

Proven performance for  
industries that demand reliability.



## Virgo Triple Offset Valve Applications Guide



# Why Virgo?

The Virgo line of Ball Valves and Triple Offset Butterfly Valves are part of Emerson Process Management product portfolio. Emerson has experts located around the globe, ready to help solve the problems our customers face; this includes a huge network of experts in the Virgo product line. The Virgo product portfolio, in combination with other Emerson products, provides our customers with a complete valve solution that addresses their problems and optimizes their processes.

All Virgo products are designed utilizing the latest design tools, including Pro-E, Computational Fluid Dynamics (CFD), and Finite Element Analysis (FEA), to ensure that our products are safe, reliable and perform as advertised. During manufacturing, Emerson utilizes state-of-the-art equipment and techniques to produce Virgo products cost-effectively, with quality standards that often exceed those of other valve manufacturers. All of this exceptional design and manufacturing is capped off with an industry-leading test facility. Not only does Emerson's test facility assure that Virgo products are made according to exceptional quality standards, our facility can perform testing to certify that our products are compliant to the latest standards and certifications.

When you purchase Virgo products you can expect:

- **Reliable products at a competitive price** – Emerson's investment in superior manufacturing equipment, an ongoing commitment to keep our employees well-trained, and our quest for upper quartile performance are just a few items that drive our mission for the highest in-class quality. At the same time, our global supply chain and manufacturing allows us to produce products at very competitive prices when compared to other high-quality valve manufacturers.
- **Expert project management** – Virgo valves have been supplied to over 2,300 projects around the globe, both large and small. We help our customers maintain project certainty by presale design collaboration, a structured project execution process, and maintaining flexibility throughout the manufacturing process. The result is a responsive supplier that supports you throughout the process and meets the promised delivery dates.
- **Single point accountability** – Emerson owns the process from design, manufacturing, assembly, automation, integration, and lifecycle coverage. Emerson goes to great lengths to maintain full process accountability that only a few industry-leading manufacturers can provide. This includes having our own in-house foundry, which enables Emerson to maintain the highest quality standards on all Virgo products.
- **Local support and a global presence** – Our vast network of Local Business Partners (LBPs) are there to support our customers, including you, around the globe. These partnerships offer our customers superior pre- and post-sales support, local inventory, as well as a comprehensive range of other services.
- **Safe, proven products** – We are committed to delivering quality products that meet or exceed our customers' expectations. This commitment starts with thorough testing of our products to ensure that they comply with the latest standards and certifications. This is backed up by years of experience in many of the most demanding applications around the globe. We have supplied over 1 million valves to more than 150 of the world's leading EPCs, OEMs, and end users, and they keep coming back to Emerson over and over.

