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PM's Largest Issue!

# PM

Plumbing & Mechanical

## ANOTHER WAY AT *Backflow Prevention*

- 2003 Manufacturers Spotlights
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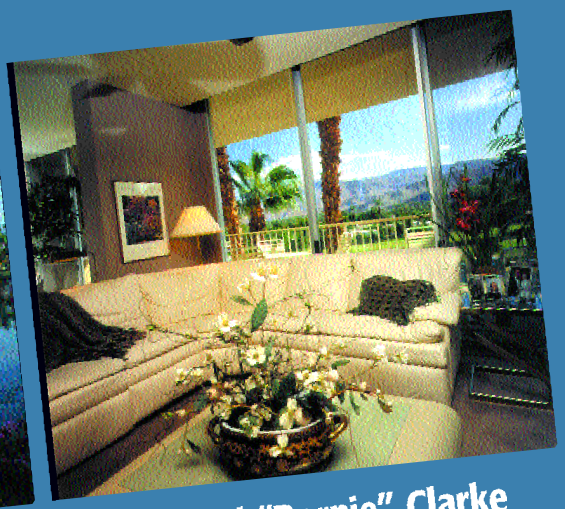
Shutting off water for backflow work?
Performing all the work in the field?
Think again.



by Bernard "Bernie" Clarke

# ANOTHER WAY OF *Backflow* Prevention

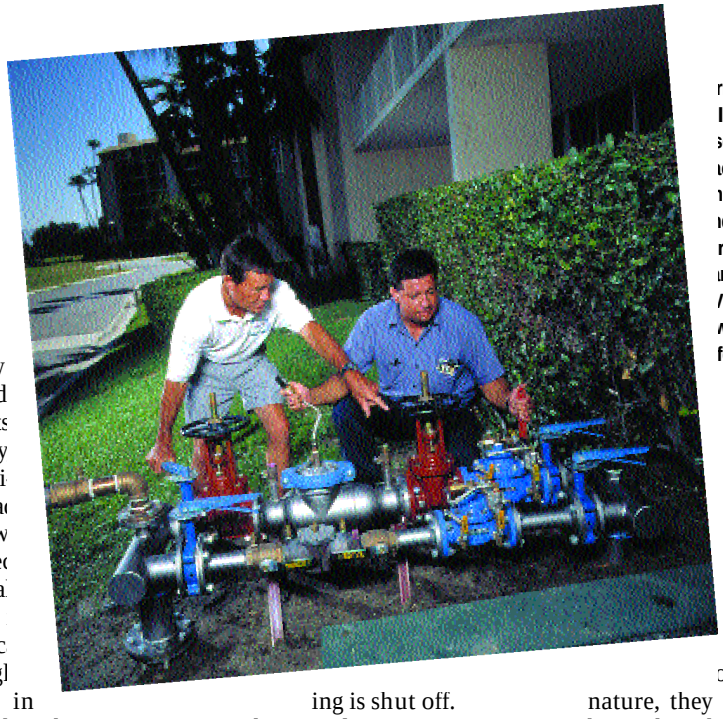
**Backflow prevention expert Bernie Clarke (left), and David Sullins, chief engineer for Desert Island, make a few adjustments at the valve station located in a condo garage.**

As the names suggests, Desert Island, an upscale Rancho Mirage, Calif., condominium development,is an oasis in the sun with plentiful water, lush green grass and palms waving in the breeze.

The three high-rise condo buildings with a total of 226 individual homes have all the high-end trimmings one would expect when investing $300,000 to $1.5 million in a condominium.

Yet, some residents couldn't get more than a trickle of water in their homes. To make problems worse, cooling towers were also water-starved — not something you can easily ignore where temperatures are known to reach 125 degrees!

As it turned out, the backflow preventers installed in all three high-rises were out-of-date and no longer passed certification tests. The water supply was not sufficient for each of the buildings' upper floors, cooling system demands, and fire water systems — the tangled snarl of mismatched and aging backflows, pressure-reducing and irrigation valves, strainers,shutoffs and accessories combined to siphon away water pressure at each building.



rnie Clarke (left) and Paul lasquez, maintenance super- sor for Desert Island, check ıckflow function just before the ıits go online."The Watts ıdustries valve stations were re-engineered, pre-certified ınd preassembled," said /elasquez. "We're delighted with the engineering and per- formance."

