



Comparative analysis of Butterfly valves being used in Industry

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ABSTRACT

The current article is dedicated to the research on the different types and constructions of the butterfly valves as well as various approaches to their applications in Industry. As per the thorough examination of the butterfly valves, the following types have been considered as mostly used in industry: wafer type of butterfly valves, Lever Operated Butterfly Valve, Worm gear Operated Butterfly Valve, Flanged type of butterfly valve, PTFE lined butterfly valve, Pneumatic /Motorized butterfly Valve, metal seal butterfly valve, universal butterfly valve. It demonstrates the highly dependent usage of universal type of butterfly valve in industry. The article dedicated to comparative analysis of the butterfly valves and determine their advantages and disadvantages in application of industry.

Keywords: Valves, butterfly valves, wafer, seal, friction, UHOWBV

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INTRODUCTION

As per the thorough examination of the butterfly valves, the following types have been considered as mostly used in industry: wafer type of butterfly valves, Lever Operated Butterfly Valve, Worm gear Operated Butterfly Valve, Flanged type of butterfly valve, PTFE lined butterfly valve, Pneumatic /Motorized butterfly Valve, metal seal butterfly valve, universal butterfly valve. The current article demonstrates the highly dependent usage of universal type of butterfly valve in industry and reason of its failure.

A wafer butterfly valve's function is to retain a seal to protect against dual-directional pressure differential in the flow of fluid. In other words, the wafer version of butterfly valves was designed to hold a tight seal, safeguarding against bi-directional pressure differential in order to avoid any backflow in systems that have been manufactured for uni-directional flow. This is accomplished by using a tightly fitted seal, such as an O-ring, gasket, precision machined, along with a flat valve face on the downstream and upstream sections of the valve [1].

Main application of the wafer type of butterfly valves considered for fresh water, sewage, sea water, weak acid, alkali and etc. it is also suitable for the municipal construction, water treatment, power, water supply and drainage, water conservancy projects and etc. [5].

Universal Handle Operated Wafer Butterfly Valve (UHOWBV) is more flexible and accurate in its operation compared to Worm gear Operated Butterfly Valves. This type of butterfly valves is lighter, compact and weight less than the other type of control valves being used in industry. Such a flexibility of this valve makes it the best choice to use in Industry for many kinds of applications.

Such type of butterfly valves uses a rotating disk to control the amount of flow through the pipe. The disk itself is obviously operational through 90 degrees. Therefore, they are sometimes called as quarter-turn valves. Taking into account that these types of valves are typically economical, in many industries they are being considered in force to operation.

MATERIAL AND METHODS

Other advantages of Universal Handle Operated Wafer Butterfly Valves include a straight through flow path into direction as well as considerably high capacity and the ability to easily pass solids and viscous media.

Additional to above mentioned points, Universal Handle Operated Wafer Butterfly Valves offer well shutoff performance in above range of temperatures as well as in different body shapes based on the manufacturer referenced standards.

