THE SHUTTER VALVE

Clarke Industrial Engineering

High performance valve for gas, steam, liquid, dry bulk, slurry, and viscous medias.

Patented high-performance valve featuring:

- Precision flow control from a mist to full bore
- Leak-proof shut off to 1000 PSI
- Zero pressure drop technology
- Full bore operation
- Fully piggable for cleaning
- Low torque activation requirements
- Reduced cavitation and water hammer
- Low Power Consumption
- Absolute Reliability
- Cost Efficiency
- Compact Design

ENGINEERED WITH PRECISION

CFD (Computational Fluid Dynamics) analysis, using standard Navier-Stokes equations, has shown that the Shutter Valve eliminates the undesirable fluid disruptions of ball valves and butterfly valves. This means that the problems with noise, pumping losses, high energy costs and reliability will be greatly reduced by simply using the Shutter Valve in your system.

The key to the incredible performance is the fact that the petals open from the center, rather than pinching the walls of the pipe, providing access to the naturally smoothest portion of the pipe flow. The torque required to open the valve at operating pressure is much lower because of this as well. That is why you can use low torque actuators that cost less and take up less space with our valve than you can with butterfly valves and ball valves.

THE SHUTTER VALVE
Overview

Features:

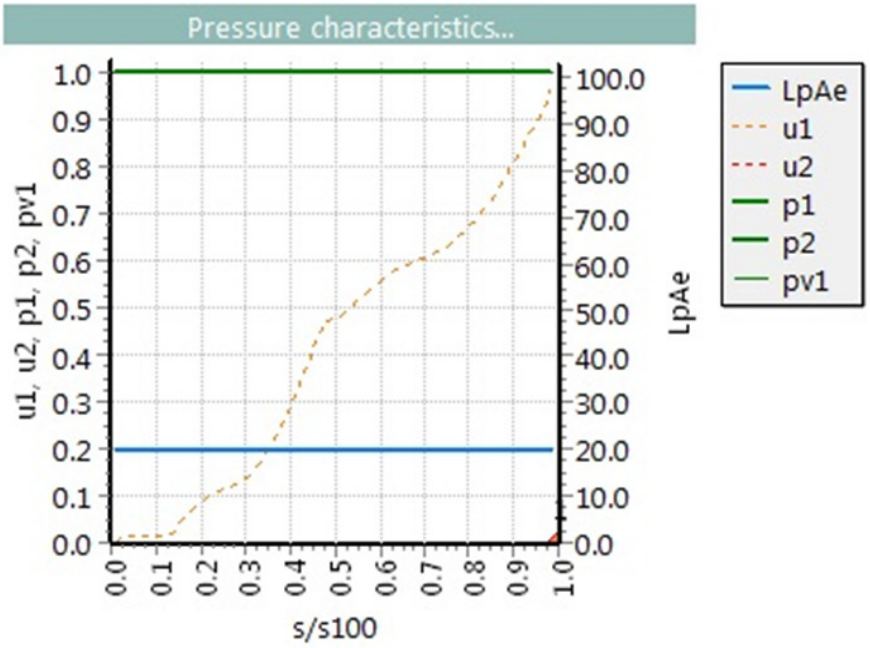
- Available in 1/4”, 1”, 2” and 4” sizes
- Leak-proof shut off to 1000 PSI
- Precise flow control
- Factory designed and assembled
- Temperature and pressure tested
- Stainless Steel 316; Aluminum 6061-T6 (4 inch only)
- Application specific seals and gaskets available
- Cleaning Seal for slurries and mixed phase media
- Easy maintenance and repair
- Plug and Play compatible with existing systems
- Fully piggable
- Temperature range: -40^0 F to $+600^0$ F (-40^0 C to $+315^0$ C)
- Zero pressure drop at full open
- Low actuation torque required
- Compact design
- Reduces turbulence
- Eliminates water hammer
- Stops cavitation
- Creates lower noise
- Lessens high frequency vibration

