

### Rate Technology Systems

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# Quantum SERIES

### VALVES FOR DRY BULK PROCESSING & CONVEYING

For more than 40 years, Vortex Quantum Series slide gates and diverters have been used to shut off, meter, divert and converge dry bulk solid materials in gravity flow and pneumatic conveying processes. As our flagship line, the Quantum Series is the foundation to Vortex's design philosophy – and is especially known for in-line maintainability using minimal spare parts.



### **FAST C TRACK**



History: Worldwide, plant managers and maintenance engineers recognize the Vortex<sup>®</sup> Orifice Gate<sup>™</sup> as the industry standard. It was the first valve specifically designed for handling dry bulk solid materials, and is "the original" orifice gate valve.

Purpose: Prior to the Orifice Gate, conventional knife gates and butterfly valves were commonly used in dry bulk solid material handling systems. Though knife gates and butterfly valves are well-designed for handling liquids and gases, they are ill-equipped for handling dry bulk solids. With their deficiencies in mind, the Vortex Orifice Gate was designed to present a high-guality solution specifically for dry bulk solids handling.



**OPTIONS** 



**KEY FEATURES** 



Live loaded, wear compensating hard polymer pressure plate seals







Displacement area as an alternative to packing materials into an end seal

Conveyance Type	Gravity flow & dilute phase pneumatic conveying applications. Can handle differential pressures up to 15 psig   1 barg   0.1 MPa, depending on gate size. Can be used in pressure or vacuum systems.
Materials Handled	Non-abrasive to moderately abrasive powders, pellets and granules. Modifications available for handling corrosive materials and/or for wash-down.
Standard Sizes	2 – 16 in   50 mm – 400 mm
Opening	Available in round sizes
<b>Overall Height</b>	2 – 3 in   50 – 75 mm
Weight	10 – 225 lb   5 – 100 kg
Flange Options	Standard stud bolt pattern, thru-bolt pipe connection, ANSI #125/150, DIN PN10, JIS 10 Custom flanges are available
Material Temperatures	180° F   80° C for standard gate, with modifications that allow up to 400° F   205° C
<b>Body/Frame Options</b>	Aluminum, 304 stainless steel, painted carbon steel
Material Contact Options	304 or 316L stainless steel
Pressure Plate Options	Nylon, PET, UHMW-PE, glass-filled PTFE, molybdenum disulphide-impregnated nylon
Load Seal Options	Natural rubber and/or silicone rubber
Drive/Actuation	Double-acting air cylinder, hand wheel/crank, chain wheel, electric actuator (see pages 61 & 62)
Position Confirmation	Magnetic reed, proximity or mechanical limit switches, and/or clear bonnet cover for visual indication (see page 63)
Material Flow Controls	AVP, IVP, VPO, VPC (see pages 65 & 66) * Gate must cycle to full-open between runs to keep the displacement area clear of materials
Other Options	Sealed body air purge (see page 64) Special Service inlet (see page 67)
Compliance	ATEX Zone 20 (internal), ATEX Zone 21 (external), FDA

### THE POWER OF COMPARISON

### Vortex Orifice Gate vs. Alternatives

- · Many alternative slide gates and butterfly valves rely on soft rubber seals which are directly exposed to the material flow stream. These seals rapidly erode or tear away in service. Others rely on bonnet packing, which can relax and allow material packing in the seals. These deficiencies promote leakage of materials and dusts past the gate and to atmosphere, in addition to actuation issues and several other maintenance concerns. The Vortex® Orifice Gate™ addresses these issues by incorporating "live loaded" hard polymer pressure plate seals. Hard polymer provides greater wear resistance and longer service life than alternative sealing materials. The hard polymer seals are "live loaded" with compressed rubber backing to ensure even as the polymer experiences frictional wear from many actuations over time, the rubber load seals continuously force the polymer seals against the sliding blade. The seals are also shielded from the material flow stream, to protect them from abrasion. This design maintains the gate's positive seal of materials/dust-tight seal with infrequent maintenance intervention.
- Many alternative slide gates and butterfly valves have open cavities where materials can wedge and prevent positive material shut-off. Wedging can also create seal wear and material degradation, and can cause a gate to seize and bind. Wedged materials also create risk for cross-contamination and spoilage. To prevent wedging and ensure positive gate closure, the Orifice Gate's sliding blade is designed to mechanically clear materials away from the sealing surfaces with each opening stroke. This ensures migrant materials are forced back out of the seals and are discharged into the process line, rather than packing in the seals and causing actuation issues.
- Many alternative slide gates allow metal-on-metal sliding, which creates galling. This causes a gate to seize and bind, and can create foreign metal fragment contamination. The Orifice Gate's hard polymer seals eliminate metal-on-metal contact to resolve each of these concerns.
- A butterfly valve's rotating disc is directly exposed to the material flow steam, which creates wear to the disc itself. The exposed disc also disrupts convey line pressures and obstructs material flow as they pass through the valve, which can cause line plugs and other maintenance concerns. To resolve these issues, the Orifice Gate's sliding blade is machined with an unobstructed, full-bore orifice that maintains convey line pressures and allows unrestricted material movement.
- If the pressure plate seals have partially worn and the compression load is lessened, slight dusting may be present through the weep holes at the front of the gate. With this maintenance indication, the Orifice Gate's shimming system can be utilized to restore the gate's dust-tight seal. Unlike alternative valves, which require spare parts be kept on-hand for seal maintenance, the Orifice Gate requires removal of parts. By simply loosening the nuts along the lateral aspects of the gate, shim(s) can be removed from each side and the nuts retightened to restore the pressure plate seals' compression load. This maintenance process can be performed while the gate remains in-line, and can be repeated several times before the shims and pressure plate seals must be replaced.
- The Orifice Gate is designed with several replaceable parts, including actuator, sliding blade, clevis, pressure plate seals and shims, among others. If maintained and operated as recommended, these should be the gate's only wear parts. In several cases, this has allowed an Orifice Gate to remain in service for many years -and sometimes, even decades.

