

4.20 Floating Piston Valve

Statement: A novel approach to low maintenance of valves without an actuator.

Problem: The various types of valves typically include a housing and a seat. In high pressure applications, the housing and seat are often manufactured from a metal material. Accordingly, movement of the seat to open and close the valve moves the metal seat against the metal housing. The large forces acting on the valves generate a high-friction load on the seat during movement of the seat. The high friction between the seat and the housing, in combination with the metal-on-metal interface between the seat and the housing, may potentially damage the seat. Additionally, the valves typically require an actuator, such as a handle, rotary knob, motor, etc., to operate the valve. For high-pressure working fluids, the actuators become large, greatly increasing the overall size and cost of the valve.

Solution: the valve consists of only five parts with a few simple seals incorporated into a well-protected design. The simple design allows for use in nominal or extremely high pressures and for the use of soft or hard metal seats; this valve design reduces downtime and maintenance costs, while increasing valve reliability and seat life.

Technology description: This valve has many unique features and design advantages over conventional valve concepts:

- The largest advantage is the elimination of the valve stem and any conventional actuator, reduces physical size and cost.
- It is constructed with only five parts.
- It eliminates the need for many seals, which reduces failure, downtime and maintenance while increasing reliability and seat life.
- The flow path is always axially and radially symmetric, eliminating almost all of the flow induced thrust loads - even during transition from closed to open.

Benefits: The novel concept has great potential where flow control is required. It enables functional advantages similar to a globe valve; this includes:

- Reduced maintenance due to single design with fewer parts and seals
- Reduced size.
- Reduced cost.
- No fugitive emissions.
- Hermetically sealed and leak-free.
- Withstand high pressure.

Areas of application: This technology could be used in the following applications:

- Power plants.
- Petrochemical plants, chemical industry, refineries.
- Pressurized storage tanks.
- Cryogenic fluid systems.
- Severe duty, extremely high pressure or temperature.
- Fast actuation applications.