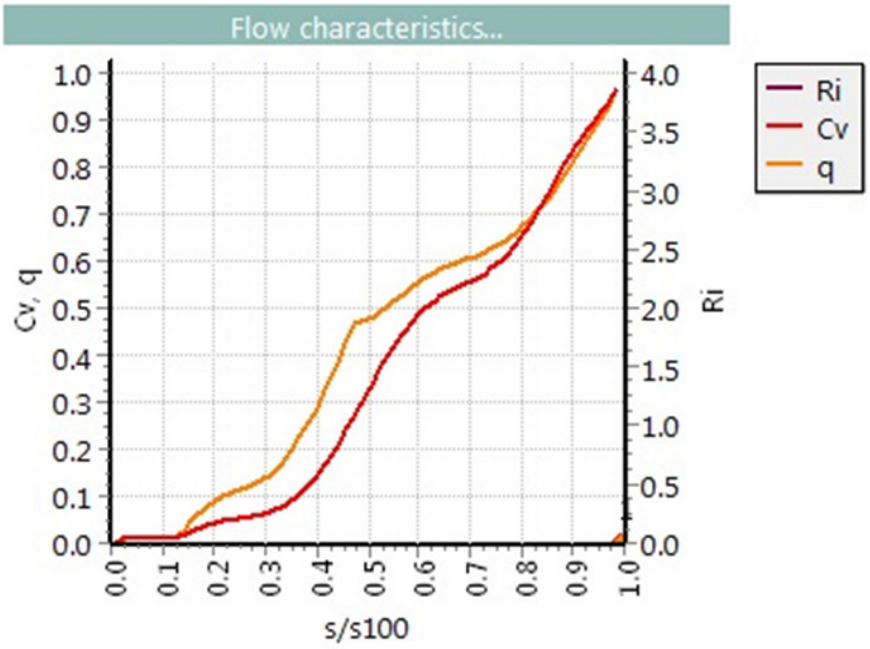
Industries:

- Chemical
- Pulp and Paper
- Energy
- Manufacturing
- Water and Wastewater
- Oil and Gas
- Food and Beverage
- Anywhere control and shut off valves are used

Design / Quality Standards & Specifications:
ASME B16.34
ASMB B16.10
ISO 9001:2012
EN12266:2012
API-6D (upon request)
ANSI/3-A 00-00-2014 C3.1
U.S. Patent numbers: 6,199,531; 8,910,920; 9,206,911

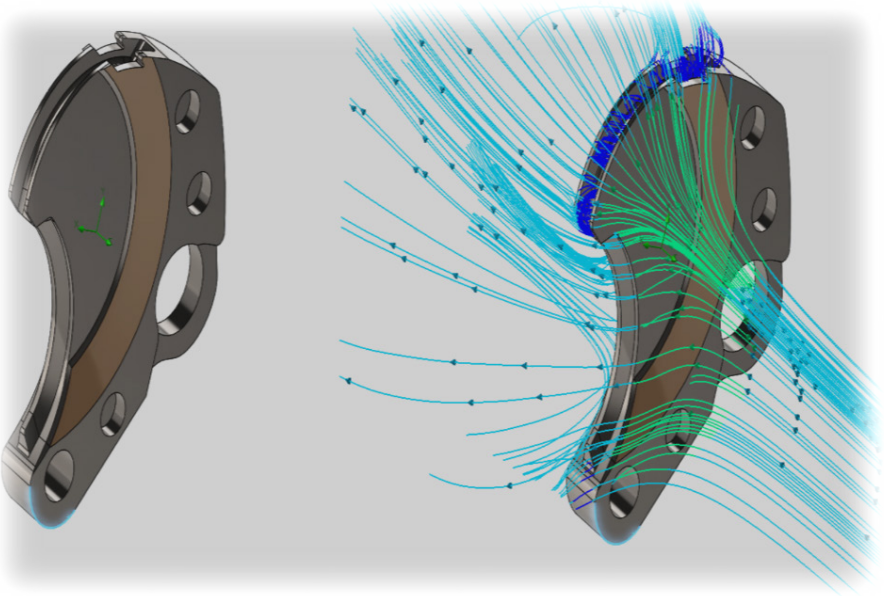
THE SHUTTER VALVE
Pressure and Flow Characteristics

