaces are kept constantly wetted to ensure problem-free use of the ball valves in *bleach* transfer and injection applications.

Background

In the search for a safer alternative to chlorine vacuum gas injection, fresh and wastewater treatment, paper and textile plants, and aquatic centers are converting to the use of sodium hypochlorite as a disinfectant or bleaching agent. A high pH level characterizes *commercial bleach*, which consists of a nominal 15% solution of sodium hypochlorite along with approximately 1-2% of sodium hydroxide to act as a chemical stabilizer. Known as a good oxidizer, the solution has been found to cause *stress cracking* in polyethylene, polypropylene, and Kynar® (PVDF homopolymer) materials. And metallic materials react, causing rapid decomposition of the “hypo.” However, PVC and CPVC, with fluorocarbon rubber (FKM) seals, have been successfully used for years to handle this aggressive chemical solution.

Some system design considerations are important, though. Heat, time, and positive ions are enemies of bleach stability. When a ball valve is closed in periods of inactivity, the bleach will decompose over time liberating oxygen gas. The decomposition rate is increased by heat absorbed from sun shining on exposed piping, or by reaction heat resulting from debris trapped in a ball valve body between the ball and its seats. Gas pressure may slowly build in the closed valve cavity, or quite rapidly in the reactive case. There are *confirmed reports of ball valve structural failures*.

Also, *evaporation of sodium hypochlorite in the ball cavity can lead to the formation of crystalline residue* that eventually embeds in the PTFE seats of a ball valve and significantly raises the turning torque due to excessive wear on the ball by fouled seats. A broken stem or frozen ball can be the ultimate failure in this case.

The Chemtrol® Bleach Ball Valve is the only plastic ball valve offering a viable solution for sodium hypochlorite transfer and injection applications. Our unique factory-assembled *bleach ball valve* has effectively eliminated the problems associated with these uses for more than seven years. By ensuring that all inner surfaces of the valve are kept *constantly wetted and vented to the upstream side* when the valve is in the closed position, we have eliminated the conditions required for gas accumulation and caustic crystallization in the body cavity.

The Chemtrol® Butterfly Valve, Model B, in sizes 3" - 6", is an excellent alternative to the ball valve for bleach applications. See page 11 for important reasons why.



Permanent Bleach
And Vent/Flow
Directional Marking

Recommended Specification

In the interest of safety, owners of sodium hypochlorite transfer and injection piping systems must have confidence that the PVC or CPVC ball valves in their system were properly manufactured, cleaned, assembled, tested, and oriented during installation in accordance with intended system design. Therefore, engineering specifications for bleach transfer and injection systems should include the following product, installation, and pre-commissioning inspection requirements:

- All PVC or CPVC bleach ball valves must be of the True Union type *with an energized seat* that will concurrently provide automatic adjustment for wear and leak-free service at the lower pressure port. And *the ball must contain an adequate vent* to the pressure port opposite of the downstream sealing port.
- The manufacturer of all PVC or CPVC bleach ball valves must *complete all components prior to the factory assembly, test, and packaging of those valves*. Modification of assembled valves by any manufacturer or vendor is unacceptable. Also, the valves must be individually packaged with each carton label stating: *Bleach ball valve, size, material, and manufacturer*.
- Bleach ball valves must be *permanently marked externally* with: the word *Bleach*; *two opposing directional arrows*, one inscribed with *Flow* and the other with *Vent*; and *NSF* (symbol of the National Sanitation Foundation International, indicating approval for use with potable water).