VORTEX | Quantum Series





Ideal application: Installations above or below gravity-fed hoppers/silos, mixers, and augers/screw conveyors. It is also an excellent choice for application as an air shut-off gate/damper valve in vacuum dust collection systems. Custom sizes are available to accommodate any combination of gate stroke or width.





**Dual Cylinder** 

**OPTIONS** 

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**KEY FEATURES** 



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and minimizes material contact with the seals

Cam-adjustable rollers for in-line maintenance

for in-line maintenance

Live loaded, wear compensating hard polymer bonnet & side seals

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Conveyance Type	Gravity flow only. Contact us to discuss suitability for use in low pressure/vacuum applications.
Materials Handled	Non-abrasive to moderately abrasive powders, pellets, granules and dusts. Modifications available for handling sticky and/or corrosive materials, and for wash-down.
Standard Sizes	6 – 30 in   150 – 760 mm Contact us for custom sizes
Opening	Available in square or rectangular sizes. Round transition options are available (see page 67)
<b>Overall Height</b>	3 – 4 in   75 – 100 mm
Weight	30 – 200 lb   15 – 90 kg
Flange Options	Standard flange or CEMA flange Custom flanges are available
Material Temperatures	180°F   80°C for standard gate, with modifications that allow up to 400°F   205°C
<b>Body/Frame Options</b>	6061-T6 aluminum, 304 or 316L stainless steel
Material Contact Options	304 or 316L stainless steel
onnet & Side Seal Options	Nylon, PET, 25% glass-filled PTFE, felt
Load Seal Construction	Silicone rubber
<b>Roller Options</b>	PET, 25% glass-filled PTFE, hardened steel, stainless steel & bronze
End Seal Options	UHMW-PE, polyurethane, PET, 25% glass-filled PTFE
Drive/Actuation	Double-acting air cylinder, hand wheel/crank, chain wheel, electric actuator (see pages 61 & 62)
Position Confirmation	Magnetic reed, proximity or mechanical limit switches, and/or clear bonnet covers for visual indication (see page 63)
Material Flow Controls	AVP, IVP, VPO, VPC (see pages 65 & 66)
Other Options	Dual cylinder actuators (see page 61) Sealed body air purge (see page 64) Return Pan & Special Service Inlet (see page 67)
Compliance	ATEX Zone 20 (internal), ATEX Zone 21 (external), FDA

### THE POWER OF COMPARISON

### Vortex Roller Gate vs. Alternatives

The Vortex<sup>®</sup> Roller Gate<sup>™</sup> provides advantages over alternative roller-supported slide gates:

- Many alternative roller-supported slide gates rely on soft rubber seals which are directly exposed to the material flow stream. These seals rapidly erode or tear away in service. Others rely on bonnet packing, which can relax and allow material packing in the bonnet area. These deficiencies promote leakage of materials and dusts past the gate and to atmosphere, in addition to actuation issues and several other maintenance concerns. The Roller Gate addresses these issues by incorporating "live loaded" hard polymer bonnet seals and side seals. Hard polymer provides greater wear resistance and longer service life than alternative sealing materials. The hard polymer seals are "live loaded" with compressed rubber backing to ensure even as the polymer experiences frictional wear from many actuations over time, the rubber load seals continuously force the polymer seals and rollers are also shielded from the material flow stream, to protect them from abrasion. This design maintains the gate's positive seal of materials/dust-tight seal with infrequent maintenance intervention.
- Many alternative slide gates allow metal-on-metal sliding, which creates galling. This causes a
  gate to seize and bind, and can create foreign metal fragment contamination. The Roller Gate's
  hard polymer seals eliminate metal-on-metal contact to resolve each of these concerns.
- Many alternative roller-supported slide gates have open cavities where materials can wedge and prevent positive material shut-off. Wedging can also create seal wear and material degradation, and cause a gate to seize and bind. Wedged materials also create risk for cross-contamination and spoilage. To prevent wedging and ensure positive gate closure, the Roller Gate's sliding blade is designed to mechanically clear materials away from the sealing surfaces with each actuation. With each closing stroke, the Roller Gate mechanically self-cleans its side seals. With each opening stroke, the gate's bonnet seals prevent the blade from carrying materials back into the bonnet area. Both of these considerations ensure migrant materials are forced back out of the seals and are discharged into the process line, rather than packing in the seals and causing actuation issues.
- If materials and dusts begin to migrate and collect in the gate's bonnet area, it indicates that
  the gate's bonnet seals have partially worn and the compression load is lessened, causing the
  seals to no longer be forced against the sliding blade as they should be. With this maintenance
  indication, the Roller Gate features access slots on each side of the gate that allow bonnet seal
  replacement while the gate remains in-line. Using simple tools, new bonnet seals are driven
  into one access port as the worn bonnet seals are simultaneously ejected on the other side of
  the gate, through the opposite access port.
- When the Roller Gate is closed, if materials and dusts begin to leak past the sliding blade, it indicates that the gate's side seals have partially worn and the compression load is lessened, causing the blade to no longer be forced against the side seals as it should be. With this maintenance indication, the Roller Gate's cam-adjustable rollers can be utilized to restore the gate's dust-tight seal. Using simple tools, the cam rollers can be adjusted to lift the sliding blade against the side seals and restore the compression load. This maintenance process can be performed while the gate remains in-line, and can be repeated several times before the side seals must be replaced.

