Goodbye Headloss, Hello Savings!

By: David W. Buchwald, P.E. & Val-Matic

The East Cherry Creek Valley Water and Sanitation District (ECCV) located in Aurora, Colorado has a new high service water treatment plant. For more than 40 years, ECCV depended on finite water supplies in deep underground aquifers, known as the Denver Basin, to serve the residents in eastern Centennial, Colorado and unincorporated Arapahoe County. However, as the population has steadily grown to reach 50,000 people, aquifer levels have dropped and pumping costs have increased, so ECCV leaders sought a renewable water source to supplement the area's supply.

The result was a proposed plan appointed the name: The Northern Water Supply Project (NWSP). The $35 million project intends to pump water out of the South Platte River, more than 30 miles away. Phase one secured a 31-mile pipeline and two pump stations to carry the water nearly 1,000 feet in elevation to ECCV's storage tanks. The Northern Project will supply enough water to support nearly 90 percent of the needs in the district, with groundwater sources providing the remaining 10 percent.

Phase two of the project included additional water rights, as well as the construction of a state-of-the-art reverse osmosis (RO) treatment plant near the Beebe Draw. The station houses three sets of pump control valves and two surge anticipation relief valves. Each set includes a vertical turbine pump with capacity of 4,000 gpm and a 16" Val-Matic Ener•G® AWWA Rubber Seated Ball Valve with SIPOS variable speed actuator.

Figure 1 – Ener•G® Ball Valves at ECCV Treatment Plant

Val-Matic's Ener•G® AWWA Rubber Seated Ball Valves have been used at ECCV since 2006 with notable success in their Northern and Southern Booster Pump Stations; part of phase one of the Northern Project. According to Clint Carter, Water Treatment Lead Manager at the ECCV Treatment Plant, "We already had some Val-Matic Ball Valves installed in our booster stations. When it became time to make a decision concerning the last phase of the NWSP, the board of directors and myself decided to go ahead and add additional Ener•G® Ball Valves to our pumping stations due to the valve's capability to provide tight seating, long life, and energy savings."

However, the decision to use the Ener•G® Ball Valve in the ECCV Treatment Plant was not based solely on these benefits. Mr. Carter, along with the board of directors, also chose the valve based upon its ability to provide optimal surge control in pumping systems. Unlike check valves, pressure conditions and line flow do not affect the speed of operation of the Ener•G® Ball Valve because the valve uniformly changes the flow rate during full travel. The most desirable flow characteristic for surge control is equal percentage, as provided by the Ener•G® Ball Valve (as seen in Figure 2). The result: virtually no headloss, minimized pumping power, energy savings, and reduced costs.

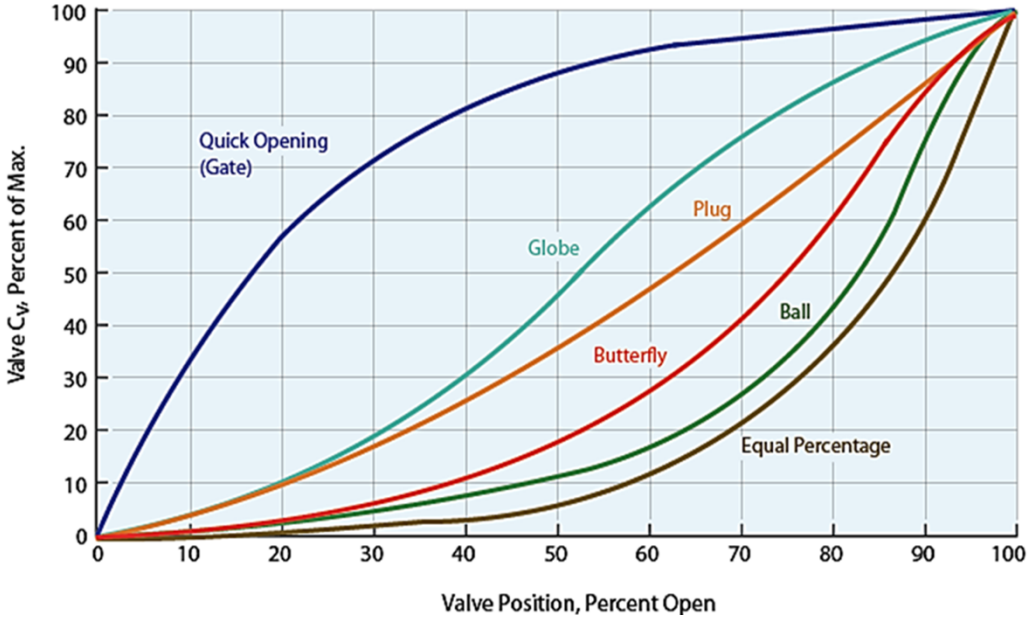
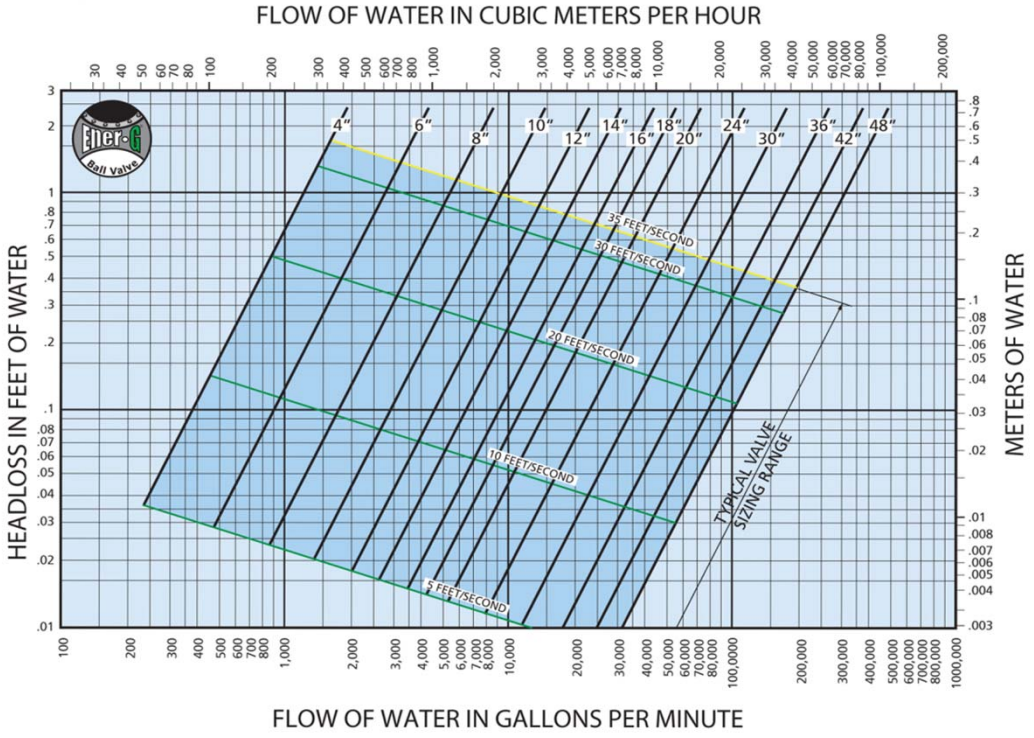


