An Introduction to Rotating Disc Gate Valves

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Gate valves are one of the most widely used valves in the waterworks industry and have played a vital role in controlling the flow of fluids throughout distribution systems and in-plant applications for hundreds of years. If your application requires a dependable shut off valve capable of withstanding generations of service, a Rotating Disc Gate Valve would be an excellent choice.

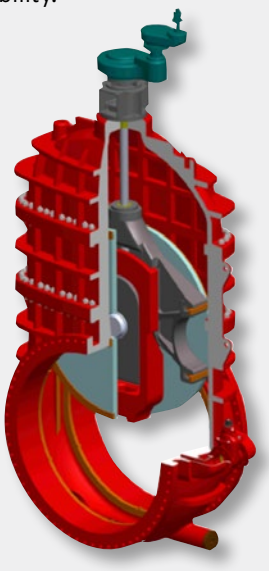
The Rotating Disc Gate Valve was first introduced in 1908 and has been a staple within the waterworks industry ever since. Its metal seated design conforming to AWWA C500 makes it an excellent choice in both clean water and wastewater services, that no other metal seated gate valve on the market is equipped to handle.

STANDARDS

The American Water Works Association developed a governing standard for gate valves in the early 1900's that details the design, manufacture, and test requirements of all metal seated gate valve types used within water supply services, known as AWWA C500. A metal seated gate valve can be characterized by the use of metal materials for their seating surfaces to prevent the flow of fluids.

While there are a few different types of metal seated gate valves used within the waterworks industry, such as double disc or solid wedge gate valves, they all contain the same main components. Let's review the components that are essential in the operation of all metal seated gate valves:

- **Body:** The body houses all valve components and is typically cast of grey or ductile iron for durability.
- **Bonnet:** The bonnet serves as the valve cover, providing access to internal components for maintenance and repair.
- **Gate or Wedge:** The gate is the primary component that blocks or allows the flow of water. In metal-seated gate valves, the gate is typically made of iron or other hard metals to ensure longevity and resistance to wear.
- **Stem:** The stem is the mechanism that connects the actuator to the gate or wedge, allowing it to be raised or lowered.
- **Seating Surface:** Metal-seated gate valves rely on metal-to-metal contact between the gate and the valve seat to create a tight seal. The surfaces are ground and polished to a fine finish to minimize leakage. Per AWWA C500, leakage may not exceed a rate of one fluid ounce of water per nominal inch of valve per hour.
- **Operator:** Device used to move the valve gate open and shut. Common examples of gate valve operators include an operating nut, handwheel, bevel/spur gears, electric actuators, and pneumatic actuators.



The Rotating Disc Gate Valve is recognized as a double-disc style gate valve under AWWA C500, but its added features make it superior to all other metal seated gate valves on the market. Let's review the features which make the Rotating Disc Gate Valve the most reliable gate valve in the waterworks industry today.

DISC AND WEDGE SYSTEM

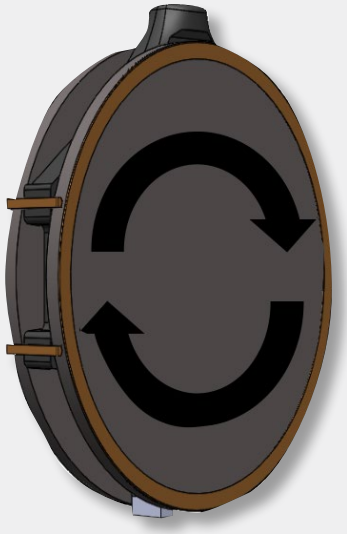
The Rotating Disc Gate Valve revolutionized the metal seated gate valve market with its innovative disc and wedge design. Unlike traditional metal seated gate valves, this design eliminates the need for any linkages or pins to hold the components in place within the valve body. The unique assembly consists of an upper and lower wedge, along with two identical discs that nest together within the valve body. This innovative, yet simplistic design makes any future need for parts replacement incredibly simple.

With no pins or hardware required for assembly, there is no risk of misplacing small components or assembling the valve incorrectly. This user-friendly design significantly reduces maintenance time and effort, ensuring that the valve remains in optimal working condition with minimal intervention. Additionally, this design prevents the accumulation of debris, as all working parts are free from pockets or cavities that could hinder cycling. This feature further reduces wear and tear, ensuring longevity and consistent functionality.