**Roller Gate** 



**KEY FEATURES** 



End seal displacement pocket to prevent material packing upon closure

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Externally adjustable blade for in-lin maintenance Patented "rising blade" action to positively seal against high pressures Replaceable parts for in-line maintenance and prolonged service life

Conveyance Type	Gravity flow, dilute phase and dense phase pneumatic conveying applications up to 75 psig   5 barg   +0.5 MPa, depending on gate size. Can be used in pressure or vacuum systems.
Materials Handled	Non-abrasive to moderately abrasive powders, pellets and granules. Well-suited for handling sticky and/or corrosive materials, and for wash-down.
Standard Sizes	4 – 16 in   100 – 405 mm ID & OD diameters are available. Also available in schedule 10, 20 or 40 pipe sizes.
Opening	Available in round sizes
<b>Overall Height</b>	8 – 9 in   200 – 230 mm
Weight	75 – 425 lb   35 – 195 kg
Flange Options	ANSI #125/150, DIN PN10 Custom flanges are available
Material Temperatures	250° F   120° C for standard gate, with modifications that allow up to 400° F   205° C
Body/Frame Construction	Cast aluminum
Material Contact Options	304 or 316L stainless steel, carbon steel
O-Ring Seal Construction	Silicone
<b>Drive/Actuation</b>	Double-acting air cylinder (see pages 61 & 62)
Position Confirmation	Magnetic reed, proximity or mechanical limit switches (see page 63)
Material Flow Controls	AVP (see pages 65 & 66)
Other Options	Sealed body air purge (see page 64) Special Service Inlet (see page 67)
Compliance	ATEX Zone 20 (internal), ATEX Zone 21 (external), FDA

### THE POWER OF COMPARISON

### Vortex HDPV2 Gate vs. Alternatives

- Many alternative slide gates and butterfly valves rely on seals which are directly exposed to the material flow stream. These seals rapidly erode or tear away in service. This deficiency promotes leakage of materials and dusts past the gate and to atmosphere, in addition to actuation issues and several other maintenance concerns. The Vortex<sup>®</sup> HDPV2 Gate<sup>™</sup> addresses these issues by incorporating a durable, silicone (durometer 70) O-ring seal, which provides greater wear resistance and longer service life than alternative sealing materials. To hinder materials from migrating into the gate body, the HDPV2 Gate also features a bonnet seal cartridge, which houses a PTFE-treated packing gland. PTFE-treated packing gland also provides greater wear resistance and longer service life than alternative sealing materials. Within the bonnet seal cartridge, the packing gland expands to create a dust-tight seal around the vertical perimeter of the blade. The bonnet seal cartridge shields the packing gland from the material flow stream, to protect it from abrasion. This design maintains the gate's positive seal with infrequent maintenance intervention. Once the packing gland has experienced significant frictional wear, it can be removed and replaced to restore the gate's dust-tight seal. This maintenance process can be performed while the gate remains in-line.
- A butterfly valve's rotating disc is directly exposed to the material flow steam, which creates wear to the disc itself. The exposed disc also disrupts convey line pressures and obstructs material flow as they pass through the valve, which can cause line plugs and other maintenance concerns. To resolve these issues, when the HDPV2 Gate is open, its sliding blade is recessed to create an unobstructed opening that maintains convey line pressure and allows unrestricted material movement.
- The HDPV2 Gate is specifically designed to mechanically clear materials away from the sealing surfaces with each actuation. The HDPV2 Gate's packing gland is designed to mechanically self-clean the blade with each opening stroke. This prevents the blade from carrying materials back into the gate body, which could otherwise cause actuation issues and other maintenance concerns. At the closing end of the gate, the HDPV2 Gate can be designed with a partial Special Service Inlet to create a slight void between the leading edge of the blade, the material flow stream, and the O-ring seal. As the leading edge of the blade nears the O-ring seal. As Special Service Inlet ensures any residual materials remaining at the blade's leading edge have an opportunity to fall away into the process line, prior to the blade contacting the O-ring seal. By protecting the O-ring seal from material contact, it reduces seal wear and maintains the gate's positive seal with infrequent maintenance intervention.
- Many alternative slide gates pack materials into an end seal, preventing positive closure. This
  promotes material leakage through the valve, can cause blade damage, and can cause other
  actuation issues. Upon gate closure, the HDPV2 Gate's sliding blade "rises" upward into a seat,
  rather than a true end seal, so that materials remaining at the leading edge of the blade can fall away
  into the process line below, rather than packing into an end seal. The rising blade design also lifts
  the blade against the O-ring seal for a better seal of materials and dusts in high pressure
  applications.
- When the gate is closed, if materials and dusts begin to leak past the blade, it indicates the O-ring seal has partially worn and the compression load is lessened, causing the blade to no longer be forced against the O-ring seal as it should be. With this maintenance indication, the HDPV2 Gate's blade is externally adjustable to restore the gate's dust-tight seal. Using simple tools, the nut beneath the lower bonnet cover can be tightened. This "lifts" the blade to restore its compression load against the O-ring seal. This maintenance process can be performed while the gate remains in-line, and can be repeated several times before the O-ring seal must be replaced.

### CLEAR ACTION GATE

Model No. JAXX

**Ideal application:** Isolating a rotary airlock from a feeder above. Flange patterns are customizable to match up with any rotary airlock in the industry.

**Purpose:** Designed to seal against pressure from below. When a rotary airlock is idle, the Clear Action Gate is closed to prevent air loss into upstream equipment. This prevents line plugs and improves blower efficiency. A Clear Action Gate can also act as a maintenance device to isolate upstream equipment, if airlock maintenance is necessary.



