

## 39004 Series High Performance Butterfly Valves



Baker Hughes **Masoneilan™** 39004 Series High Performance Butterfly Valve (HPBV) is a heavy duty automatic throttling control valve that incorporates the two basic features of the HPBV types. These features differentiate the Masoneilan 39004 Series HPBV from the conventional swing-through butterfly valve in regards to sealing method and operational characteristics. Specifically, the two basic features are: (1) A PTFE, RTFE, or metal seal ring instead of a liner, and (2) The employment of double offset (eccentric operation). Each of these features contributes to the improved performance of HPBV's compared to conventional butterfly valves.

The use of a seal ring (PTFE, RTFE, or metal) eliminates the inherent problems of high sealing forces, due to interference fit, and the resultant high wear rates due to scraping and scuffing of liners. Also, due to the design of the seal itself, which is a dynamic pressure-assisted member, ASME Class VI shutoff rates are available throughout the full range of ASME Class 150, 300 and 600 ratings (soft-sealed constructions only).

The double offset (eccentric) operating principles of both seal offset (the seal ring centerline is offset from the shaft centerline) and shaft offset (the shaft centerline is offset from the valve centerline) allows the disc to get off the seal quickly due to the camming rotation with respect to the valve/seal centerlines. This results in minimal sliding (friction producing) contact between the disc and the seal ring with complete separation after only a few degrees of rotation.

The overall characteristics of the Masoneilan 39004 Series valve are:

- **Long seal life** – Offset (eccentric) operation gets the disc off the seal quickly, minimizing sliding contact and friction, resulting in reduced seal wear and lower breakaway and seating torque requirements.

- **Fast/dynamic operation** – Offset (eccentric) operation eliminates disc-to-seal friction throughout the operating range resulting in fast response to input signals. Also, the disc tends to move in the direction of flow, assisting the valve and actuator to maximize the allowable operating pressures.
- **Excellent flow characteristics** – The offset (eccentric) disc design provides an approximate equal percentage flow characteristic through its full travel of 90° rotation yielding a Cv ratio of 100:1.
- **Extra heavy shafts with keyed ends for actuator mounting** – Precise and accurate positioning without lost motion or backlash.
- **PTFE-lined low-friction bearing** – Reduces operating torque and promotes fast response to valve and actuator action. The triple bearing support of the shaft prevents deflection of the shaft due to side-loading.
- **Field replaceable components** – Unlike most competitive valves, shaft and disc need not be purchased as a set. The Masoneilan 39004 Series valve uses tapered pins to attach the shaft and disc positively, yet provide component interchangeability.

## Features

Baker Hughes Masoneilan 39004 Series HPBV includes unique valve seal designs for metal, soft seal, and fire-safe configurations.

### Metal seal design

The metal seal design incorporates an Inconel seal for higher tensile strength, a 300 Series stainless steel back-up ring in the seal cavity for axial seal support, and a disc that is case hardened by nitriding.

The Inconel seal, by its dynamic and flexible design, applies enough force per linear inch against the disc edge (Rockwell™ Hardness of C66 to C70) to obtain an optimum sealing characteristic while controlling the loads between the metal surfaces.

The metal seal design can be utilized for temperatures up to 900°F, in compliance with ASME B16.34 pressure/temperature specifications. Leakage is rated at Class IV per ASME FCI 70-2.

### Soft seal design

The soft seal design provides a bi-directional bubble tight shutoff (zero leakage) through the use of a patented seal. This unique seal design creates a self-energized seal in vacuum-to-low pressure applications.

Under higher pressure conditions, the seal is also designed to confine and direct movement of the soft seal against the disc edge, up to the full ASME Class 150, 300 and 600 Cold Working Pressures.

The soft seal is designed for high services with minimal wear and low torque. Seal replacement is a simple procedure requiring no special tools.

### Fire-safe seal design

The fire-safe seal design incorporates two patented seals which function together to seal off pipeline flow. In normal operation, the soft seal provides a bi-directional “bubble tight” shutoff (zero leakage); the metal seal provides bi-directional shutoff in the event of a fire, in conformance to industry fire-safe requirements.

With little or no pressure, the fire-safe seal creates a self-energized seal against the disc. Higher line pressures act on the geometry of both seals to dynamically load them against the disc, creating higher sealing forces in either direction.

The metal seal is made of Inconel material which is shaped by a proprietary hydroforming process into its unique, patented design. Stainless steel outer bearings are included for post-fire disc and shaft alignment. Fireproof packing is used to prevent external shaft leakage.

## Standard 39004 Series valve components