An added benefit of the disc and wedge design is that while the valve is in operation, as the valve closes, the lower wedge bottoms out within the valve body, working with the upper wedge to push the discs into the seated position. This sealing mechanism guarantees a tight seal, while minimizing any friction between the seating surfaces as the discs open and close.

ROTATING DISCS

The defining feature of the Rotating Disc Gate Valve lies in its innovative rotating discs—a design element that ensures long-term reliability and outstanding performance. The disc design does not require the use of any hardware, which allows the discs to rotate freely about a trunnion centered on the backside of each disc. This rotating action of the discs is a key aspect of the valve's self-maintenance capabilities.



With every operation, the discs are free to rotate, effectively cleaning themselves and removing any build-up that could damage the seating surfaces over time. This self-cleaning mechanism is crucial in preventing the accumulation of debris and mineral deposits, such as tuberculation, that could lead to premature deterioration of the seating surfaces. By ensuring that the seating surfaces remain clean and free of debris, the valve maintains optimal sealing performance over extended periods, reducing maintenance requirements and prolonging service life.

Beyond its self-cleaning benefits, the rotating disc action creates a new seating position with each closure, virtually eliminating any potential for uneven or excessive wear to the seating surfaces. In contrast, traditional double disc gate valve discs are fixed throughout operation, which makes it possible for wear patterns to develop over time. These wear patterns can compromise the valve's sealing capability, resulting in leaks that exceed allowable limits.

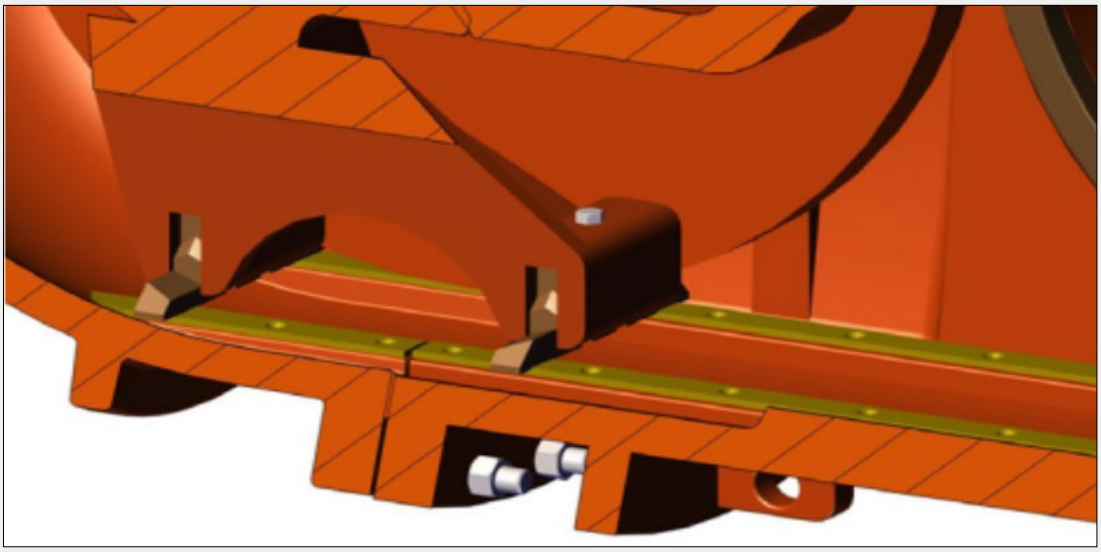
In contrast, the Rotating Disc Gate Valve's design ensures that the seating surfaces experience even wear, as the discs continuously change their contact points with each operation. This not only extends the lifespan of the valve but also enhances its reliability and performance. Customers can have confidence in the valve's ability to provide a consistent and secure seal, even after prolonged use in demanding environments.

TRACKS AND SCRAPERS

Sediment build-up is a common issue within the waterworks industry that has plagued valves in piping systems for decades. This problem arises when particles and debris present in the water supply accumulate inside the valve, leading to a range of complications. Without regular cycling, sediment build-up can become so severe that it causes significant damage to valve internals and can even render the valve completely inoperable. The consequences of this build-up can include reduced system efficiency and increased maintenance costs, which can be both costly and disruptive.