OPTIONS



**KEY FEATURES** 



Positive seal of materials/dust-tight seal across the blade and to atmosphere



Live loaded, wear compensating hard polymer pressure plate seals



Enhance conveying efficiency by preventing air loss

Conveyance Type	Gravity flow and dilute phase pneumatic conveying applications. Can handle differential pressures up to 15 psig   1 barg   0.1 MPa, depending on gate size. Can be used in pressure or vacuum systems.
Materials Handled	Non-abrasive to moderately abrasive powders, pellets and granules. Modifications available for handling corrosive materials and/or for wash-down.
Standard Sizes	6 – 16 in   150 – 400 mm
Opening	Available in round sizes. Square, round or rectangular mating flanges are available.
<b>Overall Height</b>	4 – 8 in   95 – 200 mm
Weight	55 – 180 lb   25 – 80 kg
Flange Options	Standard stud bolt pattern, ANSI #125/150, DIN PN10, JIS 10 Custom flanges are available
Material Temperatures	$250^\circ\text{F} 120^\circ\text{C}$ for standard gate, with modifications that allow up to $400^\circ\text{F} 205^\circ\text{C}$
Body/Frame Construction	Aluminum
Material Contact Options	304 or 316L stainless steel
Pressure Plate Options	Nylon, PET
Load Seal Construction	Silicone rubber
Drive/Actuation	Double-acting air cylinder, hand wheel/crank, chain wheel, electric actuator (see pages 61 & 62)
Position Confirmation	Magnetic reed, proximity or mechanical limit switches, and/or clear bonnet cover for visual indication (see page 63)
Material Flow Controls	AVP, IVP, VPO, VPC (see pages 65 & 66)
Other Options	Sealed body air purge (see page 64) Special Service Inlet (see page 67)
Compliance	ATEX Zone 20 (internal), ATEX Zone 21 (external), FDA
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### THE POWER OF COMPARISON

### Vortex Clear Action Gate vs. Alternatives

• Many alternative slide gates and butterfly valves rely on soft rubber seals which are directly exposed to the material flow stream. These seals rapidly erode or tear away in service. Others rely on bonnet packing, which can relax and allow material packing in the seals. These deficiencies promote leakage of materials and dusts past the gate and to atmosphere, in addition to actuation issues and several other maintenance concerns. The Vortex<sup>®</sup> Clear Action Gate<sup>™</sup> addresses these issues by incorporating "live loaded" hard polymer pressure plate seals. Hard polymer provides greater wear resistance and longer service life than alternative sealing materials. The hard polymer seals are "live loaded" with compressed rubber backing to ensure even as the polymer experiences frictional wear from many actuations over time, the rubber load seals continuously force the polymer seals against the blade. The seals are also shielded from the material flow stream, to protect them from abrasion. This design maintains the gate's positive seal of materials/dust-tight seal with infrequent maintenance intervention.

 Many alternative slide gates allow metal-on-metal sliding, which creates galling. This causes a gate to seize and bind, and can create foreign metal fragment contamination. The Clear Action Gate's hard polymer seals eliminate metal-on-metal contact to resolve each of these concerns.

 Many alternative slide gates and butterfly valves have open cavities where materials can wedge and prevent positive material shut-off. Wedging can also create seal wear and material degradation, and cause a gate to seize and bind. Wedged materials also create risk for cross-contamination and spoilage. To prevent wedging and ensure positive gate closure, the Clear Action Gate's machined, square-edged blade is designed to mechanically clear materials away from the sealing surfaces with each closing stroke. This ensures migrant materials are forced back out of the seals and are discharged into the process line, rather than packing in the seals and causing actuation issues.

# **OUICK CLEAN GATE**

**Ideal application:** Sanitary dry bulk solid material handling applications that require frequent "Clean out of Place." The Vortex<sup>®</sup> Quick Clean Gate<sup>™</sup> can be washed down daily, during shift change, or on any other regular cleaning or sanitation schedule. This eliminates potential for microorganisms, spoilage and bacterial growth.

**Purpose:** The Vortex Quick Clean Gate is the first slide gate to be USDA Dairy Standard-accepted. It can be disassembled and reassembled in a matter of minutes – without using any tools.



**KEY FEATURES** 



Ferrule-type fittings accommodate compression couplings for quick gate installation and removal without tools



Press-lock latches for internal access without tools



Specially designed clevis allows for quick blade removal

Conveyance Type	Gravity flow only. Contact us to discuss suitability for use in low pressure/vacuum applications.
Materials Handled	Non-abrasive powders, pellets and granules in applications where regular sanitation is required. Can be used to handle sticky and/or reactive materials.
Standard Sizes	2 – 10 in   50 – 255 mm ID & OD diameters are available. Also available in schedule 10, 20 or 40 pipe sizes.
Opening	Available in round sizes
Overall Height	5 1/2 in   140 mm
Weight	30 – 110 lb   15 – 50 kg
Connection Options	Ferrule-type fittings, tube stubs, thru-bolt, ANSI #125/150 Custom flanges are available
Material Temperatures	100° F   40° C for standard gate, with modifications that allow up to 200° F   95° C
Body/Frame Construction	304 stainless steel
Material Contact Options	304 or 316L stainless steel & copolymer acetal
Pressure Plate Construction	PET & silicone rubber Seals should be hand-cleaned in treatment solutions not exceeding 180°F   80°C
Load Seal Construction	Silicone rubber
Drive/Actuation	Double-acting air cylinder (see pages 61 & 62)
Cylinder Construction	Aluminum
Cylinder Shaft, Barrel Nuts & Tie Rod Construction	303 stainless steel
Position Confirmation	Magnetic reed switches (see page 63)
Material Flow Controls	AVP (see pages 65 & 66) * Gate must cycle to full-open between runs to keep the displacement area clear of materials
Compliance	ATEX Zone 20 (internal), ATEX Zone 21 (external), FDA, USDA Dairy Standard

### THE POWER OF COMPARISON

### Vortex Quick Clean Gate vs. Alternatives

The Vortex<sup>®</sup> Quick Clean Gate<sup>™</sup> offers unique features and many distinct advantages over typical butterfly valves, pinch valves, ball valves and slide gates used in sanitary applications.

 Alternative slide gates and other valves can be problematic if they cannot be readily disassembled and sanitized. If materials collect in a valve's sealing surfaces, cross-contamination, spoilage and bacterial growth can result. The Quick Clean Gate's ability to be "Cleaned out of Place" ensures product safety and quality.

 The Quick Clean Gate is specifically designed to accelerate the sanitation process, so that downtime is significantly reduced. The Quick Clean Gate's compression coupling connections and its press-lock latches allow for quick disassembly, sanitation and reassembly without tools.