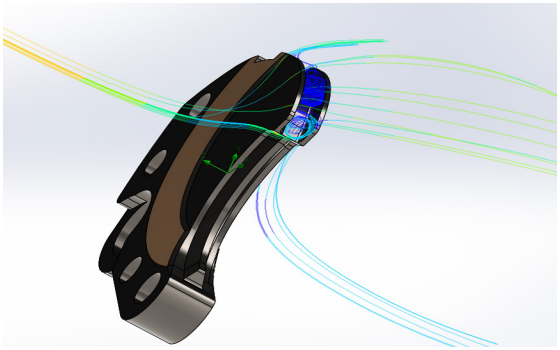


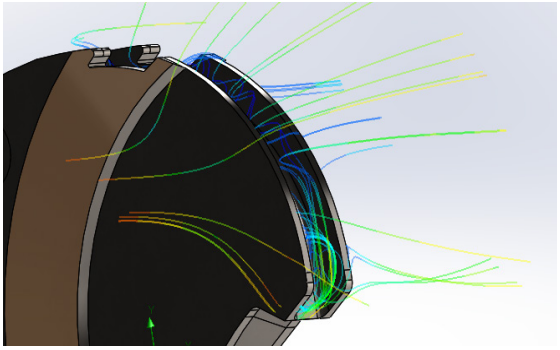


THE SHUTTER VALVE
Design Elements

- Inherently rugged design
- Wear forces scale down exponentially for critical surfaces
- Aerospace design elements reduce wear forces
- Once open, the seating surfaces are completely out of the flow path







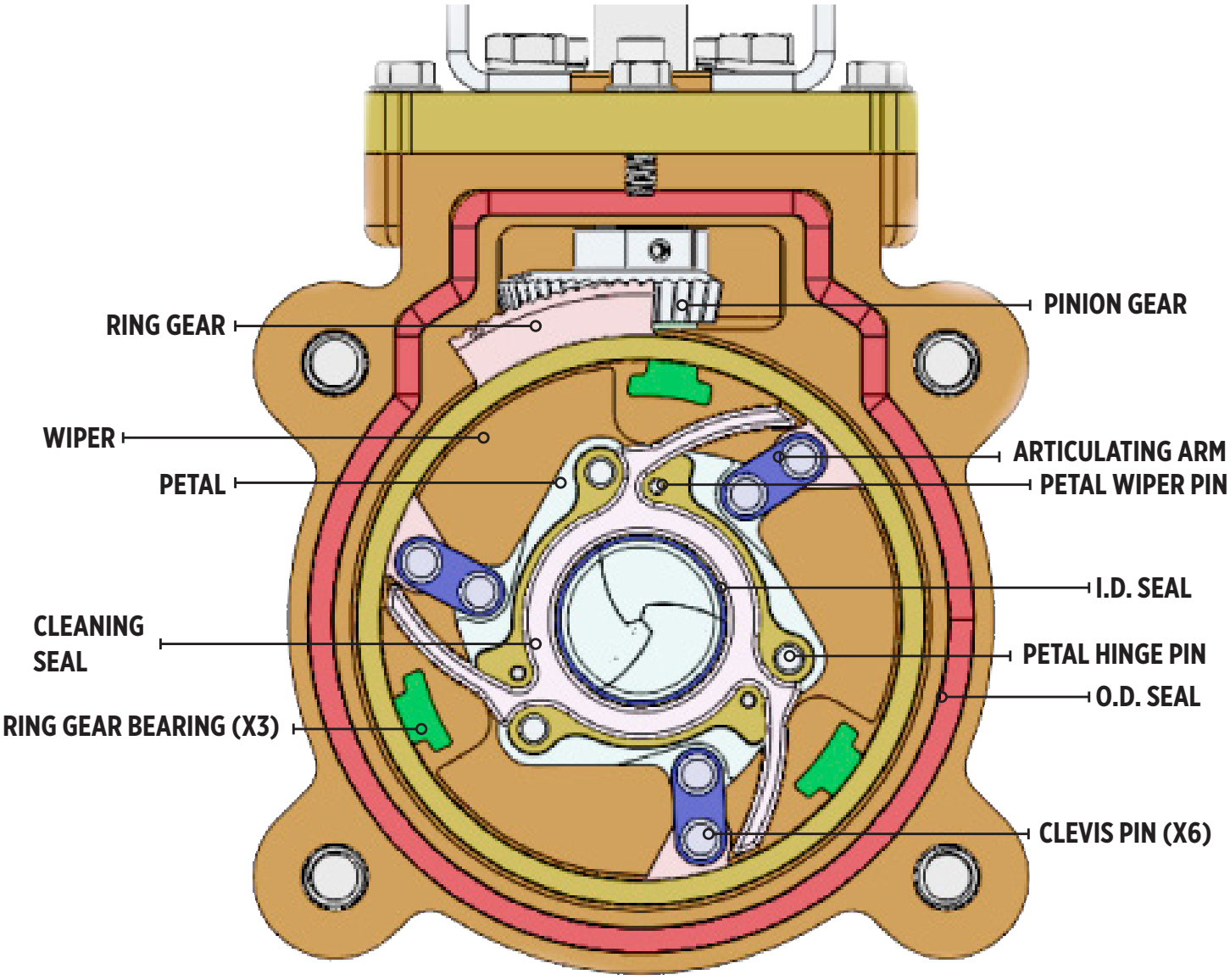
Throttling:

- Velocity decreases inside the sealing cavity which reduces the Reynolds number.
- Significantly reduces turbulence, cavitation and friction on the seal surface

Full Bore:

- The velocity inside the sealing cavity reduces significantly as the valve opens to full position

THE SHUTTER VALVE
Bill of Materials



THE SHUTTER VALVE
Materials

***Custom materials and coatings are available upon request**

ITEM	QTY	DESCRIPTION	MATERIAL	OPTIONAL MATERIALS
1	1	Ring Gear - Driven by the pinion gear to rotate the petals between open and closed	Stainless Steel	FC3N (6% Ni), FC8N (Ni-CR-Mo), Aluminum Alloy (G-AISi0Cu3, G-AISi10Mg)
2	3	Petal - Three interlocking petals containing embedded seals that interlock in the axial and radial directions to provide a bubble tight seal	Stainless Steel	FC3N (6% Ni), FC8N (Ni-CR-Mo), Aluminum Alloy (G-AISi0Cu3, G-AISi10Mg)
3	1	Cleaning Seal - Provides three sealing surfaces to each petal to maintain bubble tight performance over the life of the valve.	Elastomer	PTFE, EPDM, Viton, Buna N (Nitrile), Acetal (Delrin®)
4	3	Petal Wiper - Interlocks with the cleaning seal in the closed position designed to wipe away any excess media out of the cavities and into the flow path	Stainless Steel 316	FC3N (6% Ni), FC8N (Ni-CR-Mo), Aluminum Alloy (G-AISi0Cu3, G-AISi10Mg)
5	3	Ring Gear Bearing - Provides a low friction wear surface to the ring gear while assisting in maintaining radial centrality	Stainless Steel 316	FC3N (6% Ni), FC8N (Ni-CR-Mo), Aluminum Alloy (G-AISi0Cu3, G-AISi10Mg)
6	1	Pinion Gear - Sized to provide 1/4 turn rotation at the shaft	Stainless Steel 316	FC3N (6% Ni), FC8N (Ni-CR-Mo), Aluminum Alloy (G-AISi0Cu3, G-AISi10Mg)
7	1	Articulating Arm - Provides additional closing force to the petal to ensure long-lasting, bubble tight performance	Stainless Steel 316	FC3N (6% Ni), FC8N (Ni-CR-Mo), Aluminum Alloy (G-AISi0Cu3, G-AISi10Mg)
8	3	Petal Wiper Pin - Secures the wiper head to the petal. Stainless steel and flush fit to the wiper face for low wear	Stainless Steel 316	FC3N (6% Ni), FC8N (Ni-CR-Mo), Aluminum Alloy (G-AISi0Cu3, G-AISi10Mg)
9	1	O.D. Seal - Provides a safety seal for shell strength to prevent fluid leakage outside the valve cavity	Elastomer	PTFE, EPDM, Viton, Buna N (Nitrile), Acetal (Delrin®)
10	6	Clevis Pin - Secures the articulating arms to the ring gear bosses and the corresponding petal boss	Stainless Steel 316	FC3N (6% Ni), FC8N (Ni-CR-Mo), Aluminum Alloy (G-AISi0Cu3, G-AISi10Mg)

