

SLUICE VALVE vs BUTTERFLY VALVE



SLUICE VALVE

BUTTERFLY VALVE

1. Utility

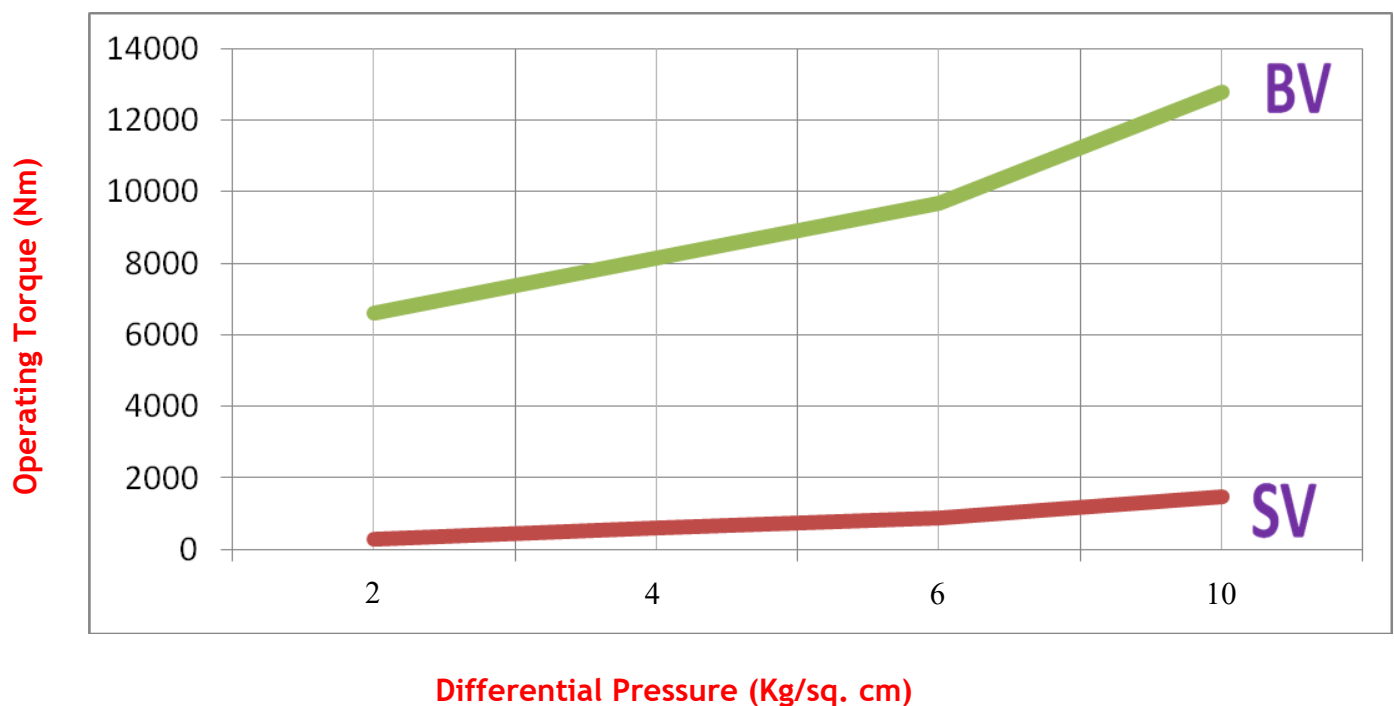
Generally used for isolation purpose, kept either fully shut or fully open. Throttling in this type of valve is ordinarily not permitted except under special circumstances.

Mainly designed for throttling application, where flow regulation is required and necessary.

2. Torque Consideration & Operating Gear

Size for size and duty for duty, vis-à-vis butterfly valve, absorb considerably less torque in overcoming a given resistance. For example in a 1200 mm size, for ordinary duty, the torque could be around or less than 200 kgm at the drive end of the operating shaft. Therefore, the mechanism to generate such torque is much smaller, more compact and hence more efficient.