# About the Product

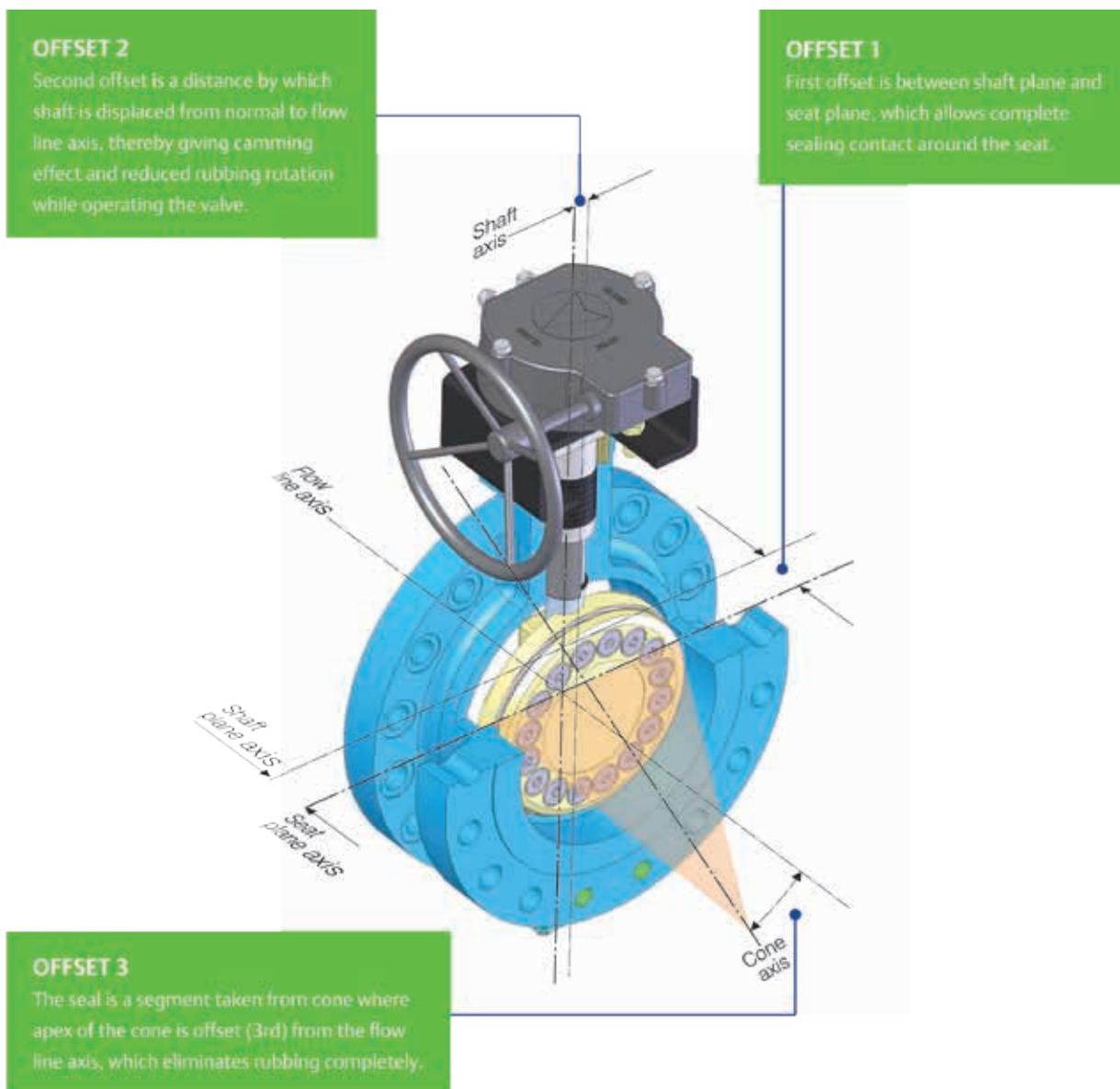
Virgo's Triple Offset Valve (TOV) is a quarter-turn, metal-to-metal sealing, zero-leakage valve. Lighter in weight compared to other types of valves, it features low-operating torques, high cycle life, an inherently fire-safe design, a one-piece shaft with blowout-proof construction, sealed bearings, and adjustable shaft seals for low emissions.

The TOV provides consistent performance with demanding processes, namely, steam, high pressure, and cycled services. It is relied upon in oil and gas process lines, refineries, power plants, sea water treatment facilities, pump stations, wastewater effluent treatment plants, circulating water systems, desalination facilities, and cooling water system applications.

The versatility of design and construction allows for use in various applications and within a wide range of temperatures.

## PRODUCT RANGE

- Size: 3" to 56"
- Rating: ANSI 150# to ANSI 600#
- Temperature Range: -50 °C to 400 °C
- Disc sealing: Graphite / Metal laminated
- End Connections: Lug, Double Flanged (short pattern), Double Flanged (long pattern for gate valve replacement)





Virgo's Triple Offset Valve (TOV) possesses many advantages over gate, globe, and plug valves, particularly in large valve applications. Among the most obvious ones are savings in weight, space, and cost. Maintenance costs are usually low because there is a minimal number of moving parts and there are no pockets to trap fluids. The TOV, being a quarter-turn low-torque valve, offers you the ability to easily and cost-effectively automate the valve.

Some of the advantages of Virgo's Triple Offset Butterfly Valves include:

- Compact design that requires less space compared to other valves
- Lightweight
- Easy to automate
- Quick operation that requires less time to open or close, making them ideal in emergency shutdown applications
- Long cycle life, having few moving parts and a non-rubbing seat
- Available in very large sizes
- Low-pressure drop and high-pressure recovery
- Zero leakage
- Highly reliable, requiring little or no maintenance
- Low fugitive emissions

## REFERENCE STANDARDS

Design and Manufacturing	API 609 (Category B), ASME B16.34, BS EN 593
Face-to-Face / End-to-End	API 609, ASME B16.10, ISO 5752 Series 13, ISO 5752 Series 14
End Connection	ASME B16.5 for flanged end up to 24" / ASME B16.47 for larger size Series A and B
Testing	API 598, ANSI/FCI 70-2
Safety	SIL3
Fire Test	API 607 / ISO 10497-5, API 6FA
Fugitive Emission Testing	MESC 77/312, ISO 15848-1, ISO 15848-2
Material Conformance	NACE MR 01-75
Product Compliance	Pressure Equipment Directives PED (97/23/EC), EAC