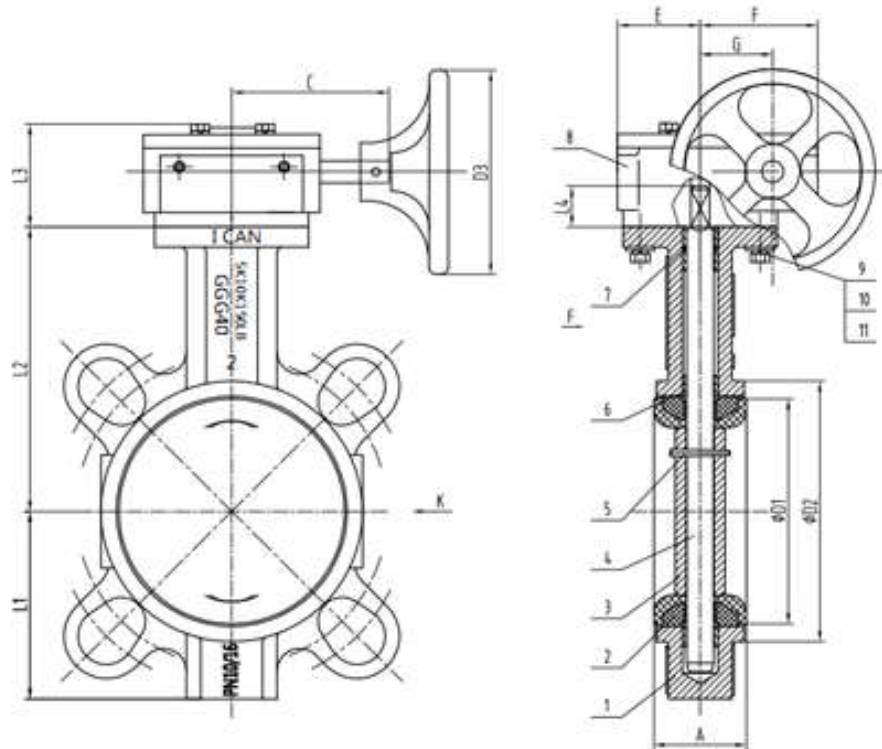


FIG 1

Besides of above mentioned advantageous, some of limitations have also been determined during the research of the Universal Handle Operated Wafer Butterfly Valves. This type of valves has got some limitations in some applications for flow control. It covers the limited pressure drop capability in comparison with the other type of the valves (for instance, ball valve) with a huge potential for cavitation or flashing which means that costs the end user high enough. This is mainly due to the larger surface contact area of the disk itself which acts like a lever and passes the dynamic forces of flow to the drive shaft. The valves have been not designed to be used for the high-pressure applications. In case, if they are being applied to the high pressurized area, then the actuator sizing and the referenced valve is turning into crucial. It has to be considered that the oversizing occurs sometimes, and it negatively affect the process performance. It can also results using the line -size valves which can dramatically increase the variability of the process in 2 different ways.

Initially, oversizing persists to have less flexibility on the using of valves while adjusting the controller. Secondly, an oversized valve can be operated often at lower valve openings which forces to get the seal friction in butterfly valves.

The biggest obstacles in use of such type of butterfly valves is that the ideal throttling control diapason is not as large as a gate or globe valve. Butterfly valves normally do not perform well outside a control diapason from about 30 to 50% open.

Putting all aforementioned in a nutshell, Universal Handle Operated Wafer Butterfly Valves have a lower initial installation cost rather than the many other types of the valves being used in industry. It can provide a reliable control diapason when sized properly. This type of valves has got a higher capacity with minimal flow restrictions.

RESULT

At the result of the research below advantages and disadvantages of the usage of Universal Handle Operated Wafer Butterfly Valve.

Advantages can be sequenced at following:

- High reliability for operation wherever requires lesser pressure to be applied
- Cost effective (economical) for the usage of such type of the valves
- Flexibility of usage in Industry and free maintenance schedule.
- A straight through flow path into direction as well as considerably high capacity and the ability to easily pass solids and viscous media.
- Good shutoff performance in above range of temperatures as well as in different body shapes based on the manufacturer referenced standards.

Disadvantages can be considered as following:

- Limitation in the application for high pressures Industries due to flow control capacity.
- Drop capability which can easily cause the cavitation or flashing
- Occurrence of oversizing
- Easy friction in the seal of disk
- Limitation on throttling control diapason

DISCUSSION

In discussion of the subject article the usage of the hand operated wafer butterfly valve's disadvantages and advantages verified and the applications in industry determined accordingly. The main advantages have been identified as high reliability for operation wherever requires lesser pressure to be applied as well as cost effectiveness (economical) for the usage of such type of the valves in industry. Additionally, flexibility of usage in Industry and free maintenance schedule also considered during the comparative evaluation process.

A straight through flow path into direction considerably noted in high capacity and the ability to easily pass solids and viscous media. Good shutoff performance is one of the biggest achievements in such kind of constructions wherever it applies in above range of temperatures and in various body shapes based on the manufacturer referenced standards.

Despite of the advantages, also the limitations of the valves have been thoroughly examined and limitation in the application for high pressures industries due to flow control capacity considered as a biggest disadvantage for such type of valves constructed. Drop capability which can easily cause the cavitation or flashing as well as occurrence of oversizing and easy friction in the seal of disk considered as a limitation and requires a mandatory check before selecting the type of valve being installed on the pipes/ flow regulations. Another point has been identified as a limitation on throttling control diapason which varies from one to other type of the valve.

CONCLUSION

At the work, the current application of the butterfly valves researched. Advantages and disadvantages of using the butterfly valves in different industries determined. Limitations of the scopes identified.

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