In view of its design, it uses up considerably more torque for a given duty. For example a 1200 mm size may require upto 2000 kgm torque. Naturally, the design of gear box is much more involved, more complicated, demanding more attention in maintenance.

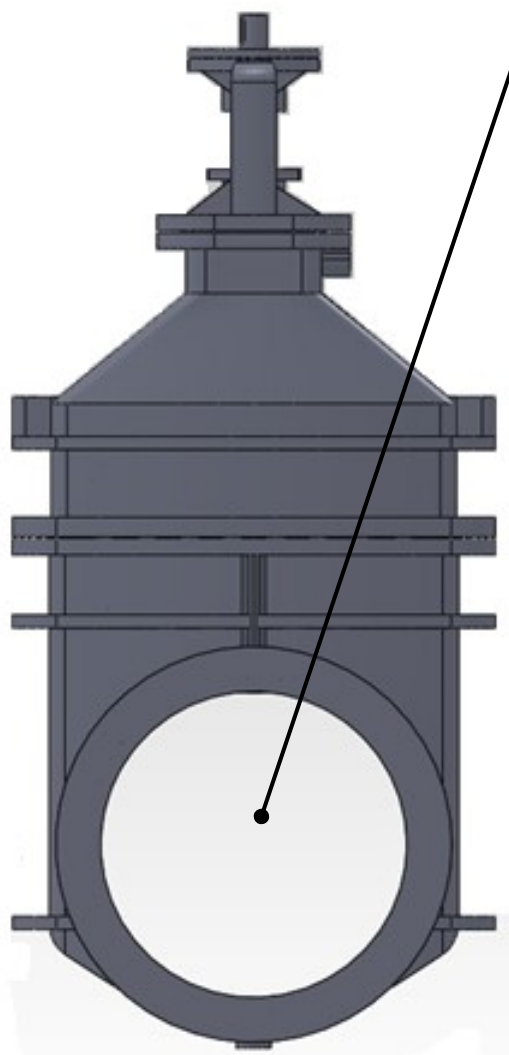


3. Head Loss

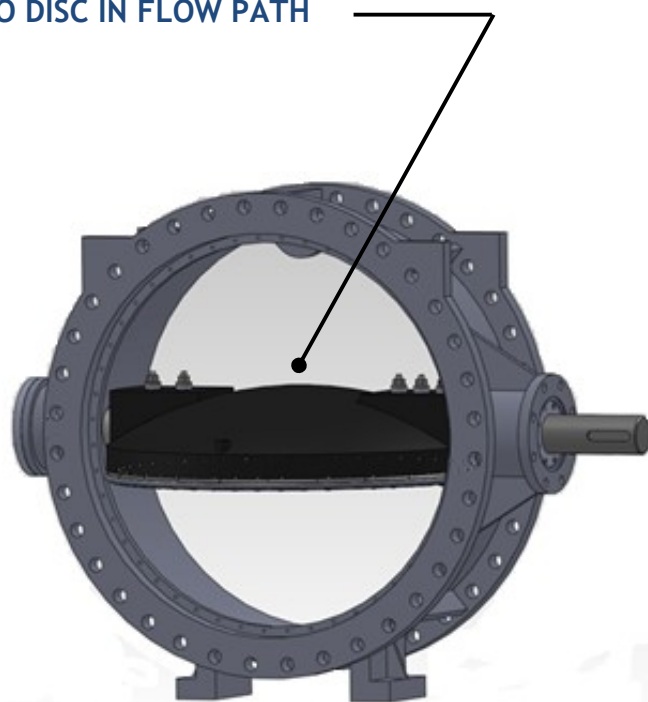
This type, having a through bore when fully open, causes minimum loss of head for a given average velocity of discharge. Losses in the crevices inside the body are the only losses in this type of valve.