- Many alternative slide gates have open cavities where materials can lodge and prevent
  positive material shut-off. Lodging can also create seal wear and material degradation,
  and cause a gate to seize and bind. Lodged materials also create risk for
  cross-contamination and spoilage. To prevent lodging and ensure positive gate closure,
  such cavities have been eliminated in the Quick Clean Gate's design. The Quick Clean
  Gate is designed to mechanically clear materials away from the sealing surfaces with
  each opening stroke. This ensures migrant materials are forced back out of the seals and
  are discharged into the process line, rather than packing in the seals and causing
  actuation and/or contamination issues.
- A butterfly valve's rotating disc is directly exposed to the material flow steam, which creates wear to the disc itself. This can result in foreign metal fragment contamination. The exposed disc also obstructs material flow as they pass through the valve, which can cause line plugs and other maintenance concerns. To resolve these issues, the Quick Clean Gate's sliding blade is machined with an unobstructed, full-bore orifice that allows unrestricted material movement.

 Alternative slide gates and butterfly valves can significantly shear materials, as a result of jamming and grinding materials into the seals. Sheared materials cause seal wear, material degradation and damaged product quality. Sheared materials may also wedge in the seals, causing the gate to seize and bind. To address these issues, the Quick Clean Gate's "scissoring" action tapers off material flow throughout closure. In keeping the pressure plate seals clear of materials, their service life is also extended.

www.vortexglobal.com

For more information & technical resources, please visit:



**KEY FEATURES** 



PTFE-treated bonnet packing gland, for greater wear resistance and longer service life



Non-rising stem, for easier manual actuation



Hand crank actuation, as a standard

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**VORTEX** | Quantum Series

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Conveyance Type	Gravity flow and dilute phase pneumatic conveying applications. Can handle differential pressures up to 15 psig   1 barg   0.1 MPa, depending on gate size. Can be used in pressure or vacuum systems.
Materials Handled	Non-abrasive to moderately abrasive powders, pellets and granules. Well-suited for handling corrosive materials and/or for wash-down.
Standard Sizes	6 – 18 in   150 – 455 mm ID & OD diameters are available. Also available in schedule 10, 20 or 40 pipe sizes. Contact us for custom sizes.
Opening	Available in square or rectangular sizes. Round transition options are available (see page 67)
<b>Overall Height</b>	5 – 6 in   115 – 140 mm
Weight	15 – 200 lb l 5 – 90 kg
Flange Options	Standard stud bolt pattern, DIN PN10, ANSI #125/150 Custom flanges are available
Material Temperatures	180° F   80° C for standard gate, with modifications that allow up to 400° F   205° C
<b>Body/Frame Options</b>	6061-T6 aluminum, painted carbon steel
Material Contact Options	304 or 316L stainless steel, carbon steel
End & Side Seal Options	Nylon, PET, UHMW-PE, 25% glass-filled PTFE
Bonnet Seal Construction	Bonnet seal cartridge with PTFE-treated packing gland
<b>Clevis Construction</b>	Ratio 5:1 ACME threaded rod
<b>Drive/Actuation</b>	Hand wheel/crank, chain wheel (see pages 61 & 62)
Position Confirmation	Clear bonnet cover for visual indication and/or proximity switches (see page 63)
Other Options	Special Service Inlet (see page 67)
Compliance	ATEX Zone 20 (internal), ATEX Zone 21 (external), FDA

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### THE POWER OF COMPARISON

#### Vortex Maintenance Gate vs. Alternatives

The design and construction of the Vortex® Maintenance Gate offers significant advantages over traditional carbon steel maintenance gates.

- The Maintenance Gate's aluminum body and frame make it lightweight and corrosion-resistant. The gate's stainless steel material contact areas provide additional resistance to corrosion and wear. This provides the Vortex Maintenance Gate with long-term and reliable service.
- Many alternative maintenance gates allow metal-on-metal sliding, which creates galling. This causes a gate to seize and bind, and can create foreign metal fragment contamination. The Maintenance Gate's hard polymer liners eliminate metal-on-metal contact to resolve each of these concerns.
- Many alternative maintenance gates rely on soft rubber seals which are directly exposed to the material flow stream. These seals rapidly erode or tear away in service. This deficiency promotes leakage of materials and dusts past the gate and to atmosphere, in addition to actuation issues and several other maintenance concerns. The Maintenance Gate addresses these issues by incorporating a bonnet seal cartridge, which houses a PTFE-treated packing gland. PTFE-treated packing gland provides greater wear resistance and longer service life than alternative sealing materials. Within the bonnet seal cartridge, the packing gland expands to create a dust-tight seal around the vertical perimeter of the blade. The bonnet seal cartridge shields the packing gland from the material flow stream, to protect it from abrasion. This design maintains the gate's positive seal with infrequent maintenance intervention. Once the packing gland has experienced significant frictional wear, it can be removed and replaced to restore the gate's dust-tight seal. This maintenance process can be performed while the gate remains in-line.
- The Maintenance Gate's stainless steel blade and hard polymer liners are FDA-compliant. This makes it an excellent choice in food handling applications and other applications where carbon steel and aluminum are not acceptable for material contact.

For more information & technical resources, please visit:



**KEY FEATURES** 



Displacement area as an alternative to packing materials into an end seal



Live loaded, wear compensating hard

polymer pressure plate seals



Shimming system for in-line maintenance

Conveyance Type	Gravity flow only. Contact us to discuss suitability for use in low pressure/vacuum applications.
Materials Handled	Non-abrasive to moderately abrasive powders, pellets and granules. Modifications available for handling corrosive materials and/or for wash-down.
Standard Sizes	2 – 14 in   50 mm – 355 mm ID & OD diameters are available. Also available in schedule 10, 20 or 40 pipe sizes.
Opening	Available in round sizes
<b>Overall Height</b>	4 – 5 in   90 – 120 mm
Weight	10 – 95 lb   5 – 45 kg
Flange Options	Standard stud bolt pattern Modified pipe flanges available
Material Temperatures	180° F   80° C for standard gate, with modifications that allow up to 400° F   205° C
Body/Frame Construction	Aluminum
Material Contact Options	304 or 316L stainless steel
Pressure Plate Options	Nylon, PET, UHMW-PE, 25% glass-filled PTFE, molybdenum disulphide-impregnated nylon
Load Seal Options	Natural rubber and/or silicone rubber
<b>Drive/Actuation</b>	Push-pull handle
Other Options	Special Service Inlet (see page 67)
Compliance	ATEX Zone 20 (internal), ATEX Zone 21 (external), FDA

### THE POWER OF COMPARISON

### Vortex Handslide Gate vs. Alternatives

The Vortex<sup>®</sup> Handslide Gate<sup>™</sup> is a highly versatile solution. It is often used in applications where air supply is not available, in filling applications where iris diaphragms are not feasible, or as a cost-effective alternative to using powered process gates in low actuation applications.