THE SHUTTER VALVE
Sanitary and Clean-In-Place Information

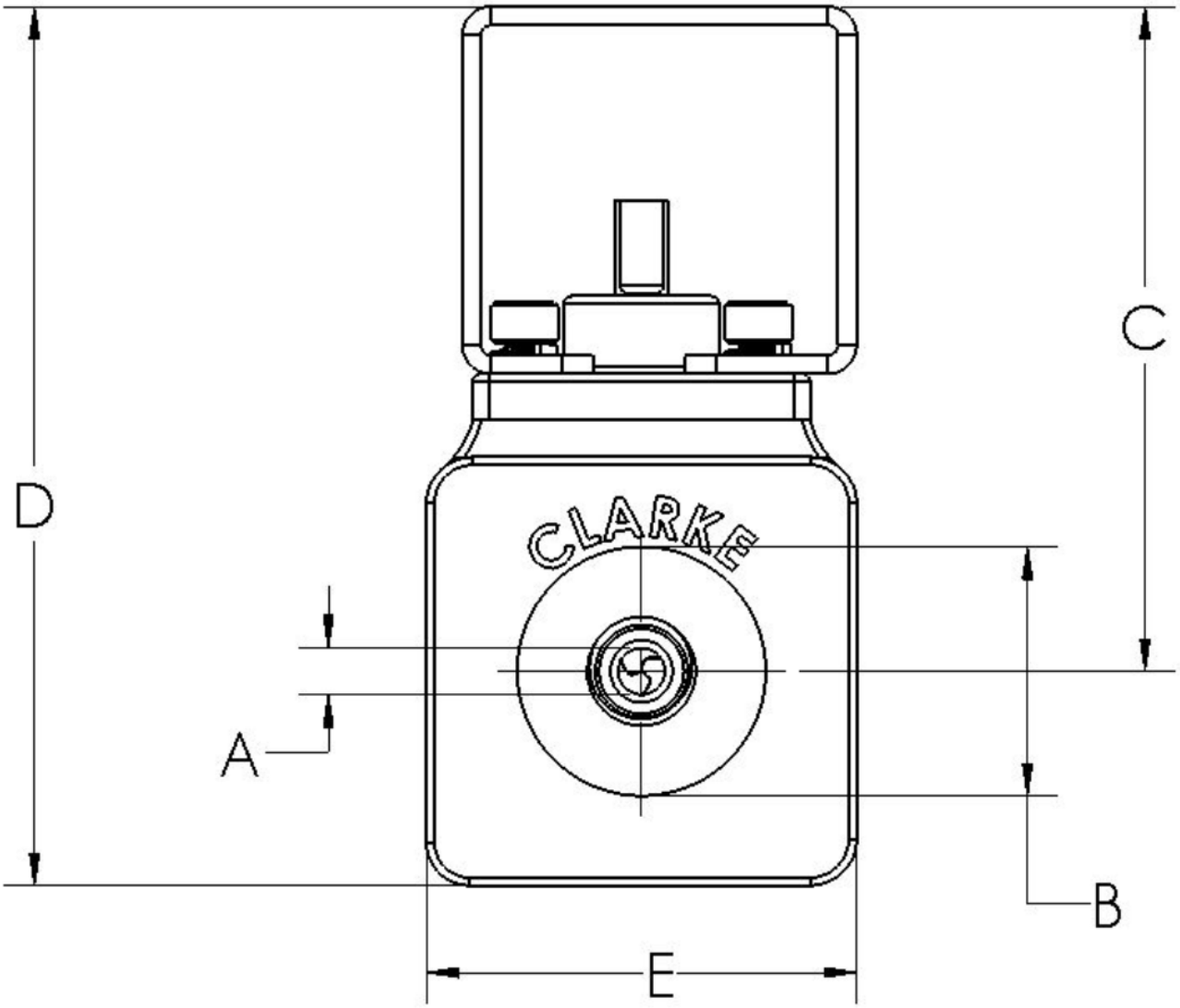
Designed to comply with ANSI/3-A 00-00-2014 C3.1

- The Shutter Valve is manufactured using Stainless Steel 316 which includes a 3.0% addition of molybdenum to increase resistance to pitting and crevice corrosion which may be encountered in higher levels of cloride or strong cleaning solutions.
- The Shutter Valve is designed with a non-flooding body and stem seal.
- All Clean-In-Place surfaces are readily accessible and inspectable.
- The Cleansing Seal of the Shutter Valve is designed to push any flow particulates back into the flow when the valve is actuated from the full open position.
- The Clean-In-Place system of the Shutter Valve is designed so that cleaning solutions are in direct contact with all product contact surfaces without any manual cleaning steps.
- Clean-In-Place testing has been evaluated and approved by an independent third party testing facility.

