



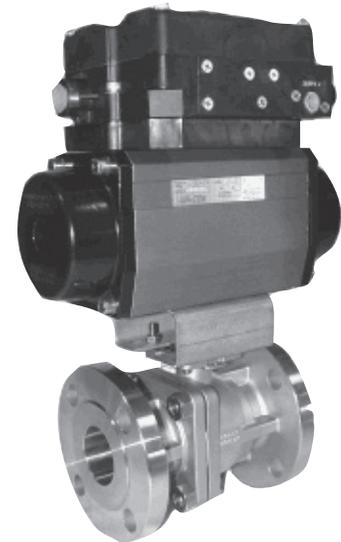
Valve Selection for Flow Control Valves

Often I am asked if I can help figure out why a **butterfly valve** is not controlling very well in a compressed air system. There can be maybe reasons for that, but if the valve is the problem, then you may consider the following:

A 4" butterfly valve 28% open has a Cv of approximately 32. Cv is a flow rating, used in valve sizing. Every valve manufacturer's Cv for a given size butterfly valve varies. It is recommended that butterfly valves control in middle 1/3 of opening or 40% to 60% open. Based on your valve being 28% open, and an assumed Cv of 32 at 28% open, you would get better control with a 2.5" butterfly valve, which would have a Cv of about 32 at 45 degrees open or 50% open. Butterfly valves are selected to control flow only when cost is the primary driving factor. The turndown range of controllable flow is 10:1. Butterfly valves do not seal bubble tight.

Globe valves have a turndown range of controllable flow of approximately 35:1 (depends on manufacturer of valve). Globe valves are expensive as they require large actuators to shut off against upstream pressure. The higher the upstream pressure, the bigger and more expensive the actuator. They are also very heavy and may require additional piping supports. The weight may also make it difficult to maintain the valve. They do not seal bubble tight and an additional ball valve is often used if positive shutoff is required.

V-ball control valves are relatively new. They have turndowns of 100:1 to 300:1 depending on the style (full ball or half ball). They also seal bubble tight (bubble tight allows some leakage measured in bubbles allowed per minute). You may consider a V-ball control valve with a 30 degree V-ball. A 4" V-ball with a 15 degree slot would have a Cv of about 35 at 65% open, which is the sweet spot of the valve. The other advantage of a V-ball is if we don't have the correct data and the valve is sized wrong, we can change the V-ball to a 30, 60, 90 or a special size slot.



Conclusion:

If the conditions are reasonably steady state and not a lot of fluctuations, then you could use a 2.5" butterfly valve, but the cost of the reducers and repiping would be expensive. The valve would also have a limited controllable range and if conditions should change, the system may need to be replaced, including the piping reducers and associated piping. The other alternative would be to use a V-ball control valve. That would be my recommendation. It would also be good to know the flow rate and the pressure upstream and downstream of the valve. The customer could use one of our flow meters and also a couple of pressure gauges. Feel free to e-mail me with any questions you have. I'd be happy to help!