- Iris diaphragms are limited in scope, compared to the Handslide Gate. Because iris diaphragms feature a fabric sleeve, most are designed to handle bulk densities < 40 lb/ft<sup>3</sup>.
   Because the Handslide Gate features a solid sliding blade, it is well-designed for handling bulk densities above that threshold.
- The fabric sleeve of an iris diaphragm is not designed to handle corrosive materials. Oppositely, the Handslide Gate's material contact areas are constructed from stainless steel to provide appropriate corrosion resistance.
- The fabric sleeve of an iris diaphragm is not designed to seal against fine materials. The Handslide Gate's solid sliding blade and hard polymer pressure plate seals provide a positive seal of materials across the gate and to atmosphere.
- It is not recommended to close an iris diaphragm through a flowing column of material. Doing so can cause wear and potentially break the diaphragm's internal control ring. The Handslide Gate's solid sliding blade is durable, allowing it to be closed through a flowing column of material.
- Many alternative slide gates rely on soft rubber seals which are directly exposed to the material flow stream. These seals rapidly erode or tear away in service. Others rely on bonnet packing, which can relax and allow material packing in the seals. These deficiencies promote leakage of materials and dusts past the gate and to atmosphere, in addition to actuation issues and several other maintenance concerns. The Handslide Gate addresses these issues by incorporating "live loaded" hard polymer pressure plate seals. Hard polymer provides greater wear resistance and longer service life than alternative sealing materials. The hard polymer seals are "live loaded" with compressed rubber backing to ensure even as the polymer experiences frictional wear from many actuations over time, the rubber load seals continuously force the polymer seals against the blade. The seals are also shielded from the material flow stream, to protect them from abrasion. This design maintains the gate's positive seal of materials/dust-tight seal with infrequent maintenance intervention.
- If the pressure plate seals have partially worn and the compression load is lessened, slight dusting may be present along the push-pull handle. With this maintenance indication, the Handslide Gate's shimming system can be utilized to restore the gate's dust-tight seal. Unlike alternative valves, which require spare parts be kept on-hand for seal maintenance, the Handslide Gate requires removal of parts. By simply loosening the nuts along the lateral aspects of the gate, shim(s) can be removed from each side and the nuts retightened to restore the pressure plate seals' compression load. This maintenance process can be performed while the gate remains in-line, and can be repeated several times before the shims and pressure plate seals must be replaced.

Handslide Orifice Gate



**Ideal application:** Manually control the gravity discharge of free-flowing dry bulk solid materials.

**Purpose:** The Vortex<sup>®</sup> Iris Valve opens from and closes toward the center of its opening to create a gradual flow or restriction of materials. This design ensures an even discharge of materials and allows manual control over flow rates. The Iris Valve's fabric sleeve and gradual closing action protect delicate and friable materials from degradation. When fully closed, the Iris Valve's fabric sleeve is twisted to the point that it becomes a flat, tight barrier to hold back materials.



### **KEY FEATURES**



Optional preset positions for quick adjustments in material flow rate



Control ring constructed from stainless steel, for increased torque and added durability



Optional replaceable wear liner reduces material contact with the sleeve to extend service life

TECHNICAL SPECIFICATIONS	
Conveyance Type	Gravity flow only
Materials Handled	Non-abrasive to moderately abrasive powder powder powder pellets and granules
Standard Sizes	4 – 18 in   100 – 455 mm
<b>Overall Height</b>	2 in   40 mm
Weight	2 – 75 lb   1 – 35 kg
Connection Options	Standard flange or tube stubs Ferrule-type fittings available by request

# Material TemperaturesUp to 150°F | 65°CMaterial Bulk DensityUp to 40 lb/ft³<br/>Contact us to discuss options for<br/>greater bulk densitiesBody/Frame OptionsAluminum, 304 or 316L stainless steelSleeve Material OptionsUrethane, silicone, Buna-N nitrile rubber, PTFE,<br/>static dissipativeControl Ring ConstructionStainless steel

Position Confirmation Visual indication via handle position

Compliance ATEX Zone 20 (internal), ATEX Zone 21 (external), FDA



### DRIVE/ACTUATION TYPES



**Infinite position hand lever:** Designed with a twisting lever which must be loosened to adjust valve position and tightened to secure the valve in place. Valve position is infinitely adjustable along a 180° horizontal plane. The infinite position hand lever is constructed from stainless steel.

**Quick-lock hand lever:** Notches are made in the metal valve body to create preset positions. The quick-lock hand lever is designed with a spring-loaded hammer to secure the valve at each set point. This allows for quick material flow adjustments. The quick-lock hand lever and its spring-loaded hammer are both constructed from stainless steel.

**Tote handle:** The tote handle is constructed from stainless steel and operates much like the quick-lock hand lever, only squeezing a trigger rather than pushing a spring-loaded hammer.

### THE POWER OF COMPARISON

### Vortex Iris Valve vs. Alternatives

- The Vortex® Iris Valve is designed with a form-fitted fabric sleeve that creates a barrier to prevent material leakage to atmosphere. The fabric sleeve also prevents materials from coming in contact with the valve's moving parts. With several sleeve material options available, an Iris Valve can be designed for most dry bulk solids material handling applications, including abrasion-resistant and food-friendly, among others.
- Many alternative iris valves are constructed with plastic control rings, trigger locks and handles. Such construction renders iris valves nondurable and unreliable. To address these durability concerns, the Iris Valve is constructed with a stainless steel control ring, as well as a metal trigger lock and a metal handle.
- The Iris Valve is constructed from precision-machined parts, to reduce wear and ensure smooth actuation.