The replacement of gate and plug valves presents cost savings opportunity when using the Virgo's Triple Offset Valve. The following table illustrates the advantages of the TOV compared to those valves:

PARAMETERS	TRIPLE OFFSET VALVE (TOV)	GATE VALVE	PLUG VALVE
Design Standard	API 609	API 600	API 6D
Testing Standard	API 598	API 598	API 6D
Face to Face Dimensions	API 609	ASME B6.10	API 6D
Fire Safe	As per API 607 / API 6FA	As per API 6FA	As per API 6FA
Ease of Operation / Operating Time	Quarter turn / Fast opening	Multi turn / Takes time to open	Quarter turn / Quick open if lubricated
Automation	Easy to automate	Unreliable to automate	Actuator sizing difficult due to inconsistent torques
Leakage	Zero leak	No zero leakage, leakage allowed per testing standard	Zero leakage achieved only by using lubricant
Weight	Light	Heavy	Heavy
Fugitive Emission Tightness	Excellent	Poor	Good
Maintenance	No maintenance required	Required for smooth operation	Required for smooth operation
Control Valve Application	Yes	No	No
Jamming/ Galling / Seizing	No probability	High probability	Very high probability
Positive Segregation	Yes	No	Yes
Application	All applications where gate & plug valves are used, except piggable lines. Critical applications like LNG and tank farms where zero leakage is mandatory.	Can't be used for critical applications	Limited usage
Conclusion	Triple offset valves are more reliable and easy to operate. They have zero leakage (tight shut-off) and require little or no maintenance. Triple offset valves are inherently fire-safe and do not have soft parts, making them the best valve for fire-hazard applications.		

# Applications



Virgo's Triple Offset Valve (TOV) is designed for critical applications in a variety of industries.

Applications include:

## OIL AND GAS

Upstream, Downstream, Pipeline and Storage

- Isolation of reservoirs and storage
- Steam piping and condensate
- Cooling water systems
- Desalinization
- Transport of hydrocarbons
- Desulfurization system
- Hydrogen gas service
- Services with hot gasses
- Services with solvents
- LPG and LNG lines

## MINING AND METALLURGY

- Water pumping stations
- Cooking water services

## REFINING

- Oil storage isolation
- Hot cracking gas
- Flare gas hydrogen
- Sour gas isolation
- Steam supply valves
- Catalytic cracker units
- Desulfurization systems and tail gas treaters
- Sulfur condenser switch
- Terminals and tank farms
- Coker plants
- Fire suppression

## STEEL MILL

- Cooling water pumping stations
- Hot gas (tail gas)
- Hot air
- Blast furnace, tail gas and coke oven gas

## POWER GENERATION

Renewables, Fossils, District Heating, Nuclear and Coal

- Equipment isolation (pumps, valves, heat exchangers, condenser cooling, etc.)
- Gas turbine isolation
- Pump and steam extraction isolation
- District heating and cooling
- Condenser cooling
- Suppression system
- Cooling, condensate, feeding water and steam
- Gas exhaustion and air injection

## CHEMICAL AND PETROCHEMICAL

- Ethylene plants
- Ethylene crackers
- Propylene plants
- Hydrogen gas service
- Propane gas service



- Brine, CO<sup>2</sup> vapor and steam service
- Cryogenic services
- Thermal fluids
- Tail gas
- Hydrocarbon gas service
- Flare inlet and manifold isolation
- PSA and molecular sieves
- Coker plants
- Pump isolation

### **SUGAR AND ALCOHOL**

- Steam
- Cooling water
- Vegetable steam
- Boiler feed water piping
- Equipment isolation (pumps, heat exchanges, etc.)
- Pre-evaporators isolation
- Condensate lines
- Pressure relief of process steam lines

### **PULP AND PAPER**

- Boiler isolation equipment (pumps, etc.)
- Steam isolation
- Green, white and black liqueurs
- Whitewash
- Cooling water
- Boiler feeding
- Steam and cogeneration systems

### **WATER AND SEWAGE**

- Water distribution pumping
- Sewage pumping
- Water and waste treatment
- Water pumping stations

### **NUCLEAR**

- Containment isolation
- Saltwater service
- Core spray systems

### **LNG**

- All liquid gases
- Oil field recovery
- Liquid natural gas
- Gasification plants and storage
- LNG ships
- Tank farm isolation

### **OTHER APPLICATIONS**

- Automotive production
- Shipyards
- Aerospace
- Food and beverage
- Water pipelines
- District storage and distribution
- Tanks and terminals
- Abrasive services
- Fire suppression systems
- Marine

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