This was especially bad news for the condo managers, knowing that it was likely to lead to more "no-water" down- time,calls and visits from frustrated condo owners, expensive repairs and another round of incom- plete problem-solving.

In some cases, a few irate occupants had already sold their interests and moved. Fortunately **David Sullins**, chief engi- neer for Desert Island, ha heard about my firm; w are a backflow and inspe tion firm based in Newha Calif., that specializes just such highly technic challenging work. Thoug started as a plumber in 1964,backflow solutions have been my sole focus for 30 years.

For me, figuring out how to solve the problems at Desert Island was a personal victory — but for more than just this one installation. I also knew that thousands of other buildings were plagued by similar problems.

**Stuck In Time:** Our industry seems stuck in time. It's widely accepted that shutting off water for backflow work is a necessity.

I recall a recent legal case in Southern California where this idea reached its illogical extreme. While working in a medical facility, a plumb- ing contractor had turned off the water main for a short period. He was unaware that nurses had partially closed the supply valve to a vacuum breaker, starving flow to the device. The unit leaked, undetected, for days. It flooded three floors of the building, effectively closing six doctors' offices for six months. The multimillion-dollar law- suit put the plumber out of business.

It's simply assumed that downtime, with expense that can be measured in dollars and frustration, is necessary. And part of this stems from an accept- ance that professionals in the field must build valve stations on site, or replace parts while water service to the build- ing is shut off.

But shutting down water service is not necessary, and performing the entire job in the field isn't either. Our solution for Desert Island was to pro- vide the first commercial installation of pre-engineered, preassembled and pre-certified valve stations. The sta- tions allow uninterrupted full flow rate of both domestic and irrigation systems when any one piece of equip- ment is off-line.

**Key Problem:** Performance was the key problem at Desert Island. Upper floor and cooling tower supply fre- quently fell below minimum pressure and flow requirements, even when the irrigation systems were not running. After an investigation, the primary "loss component" was found to be a 4- inch direct-acting (DA) pressure regu- lator that produced significant fall off during normal flow use.

Previously, property managers tried to compensate for the huge draw off of water for irrigation, a problem made worse because the irrigation connections were initially set on the "downstream" side. Sullins recalled that there was enough pressure at the water meter to do what was needed, but because of the huge demand for irrigation, upper floor condos were starved for water.

There was no way to increase both volume and pressure. Pressure coming in at 110 psi, by code, had to be regulat- ed down to 80 psi when coming in to the build- ings' first floors. Older, DA regulators simply oblems worse because, by nature, they create more fall off. We knew then that we had to increase vol- ume by using ACVs and eliminating all of the DAs.

Another challenge was that system components were placed in various locations throughout the develop- ment. Testing and maintenance were unnecessarily difficult because of the distance between components.

Finally there was one more diffi- culty — the sheer number of pieces and parts. The systems at Desert Island included many shut-off valves, swing checks, pipe loops, and fittings that were not required for proper opera- tion; in fact, they impeded water flow and complicated the job for many pro- fessionals, including plumbers; fire protection, building inspector, irriga- tion and backflow specialists.

Nothing made sense; there was no unity to the systems and, God forbid, if two or more people would have to work at the same valve station at the same time, or during the day when water was in high demand.

**Solutions:** Our ideas for the new valve stations began to mature as we partnered with Watts Regulator. I've been working with them for the past 20 years. My company's field experi- ence coupled with their engineering and manufacturing expertise, shared

in both directions, has helped strengthen everyone's businesses.

Together, we began to visualize many ways to simplify valve stations, provide redundancy to eliminate downtime and to greatly shorten installation time.

After a thorough inspection of all existing valve stations, and careful consideration of all needs within the condominium development, we worked closely with Sullins, who knew the requirements at Desert Island best of all. With Sullins' help, the specifications were set.

Each system was built by Watts exactly to specification and achieves uninterrupted flow for testing and maintenance by use of primary and secondary valve lines. The stations may include backflow preventers, pressure regulators, actuated automatic control valves (ACVs), meters, headers, single checks and shutoff valves. They permit high flow rates with low-pressure drop.