For more information & technical resources, please visit:

# SEAL TITE DIVERTER

**Ideal application:** Gravity flow applications where dry bulk solid materials must be diverted from one source toward up to three destinations.

**Purpose:** The Vortex<sup>®</sup> Seal Tite Diverter<sup>™</sup> offers many unique features and significant advantages over alternative flap diverters.



KEY FEATURES





Recessed blade(s) to protect the blade(s) & seal(s) from abrasion



Removable access panel for in-line inspection and maintenance



Live loaded, wear compensating shaft seal(s) protect the blade shaft(s) from wear and prevent material leakage into the opposite chute(s)

Out

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Conveyance Type	Gravity flow only
Materials Handled	Non-abrasive to moderately abrasive powders, pellets and granules. Modifications available for handling corrosive materials and/or for wash-down.
Standard Sizes	4 – 30 in   100 – 760 mm Contact us for custom sizes
Inlet & Outlets	Available in square or rectangular sizes. Round transition options are available (see page 67)
<b>Overall Height</b>	15x15 in – 65x55 in   385x385 mm – 1,640x1,370 mm
Weight	40 – 1,265 lb   20 – 575 kg
let Chute Angle Options	30° or 45° from center Contact us for custom angles
Flange Options	Standard flange, ANSI #125/150, DIN PN10 Custom flanges are available
Material Temperatures	180° F   80° C for standard gate, with modifications that allow up to 400° F   205° C
<b>Body/Frame Options</b>	304 or 316L stainless steel, carbon steel
laterial Contact Options	304 or 316L stainless steel, carbon steel
Blade Seal Options	Buna-N nitrile rubber, silicone rubber, polyurethane, EPDM rubber
Shaft Seal Options	PET, 25% glass-filled PTFE
Load Seal Construction	Silicone rubber
<b>Drive/Actuation</b>	Double-acting air cylinder, hand lever, chain wheel, electric actuator (see pages 61 & 62)
Position Confirmation	Magnetic reed, proximity or mechanical limit switches (see page 63)
Other Options	Spin knobs (see page 68)
Compliance	ATEX Zone 20 (internal), ATEX Zone 21 (external), FDA

### THE POWER OF COMPARISON

### Vortex Seal Tite Diverter vs. Alternatives

Many alternative flap diverters have sealed bodies, which limits interior access. In order to
perform inspection and/or maintenance, the diverter must be removed from the process line so
that its internal mechanisms can be accessed. This can lead to expensive and extensive
production downtime. To allow in-line inspection and/or maintenance, the Vortex<sup>®</sup> Seal Tite
Diverter<sup>™</sup> is designed with a removable access panel that can be removed using simple tools.
This feature is especially beneficial in sanitary applications where frequent interior access is
required for proper sanitation, or in abrasive applications where interior access is required for
wear part maintenance. The removable access panel feature significantly reduces downtime by
accelerating the maintenance process.

 Many alternative flap diverters are designed so that the leading edge of the blade(s) is constantly exposed to the material flow stream, creating wear and abrasion to the blade(s) and seal(s). If wear is significant, it can allow material leakage into the opposite chute(s), in addition to frequent wear part maintenance. To address these concerns, the Seal Tite Diverter is designed with recessed areas so that the leading edge of the blade(s) is shielded from the material flow stream.

 Many alternative flap diverters have thin elastomer seals adhered to the perimeter of the blade(s). Over time, the thin seals erode or tear away from the blade(s) and allow material leakage into the opposite chute(s). The Seal Tite Diverter addresses this concern by incorporating a blade seal constructed from a full sheet of durable rubber. Rather than adhering thin seal strips around the perimeter of the blade, the robust seal sheet is compressed between two metal plates which form the flapper blade. This design ensures the blade seals will not tear away in service, and will provide a positive seal of materials/dust-tight seal over time.

• Many alternative flap diverters do not have seals beneath the blade shaft(s). This creates a significant opening for material migration into the opposite chute(s). Especially in perishable applications, this can foster cross-contamination and spoilage beneath the blade shaft(s). Also, without blade shaft seals, the blade shaft(s) is subjected to material-assisted abrasion, resulting in frequent wear part maintenance. The Seal Tite Diverter addresses these issues by incorporating "live loaded" hard polymer blade shaft seal(s). Hard polymer provides greater wear resistance and longer service life than alternative sealing materials. The hard polymer seal(s) is "live loaded" with compressed rubber backing to ensure even as the polymer experiences frictional wear from many actuations over time, the rubber load seals continuously force the polymer seal(s) upward against the blade shaft(s). The seal(s) is also shielded from the material flow stream, to protect it from abrasion. This design maintains the diverter's positive seal of materials/dust-tight seal with infrequent maintenance intervention.

Many alternative flap diverters are designed with irreplaceable wetted parts. Once a primary
wetted part is worn significantly, the entire diverter must be replaced. To resolve this
cost-effectiveness issue, the Seal Tite Diverter is designed with replaceable wetted parts that
can be accessed in-line. This includes actuator(s), flapper blade(s) and blade seal(s), and the
blade shaft seal(s), among others. If maintained and operated as recommended, these should
be the diverter's only wear parts. In several cases, this has allowed a Seal Tite Diverter to
remain in service for many years – and sometimes, even decades.

### **FAST©TRACK**

# WYE LINE DIVERTER

Ideal application: Diverting or converging dry bulk solid materials in high cycle applications. The Vortex<sup>®</sup> Wye Line Diverter<sup>™</sup> is commonly used in storage fill and/or storage transfer applications. When applied in non-abrasive applications or as an air directional valve, Wye Line Diverters often record more than 10 million cycles over the course of their service life.





