DELTATPRODUCTS
The Superior Cartridge Seat

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Overview:

Delta T resilient-seated butterfly valves are used widely throughout the fluid flow industry because they are versatile, easy to automate, and cost effective. They are quick to install and can provide bidirectional shutoff with only quarter-turn actuation, or even operate as modulating valves. However, the functionality of a butterfly valve is greatly dependent on the seat, which typically provides the seal between the pipe flanges and for the valve disc. The seat design is a critical factor that affects valve performance, robustness and longevity.

Background:

There are three basic seat styles that are used in resilient-seated butterfly valves: booted or dovetail style, cartridge style, and molded style. Each type is manufactured and designed differently and exhibits distinct characteristics.

Above: *Booted seat bulging around disc contact points*

Booted or Dovetail Seat

The booted or dovetail style uses a geometric “dovetail” shape to mechanically mate with the inner diameter of the valve body. Because the fit is not physically bonded, the seat is easily removable but is prone to movement or deformation when mounting between flanges, resulting in a seat that tends to bulge around the disc contact points. This sensitivity to mounting conditions limits the versatility of booted seat butterfly valves. Additionally, the booted design requires the seat to have a certain thickness and flexibility, both of which necessitate a relatively high mass of elastomer. Highly elastomeric materials are subject to deformation during service, which means the seat’s outer form can change over time. Any fluctuation in the seat due to deformation results in inconsistent or increased torque, increased wear, and possible tearing. To address the limitations of the booted seat style, molded and cartridge style seats were developed.

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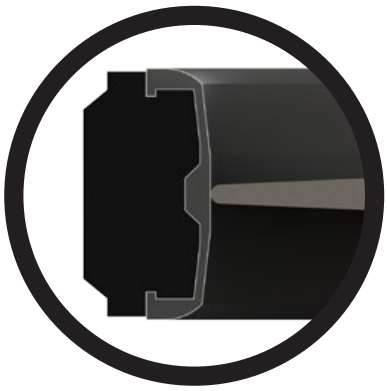
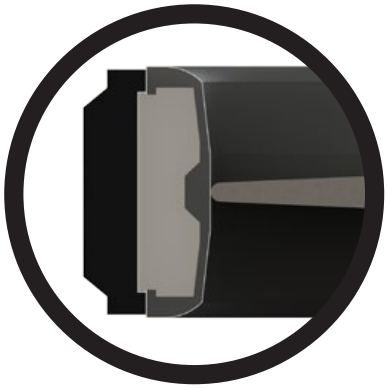


Above: *Molded seat permanently bonded to valve body*

Molded Seat

The molded style seat is bonded directly to the body of the valve through an injection molding process. The elastomer is typically applied to the inner diameter of the cast valve body without prior machining, allowing normal variations from the casting process to affect the dimensional uniformity of the seat. Furthermore, inherent pressure variation in the injection molding process makes it extremely difficult to produce consistent seat thickness, resulting in highly variable torque and wear characteristics that can adversely affect the life of the valve. Another disadvantage of molded seats is their irreparability – because the seat is integrated with the valve body, the whole valve must be replaced when the seat is damaged. However, molded seats do provide several benefits over the booted style because of the lower elastomer content and the permanent bond with the rigid valve body. Molded seats resist deformation and dislocation during valve mounting, and they are capable of dead end or vacuum service.



Above: *Cartridge seat with rigid phenolic backing ring*

Cartridge Seat

The cartridge style seat improves upon the molded style by making the seat replaceable and with better manufacturing tolerances. A layer of elastomer is compression molded onto a rigid phenolic backing ring, which supports the elastomer in multiple directions. The compression molding process is the most consistent method available, providing constant pressure to form the seat shape and therefore maintaining tighter control of the seat dimensions. The inner diameter of the valve body is also machined to provide a slight interference fit with the removable seat "cartridge", ensuring consistent assembly and the most uniform seat dimensions. Because they can be manufactured to better tolerances, cartridge seats offer the best torque consistency and highest wear resistance. Additionally, the more rigid seat design resists deformation when mounting in a variety of flange configurations, and can be used in vacuum service or unidirectional dead end service when the valve body features a retaining lip.

Cartridge Seat Advantages:

Delta T resilient-seated butterfly valves come standard with cartridge seats because they supply reliable torque, increased wear resistance, robustness and versatility. Cartridge seats offer advantages unmatched by other seat types. The chart to the right compares features of the three different seat styles.

Feature	Cartridge Seat	Molded Seat	Booted Seat
Replaceable	YES	NO	YES
Consistent Torque	YES	NO	NO
Ideal for Vacuum Service	YES	YES	NO
Dead End Service Capable	YES	YES	NO
Deformation Resistant	YES	YES	NO
Flange Type Independent	YES	YES	NO

Cartridge Seated BFV Applications:

Butterfly valves with cartridge style seats can mount in a variety of flange configurations because the seat resists deformation and is mostly independent of unique mounting conditions. In highly abrasive applications where valves need to be replaced on a regular basis, the cartridge seat could simply be replaced rather than the entire valve. When the valve body has an integrated retaining lip, cartridge seated valves are capable of dead end service. Furthermore, unlike booted or dovetail seats, cartridge seats can more suitably operate in a system that requires vacuum service. The cartridge seat unlocks the full potential of resilient-seated butterfly valves and provides competitive solutions for the fluid flow industry.

Whatever the application, Delta T resilient-seated butterfly valves are equipped with cartridge seats to provide consistent torque, improved valve lifespan, and maximum flexibility. Above all, Delta T strives to provide a product that meets and exceeds customer expectations and is "The brand by which all others are measured."

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