Valve stations were ordered for each building and a two-week advance notice was posted by management for residents that foretold of a daylong, no-water situation.

As the equipment was manufactured, each valve station was certified to meet the performance requirements in a fully assembled state and included all maintenance shut-offs, valves and piping.

**Swat Team:** Finally, on a day last June with temperatures climbing to 110 degrees, three capable installers and I arrived at Desert Island to see how our ideas would work.

At 8 a.m., with all three valve stations awaiting removal from the back of a truck, water service for each building was shutoff and drained. Additional water sources were set up for the cooling systems. Removal of old piping, additional rework of other systems, installation of the valve stations — complete with ACVs, backflow preventers, piping and shutoffs — system refill, pressure set, tuning and final testing were all accomplished by 4 p.m.

Immediately, top floor pressures improved dramatically with no pressure draw-down during high flow periods. Prior to our work there, each building had 35 gpm at 20 psi. Immediately after the new valve stations were activated, the systems saw 55 gpm at 50 psi.

Each of the three Desert Island condo buildings were fitted with easily accessible valve stations that serve all domestic, cooling and irrigation needs. The existing installation was measured and the new valve stations were made to fit the existing piping exactly. Two-inch valves were provided to handle flow during 90 percent of the duty cycle from 0-150 gpm.A larger valve was installed to handle high demand for cooling and irrigation when flow rates would call for volumes of up to 300 gpm.

**Redundancy:** Of all the advantages, the built-in redundancy is what we're proudest of. At Desert Island, the old systems were flawed from the day they were first installed. Why install a 3-inch assembly when two, 2-inch backflow preventers will allow adequate flow?

If a customer has one 4-inch assembly, and the required flow is 300 gpm at a continuous pressure of 80 psi, it's likely that, if a direct-acting regulator is used, there'll be a drop off in line pressure. With ACVs and regulators, the pre-engineered station will not see pressure fall off. And, due to the nature of the diaphragm-actuated pressure control valve, the stations don't need a low-flow bypass.

When a DA valve does produce too much fall off — and we had plenty of these to contend with — a smaller-diaphragm ACV can be used to significantly increase the system performance. By sizing the ACVs so that one provides good low-flow characteristics,and the other provides good high-flow, a steady supply of water for all needs can be provided even during testing and maintenance. And, by combining backflow prevention and pressure-reducing functions for domestic and irrigation lines, we minimize overall footprint, the number of components and installation time.

The valve stations come with the capability for built-in expansion. If, for instance, a building's small line does not provide an acceptable flow rate, a larger-diameter assembly is simply installed.

Downstream of the backflow preventer, near the risers, overlay caps permit easy use of an additional source of water if the water supply line is out. This is especially useful should the water main break.

Spacers are provided at butterfly valves. If the measurement for connections is off by 1/4–inch or so, spacers will compensate for correct sizing because there are no threaded connections — corrections happen at the butterfly valves.

Victaulic couplings are used as a flex alignment. Because most pre-installation sites are rigid, these couplings allow installers to adjust the station's flange connections for a perfect fit.

All components are designed to match or complement one another. For instance, a strainer will likely have a higher flow capacity than a backflow preventer, which may have different flow characteristics than the control valve if all are sized the same. Stations are engineered to permit all components to work together optimally.

If fire or irrigation taps or other devices are needed, the station is designed so that the water customer is never out of service. If a buyer challenges the cost of two backflow preventers, consider the cost of shutting down the building. Ask: What's the cost of downtime? What could leak? How high have you set your liability protection? Will the building owner sign a waiver, releasing you from any responsibility should a leak develop?

In our case, technology and applied thinking came to the rescue.

*Bernie Clarke is owner of Backflow Prevention Device Tester, a testing and installation firm and Clarke Sales, an equipment research, design and training firm, both based in Valencia, Calif. For 40 years, he has been a licensed plumber for the city of Los Angeles, and Los Angeles County. He began concentrating on backflow prevention work in 1976. He can be reached at 661/294-0901; e-mail: clarkesales@aol.com.* PM