MPI's solution to combat sediment build-up in Rotating Disc Gate Valves is the track and scraper system. This system is comprised of two scrapers attached to the valve wedge that move along a track as the valve opens and closes, effectively scraping away tough build-up with each cycle. An added benefit of utilizing the track and scraper system is that it also acts as an additional support for the disc and wedge assembly.

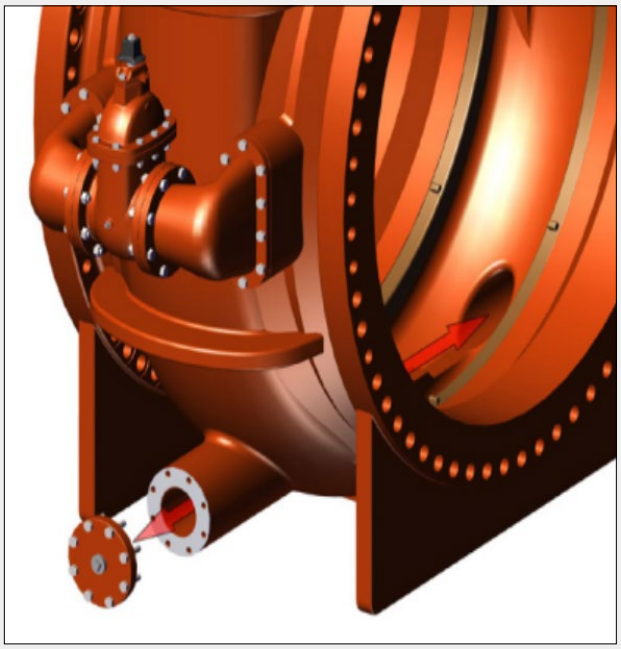
In doing so, the weight is more evenly distributed within the valve and prevents the assembly from exerting excessive stress on the valve stem. The track and scraper system is a standard feature provided on valve sizes 14" and larger when the valve is intended to be installed in a horizontal orientation.



FLUSHING PORTS

With Rotating Disc Gate Valves installed in a vertical stem orientation, flushing ports are MPI's solution for debris and sediment build-up within the bottom of the valve cavity. These ports allow for the valve to be flushed with water to ensure smooth operation and reduce the risk of debris being compacted in the bottom cavity.

Flushing ports are a standard feature on valve sizes 14" and larger when the valve is intended to be installed in a vertical orientation. Vertical installations are a preferred installation orientation for gate valves whenever possible, as a vertical installation allows gravity to assist with valve closure, resulting in lower operating torque requirements.



BYPASS VALVE

A bypass valve is an externally mounted isolation valve used to allow fluid flow around a gate valve in the closed position. In the case of a Rotating Disc Gate Valve, MPI utilizes a smaller diameter Rotating Disc as its bypass valve. The intended purpose of a bypass is to equalize pressure on both sides of the closed valve to reduce the required operating torque and wear on the seating surfaces as the valve opens. Bypass valves are an optional accessory on valve sizes as small as 16" and recommended on valve sizes 42" and larger.

CONCLUSION

The Rotating Disc Gate Valve presents a significant improvement over traditional metal-seated gate valves, particularly in demanding applications where durability, efficiency, and long-term reliability are critical. Unlike conventional gate valves that may struggle with sealing integrity and wear over time, the Rotating Disc Gate Valve enhances performance by minimizing friction during operation, reducing maintenance needs, and extending service life.

One of the most suitable applications for this robust valve is within wastewater treatment plants, specifically at the intake system, the essential first step in the treatment process. The intake system serves as the gateway for raw wastewater, collecting and channeling large volumes of influent water into the plant for processing. This raw wastewater often contains heavy debris, sediment, sludge, and other solid contaminants, making it crucial to have a highly resilient shutoff valve capable of managing unpredictable flow conditions while preventing blockages or mechanical failures.

With its rugged construction and proven performance, the Rotating Disc Gate Valve is an invaluable component for wastewater treatment facilities seeking long-term operational efficiency and reliability in their flow control systems. For additional information, please contact your local McWane Plant & Industrial representative.

48" Rotating Disc Gate Valve
Valley Creek Water Reclamation Facility
Jefferson County, AL

96" Rotating Disc Gate Valve
John C. Stennis Space Center – NASA
Hancock County, MS

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