Water Stories

Big Slams are no match for the legendary Duke Waters

I let the phone ring four times before I picked up the receiver so I could have another sip of wine cooler and wipe my brow. It had to be over a hundred in Atlanta and it was only ten o'clock in the morning. Jim Wickman was on the other end and said, *"Duke, I'm in Albany and need your help with some slamming check valves."*

Jim and I go way back as engineering consultants. Jim never was much for small talk. I said *"Jim, good to hear your voice. How are those air release valves working we installed last month on the coast?"* He said *"Great, the air is automatically venting from the pipeline and the pumps are running at peak efficiency. But Duke, I'm working with our old pal Sam on the new Third Street Pump Station and have a battery of check valves here that are waking up the neighbors when the pumps shut down."* I said, *"OK, I'll fly in this afternoon and meet you at the site."*

Jim didn't know that I was desperate to get out of town and this heat. Albany will be a refreshing change and a chance to catch up on old times with Sam. Sam has worked for Probuild Contractors for over ten years and has a PhD in fluid mechanics. I just love to talk fluids with Sam.

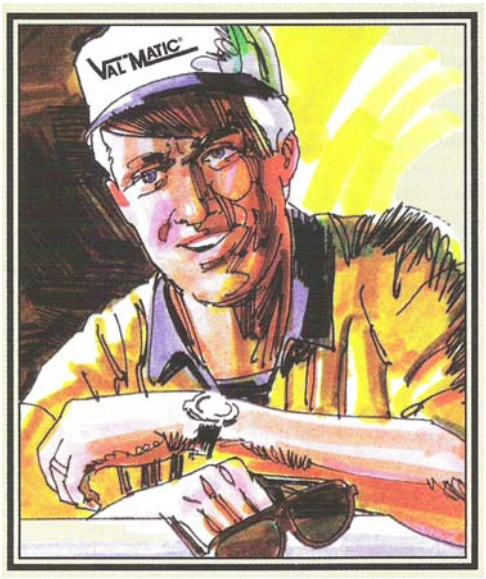
My XK8 was crying with the top up so when I got to the airport, I parked her in the hangar and let down the top. She's a beauty. The Citation X was ready to go so I raced

down the taxiway and left the scorching air behind me. Samantha and I must have started up twenty water plants over the years. But she found more enjoyment in Newtonian fluids than romance. So it goes.

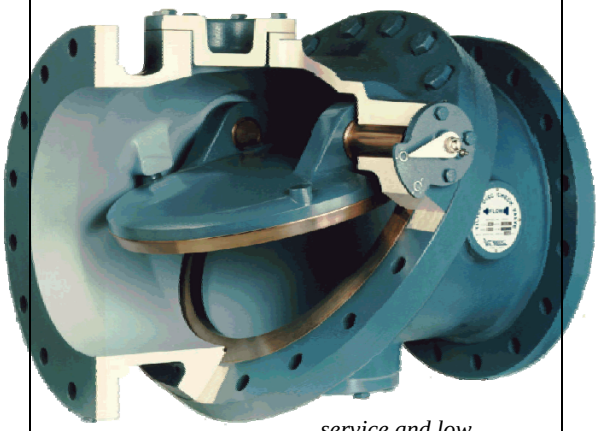
Sure enough; I heard the bang from the parking lot. I found Jim and Sam at the pump motor control center when I arrived. It's been years, but Sam still has that wild look about her. Jim said *"Hey Duke, listen up. All we're doing is lifting the treated water 20 feet and pumping it over to those ground storage reservoirs on the other side of the road. We run the four 24" pumps one at a time at 70 feet of head. Did you hear that slam?"* I ignored Jim and said, *"Samantha, you are looking sweet. I think we will be done here in an hour and we'll have time for some pasta at Tony's."*

She smiled and I knew that meant yes.

"Jim," I said. *"I thought we had a long talk about conventional swing check valves back in '87. Remember: levers, weights, cushions?"* Jim said, *"Duke, I certainly remember our talk about check valves with*



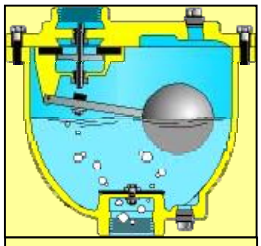
levers and weights. I also remember how the weight limited the valve opening to 20 degrees and increased the amp draw on the pump motor. So on this project I called Sam and had her retrofit the station with Tilted-Disc® Check Valves." Sam added *"I told him that the Tilted-Disc Valve with its shorter stroke and 140% seat area will provide non-slam*



service and low headloss."

Jim asked, *" Why don't we just install air cushions on the valves."* I straightened Jim out immediately, *"With an air cushion, the cylinder contains air which is compressible and will only dampen the disc travel. The extreme water forces from the reverse flow compress the air, which still allows the disc to slam into the seat. In fact, I have seen cases where the air cushion allows the return flow to build to a point where the valve slam can cause some real damage."* I added *"that air cushions are used on conventional swing check valves because their hinge pins normally can not withstand the torque generated from a closing disc. The only positive cushion is an oil cushion, which meters the oil through a flow control valve. Only specially designed check valves such as Tilted-Disc® Check Valves are designed to withstand the hydraulic forces of reverse flow with an oil dashpot."* I said that a bottom-mounted oil dashpot will always prevent slam, but it is not needed here.

Jim said *"OK; fine, but why are my check valves slamming?"* Jim has the patience of a blitzing linebacker on third down and long. I said, *"Well Jim, it's your lucky day. Our goal is to get the valve closed before the flow can reverse and slam the disc closed."* Jim hollered, *"So what do we do?"* I explained, *"See how the pipe header downstream of the check valves has a vertical elbow that goes underground to a buried pipe."* Jim just nodded. I said, *"An air pocket can act as a spring or surge tank and cause the flow to rapidly reverse after the pump shuts down, even faster than a Tilted-Disc can close. The problem here is that you forgot this huge pockets of air. Just install a combination air valve on the end of the header and you should be all set. A Val-Matic 202C Combination Air Valve should do the trick. By the way, I read about a similar installation last year in one of Val-Matic's Application Data Sheets. I'll send you a copy with my bill."*



Combination Air Valve
Performs the functions of both Air Release and Air/Vacuum Valves.

Jim installed hot taps on the elbows, bled the air from each elbow, shut down a pump, and was deafened by the silence. *"Sam,"* I said, *"Shall we?"* I'm sure we were on our second glass of Chianti before Jim knew we were gone.

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