Recommended Clean-In-Place Procedures for The Shutter Valve

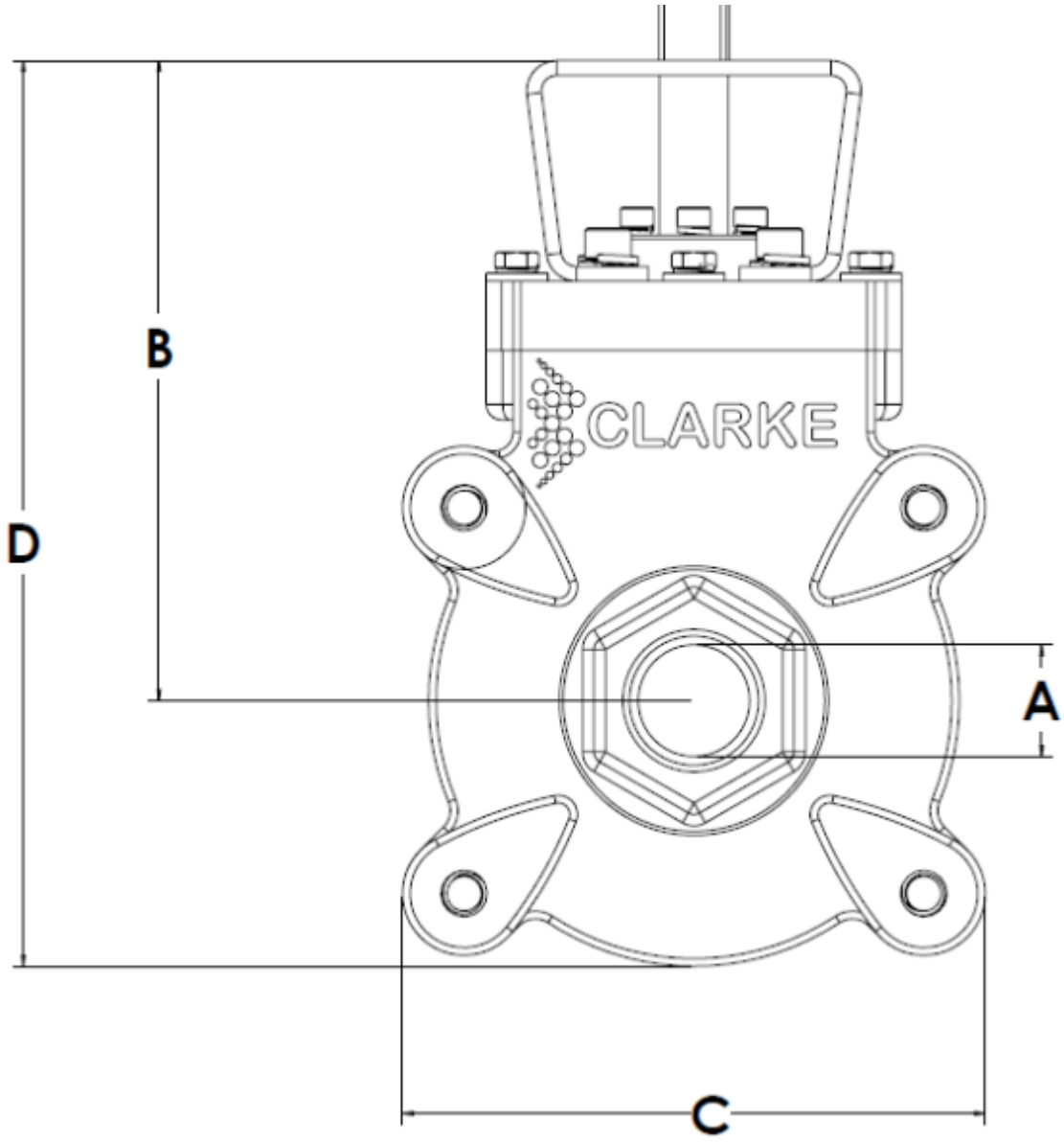
Step 1: Begin with the Shutter Valve in the full-open position.
Step 2: Using water at 100 PSI of pressure, cycle the Shutter Valve from the full-open to the full-closed position ten times using an appropriate cleaning agent for the application.
Step 3: Return the Shutter Valve to the full-open position.