Figure 2 – Inherent Flow Characteristics Chart

The ECCV Water Treatment Plant also found the ball valve's headloss characteristics to be unsurpassed. Figure 3 provides headloss characteristics measured by the flow rate and size of the ball valve. You can use the chart provided to calculate the headloss of your ball valve simply by knowing your flow rate and the size of the intended ball valve. For example, if water flows through your pipeline at 20,000 gallons per minute (GPM) and your pipeline is 30" in diameter, your total headloss would only amount to .03 feet, which is extremely low.



Flow Coefficients	
Size	Cv
4"	1,910
6"	4,310
8"	8,520
10"	14,700
12"	22,800
14"	30,500
16"	42,700
18"	56,100
20"	70,500
24"	106,000
30"	172,000
36"	257,000
42"	369,000
48"	480,000

Figure 3 – Ener•G® Ball Valve Headloss Chart

Ultimately, low headloss results in low energy costs. Since Cv represents the flow through a valve with a 1 psi pressure drop, we can see represented by Figure 4 that the ball valve has the lowest headloss characteristics when compared to other valve types. The headloss of a valve can then be converted into the energy cost related to the pumping electrical power needed to overcome the additional headloss from the valve. The table in Figure 4 demonstrates that the Val-Matic Ener•G® Ball Valve has by far the lowest energy costs. This energy savings ultimately pays for the cost of the ball valve over the valve's life. Larger systems and systems operating at higher velocities will provide even greater savings.

12 in. Valve Flow Data			
Type of Valve	**Cv**	**ΔH**	**40-Yr Energy Cost***
Swing Check & Weight	4,200	2.23	$31,100
Globe-Style Control Valve	1,800	12.74	$177,800
Butterfly Valve	6,550	0.96	$13,400
Eccentric Plug Valve	4,750	1.80	$25,300
Ener•G® AWWA Ball Valve	22,800	0.08	$1,120

*Assumes 50% usage over 40 years, $.08/kw-hr, 12 ft/sec velocity, 0.8 efficiency

Figure 4 – Ener•G® Ball Valve Energy Cost Savings

The completion of the Northern Project was imperative for ECCV residents because it provided the District with long-term renewable water solutions. "Before our Northern Project, ECCV's district's water supply was from non-renewable sources. Now we are looking ahead toward our future knowing we have a plan to provide renewable water to our residents while conserving one of our great Colorado resources. The Val-Matic Ener•G® Ball Valve plays its part in this process by being a low maintenance valve that reduces our energy costs while incorporating surge free operation. We couldn't be happier with our decision to install these ball valves in our treatment plant!" stated Clint Carter.

The Ener•G® Ball Valve was developed with over 50 years of combined engineering, manufacturing, application, and design experience. All Ener•G® Ball Valves are designed utilizing advanced valve technology, quality materials and proof of design testing to verify pressure integrity, leak tightness and operation that complies with the American Water Works Association (AWWA) Standard C507. In addition, Val-Matic Valve & Mfg. Corp. is certified to ISO 9001-2008 standards. For more information regarding the Ener•G® Rubber Seated Ball Valve and to take advantage of the Energy Cost Calculator, please visit www.valmatic.com.

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