As the trunnion mounted disc oscillates directly within the water way, regardless of the angle of travel / opening, losses in this type are much more for a given duty and for full bore opening the losses could be three to four times as much as that for a sluice valve.

NEGLIGIBLE: DUE TO FULL BORE AVAILABLE FOR FLOW



3 TO 4 TIMES THAT OF SAME DIA. SLUICE VALVE
DUE TO DISC IN FLOW PATH



4. Efficiency of Gear Box used in valves

The valves are erected with their shafts / stems vertical with the gear box mounted on top, are generally above ground, therefore not subjected to inundation. Likely to remain dry in most ordinary application.

Requiring relatively less torque, a spur gear or a bevel gear box does the job. Such gear boxes have 80 - 90 % efficiency.

In all eccentric designs, the shaft is always horizontal and the gear box thereon diametrically alongside. In most Indian conditions such valves are installed in a pit / sub surface chamber, and prone to water logging even in the best of times. Perennial submergence of gear box eats away the grease within and ceases the bearings. Regardless of claims by manufacturers, gear boxes cannot be eternally drop-tight.

Owing to high torque requirement and only a quarter turn rotation of valve shaft, a worm gear box is normally employed. These have an efficiency of 25 - 40% only.

5. Manner of Fixing of valves in pipe line

No special precaution is needed except ensuring relative parallelism between connecting flanges. Once installed inside a pipe line, a valve is intended to remain so for its entire life time of service. It is seldom (or rare) that a sluice valve requires to be removed from a pipe line.



The correct way of installing a butterfly valve is by using suitable dismantling rings or joints in a pipe system. Even though for sizes exceeding 1000 mm \varnothing local replacement (in-situ) of resilient rubber seals is possible, the operation is hazardous and highly risky requiring a series of safety and precautionary measure to ensure safety of operating personnel. Even then success cannot be always assured. It is this primary consideration that should weigh heavily upon the decision to use (or not to use) such a valve.



Invariably, it becomes necessary and expedient to remove a butterfly valve from a pipeline for the simple purpose of replacing a rubber seal on the disc or in the body. The stainless steel screws used to hold the seal retaining ring in place are some times difficult to remove, particularly when the water is not neutral, Salts always accumulate around screw heads disfiguring them rendering replacement of a resilient seal near impossible.

6. Maintenance

In this design it is minimal, because all the four faces and seat rings are in metal. Good make of such valves are designed for a life time of trouble free service i.e. approximately 30 years, provided valves are used within its designed parameters. The only maintenance consists of replacing the gland seals in the stuffing box and periodic cleaning of the gear box mechanism and replacing the grease in it.

A butterfly valve necessarily uses resilient rubber seal either n the disc or in the body. The seals have a limited life and generally depend on the number (or cycle) of operation. Their life also depends on the nature and quality of water used in the pipe lines. Periodic seal replacement is necessary. Also the high ratio, high torque gear box requires periodic greasing and maintenance.

8. Type of seating

Metal to metal - GOOD FOR LIFE



Rubber to Metal - Periodic replacement required; plant / pipeline shut down is a MUST.



8. Submergence

The operating arrangement (gear box and electric actuator) is on top, considerably higher vis-à-vis the pipe centre - line. In the event of chamber / pit getting full of water, either by way of leakage or rise in water table, chances of water reaching the operating arrangement is relatively low.

At Sarai Kale Khan, New Delhi, while there is water in all the chambers, the operating arrangement being on top, are all outside water and therefore safe.



For large diameter eccentric butterfly valve, the shafts are horizontal, along the diameter of the pipeline. The operating arrangement (gear box and actuator) is considerably lower, more or less along the horizontal shaft axis through the pipe centre - line. Chances of the operating arrangement and actuator getting fully submerged are very high.

For instance the 600 BV at Manjira Ph III, Hyderabad, is completely submerged including the operating arrangement. The grease in the gear box will lose all its properties of lubrication and the needle roller bearings would corrode rendering them useless. Maintenance cost will be high.