THE SHUTTER VALVE
1/4” Model



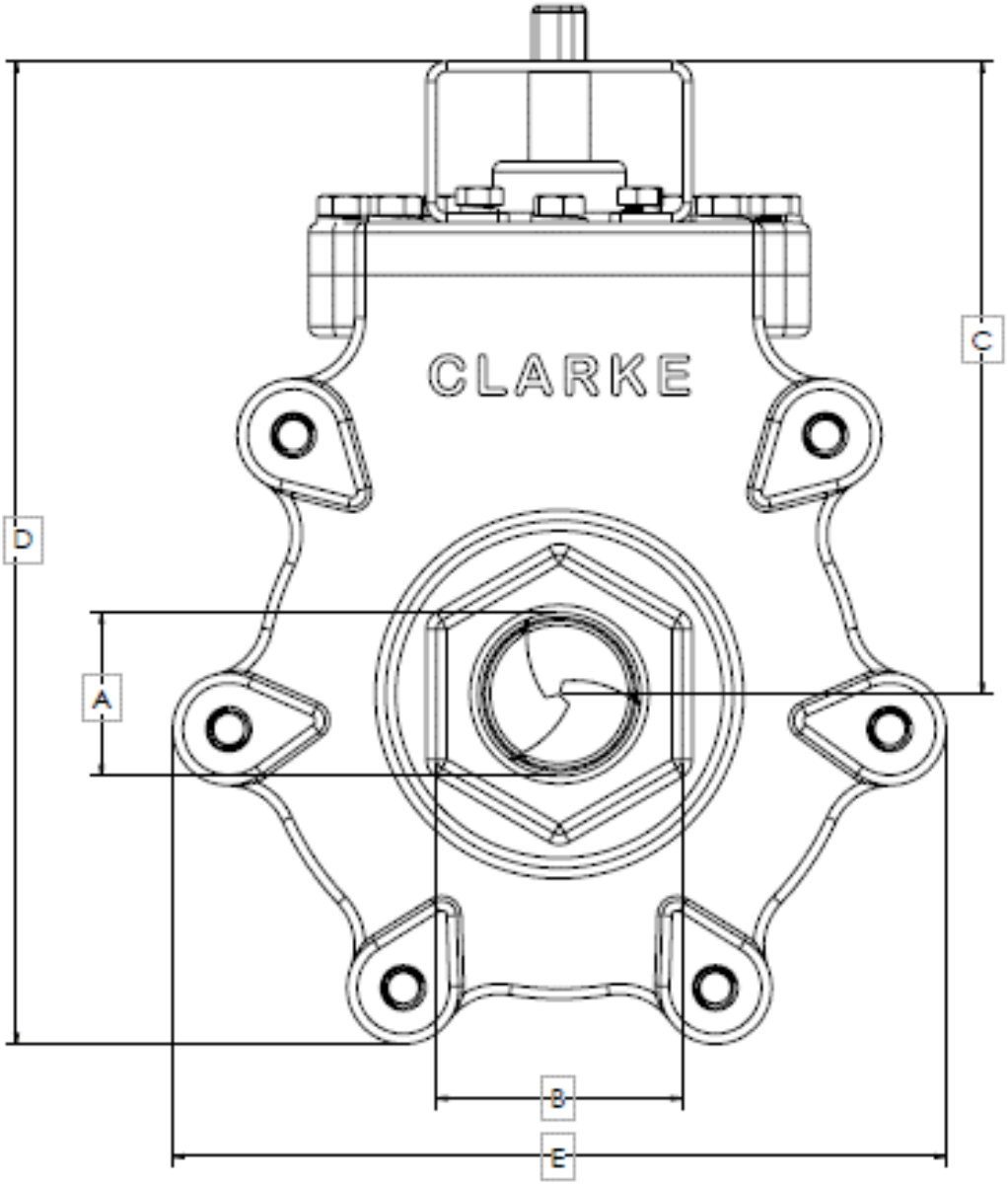
Size	Weight (LBS)	A	B	C	D	E	Cv	Min. Torque
1/4” Stainless Steel	1.4	0.18”	1.0”	2.67”	3.53”	1.73”	1.4	10 lb-in

THE SHUTTER VALVE
1” Model



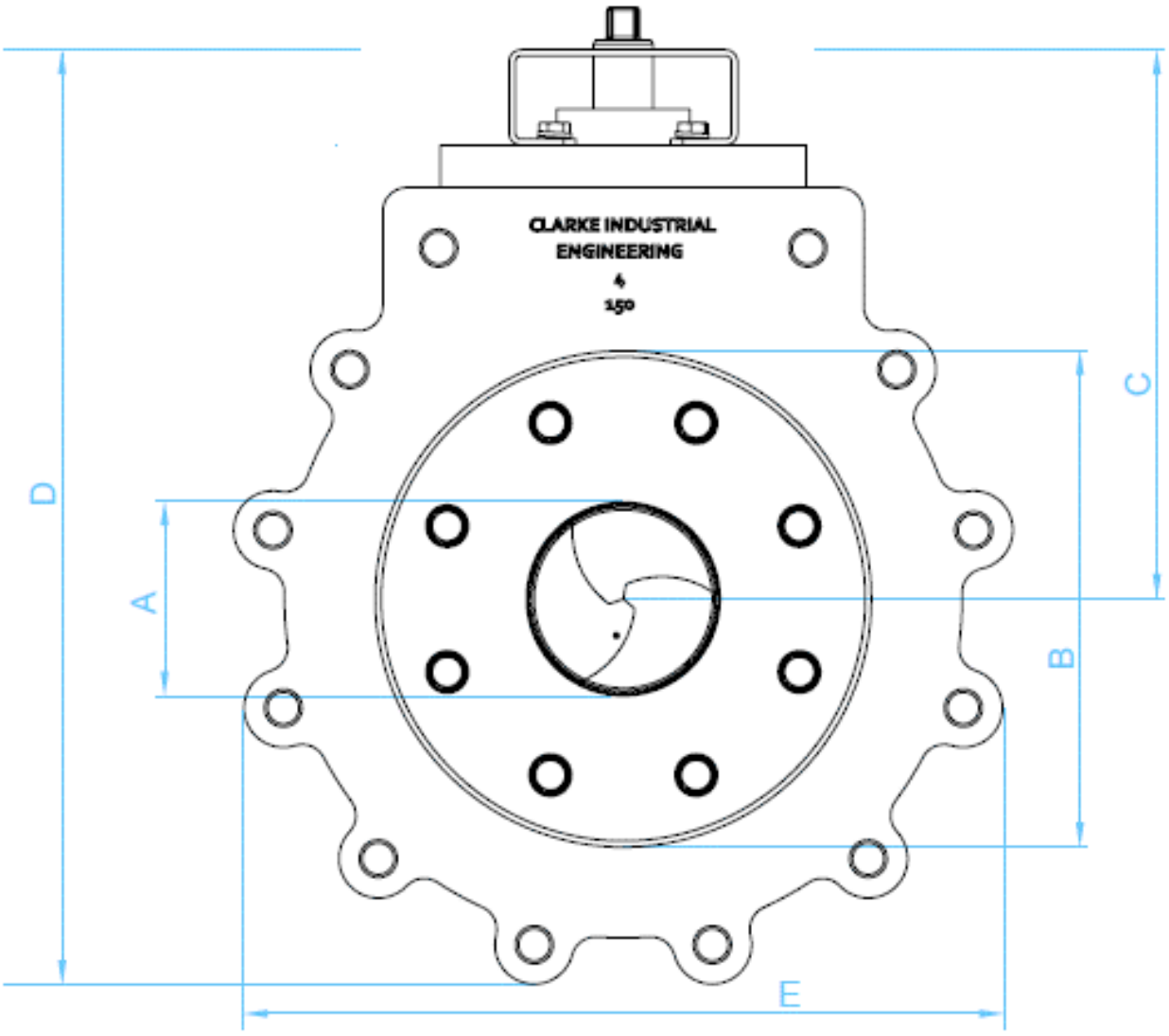
Size	Weight (LBS)	A	B	C	D	E	Cv	Min. Torque
1” Stainless Steel Class 600	6	0.91”	5.2”	4.7”	7.4”	3.31”	61	80 lb-in
1” Stainless Steel Class 900	Class 900 is being tested currently							

THE SHUTTER VALVE
2” Model



Size	Weight (LBS)	A	B	C	D	E	Cv	Min. Torque
2” Stainless Steel	44	2.00”	3.00”	7.74”	12.01”	9.46”	312	300 lb-in

THE SHUTTER VALVE
4” Model



Size	Weight (LBS)	A	B	C	D	E	Cv	Min. Torque
4” Stainless Steel	180	4.00”	10.00”	10.38”	17.42”	14.44”	1495	500 lb-in
4” Aluminum	72	4.00”	10.00”	10.38”	17.42”	14.44”	1495	500 lb-in

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