**KEY FEATURES** 



Live loaded, wear compensating hard polymer pressure plate seals



Shimming system for in-line maintenance



Machined, full-bore orifice for unobstructed material flow and to maintain convey line pressures

Conveyance Type	Gravity flow and dilute phase pneumatic conveying applications. Can handle differential pressures up to 15 psig  1 barg   0.1 MPa, depending on gate size. Can be used in pressure or vacuum systems.
Materials Handled	Non-abrasive to moderately abrasive powders, pellets and granules. Modifications available for handling corrosive materials and/or for wash-down.
Standard Sizes	2 – 12 in   50 – 305 mm ID & OD diameters are available. Schedule pipe sizes are also available.
Inlet & Outlets	Available in round sizes.
<b>Overall Height</b>	11 – 43 in   280 – 1,085 mm
Weight	20 – 450 lb   10 – 205 kg
Outlet Angle Options	30° or 45° from center Contact us for custom angles
<b>Connection Options</b>	Compression couplings, ANSI #125/150
Material Temperatures	180° F   80° C for standard gate, with modifications that allow up to 400° F   205° C
<b>Body/Frame Options</b>	Aluminum, 304 or 316L stainless steel, carbon steel
Weldment Options	Aluminum, 304 or 316L stainless steel, carbon steel
Material Contact Options	Aluminum, 304 or 316L stainless steel, carbon steel
Pressure Plate Options	Nylon, PET, UHMW, 25% glass-filled PTFE
Load Seal Options	Natural rubber and/or silicone rubber
Drive/Actuation	Double-acting air cylinder, hand wheel/crank, chain wheel, electric actuator (see pages 61 & 62)
Position Confirmation	Magnetic reed, proximity or mechanical limit switches, and/or clear bonnet cover for visual indication (see page 63)
Other Options	Ceramic backing, ceramic/epoxy coating, or reinforced inlet weldment (see page 68) Sealed body air purge (see page 64)
Compliance	ATEX Zone 20 (internal), ATEX Zone 21 (external), FDA

### THE POWER OF COMPARISON

### Vortex Wye Line Diverter vs. Alternatives

• Many alternative pneumatic diverters rely on soft rubber seals which are directly exposed to the material flow stream. These seals rapidly erode or tear away in service, which allows materials and dusts to leak into the opposite line(s) and to atmosphere. Seal damage can also cause actuation issues and several other maintenance concerns. The Vortex<sup>®</sup> Wye Line Diverter<sup>™</sup> addresses these issues by incorporating "live loaded" hard polymer pressure plate seals. Hard polymer provides greater wear resistance and longer service life than alternative sealing materials. The hard polymer seals are "live loaded" with compressed rubber backing to ensure even as the polymer experiences frictional wear from many actuations over time, the rubber load seals continuously force the polymer seals against the sliding blade. The seals are also shielded from the material flow stream, to protect them from abrasion. This design maintains the diverter's positive seal of materials/dust-tight seal with infrequent maintenance intervention.

 Plug diverters are prone to seizing and binding, as a result of material build-up in the clearance between the rotating plug and the diverter's housing. The Wye Line Diverter's sliding blade design mechanically self-cleans materials away from the sealing surfaces with each actuation. This prevents actuation issues from materials wedging in the seals, reduces seal wear, and ensures a positive seal of materials/dust-tight seal across the opposite line(s).

 Plug diverters are constructed primarily from bulky, heavy cast iron, making them costly to install or remove for maintenance. The Wye Line Diverter is lightweight and narrow profile, making it well-suited for difficult installations.

In order to shift a plug diverter, the internal plug must be rotated approximately 150°. This is
often a timely process. Before the internal plug can be rotated, the system's blower must be
temporarily deactivated. Otherwise, the plug will create back pressure as it rotates. With an
average shifting time of 2 – 6 seconds, the Wye Line Diverter can be shifted without shutting
down the system's blower and without creating back pressure.

 Many alternative pneumatic diverters have blade(s) and seals which are directly exposed to the material flow steam. This disrupts convey line pressures and obstructs material flow as they pass through the valve, which can cause line plugs and other maintenance concerns. To resolve these issues, the Wye Line Diverter's sliding blade is machined with an unobstructed, full-bore orifice that maintains convey line pressure and allows unrestricted material movement.

 The Wye Line Diverter creates a naturally occurring high-pressure airfoil that deflects errant materials away from the closed line(s) and back into the material flow stream. Also, with each purge cycle, the Wye Line Diverter forces residual materials downstream. This design addresses material cross-contamination to the opposite line(s).

 Alternative pneumatic diverters can pack and grind materials against the seals. This causes seal wear, material degradation and damaged product quality. Materials may also wedge in the seals, causing the diverter to seize and bind. To address these issues, the Wye Line Diverter's "scissoring" action tapers off material flow as it shifts between lines. In keeping the pressure plate seals clear of materials, their service life is also extended.



Please note: In Three- and Four-Way diverters, the addition of a second gate will add to overall height. Three- and Four-Way diverters are available in sizes up to 6 in | 150 mm



### MULTI-PORT DIVERTER

Purpose: Vortex<sup>®</sup> Multi-Port Diverters<sup>™</sup> are multi-directional assemblies used to divert and/or converge from many sources toward many destinations. Though Multi-Port Diverters are often designed for dilute phase and vacuum conveying applications, they may also be configured for use in gravity flow applications. **Ideal Application**: Multi-Port Diverters typically replace manually operated, labor-intensive hose manifold stations. Because the Multi-Port Diverter is an automated solution, it provides improved processing speeds, reduced risk of workplace injury and human error, and more efficient use of plant personnel. Because Multi-Port Diverters are also more compact than hose manifold stations, they further provide a reduction in footprint to make more efficient use of manufacturing space.



Contact us to learn more about Vortex Multi-Port Diverter configurations.

www.vortexglobal.com

# FLEX TUBE DIVERTER

**Ideal application:** Diverting or converging in applications where material cross-contamination is a concern.

**Purpose:** The Vortex<sup>®</sup> Flex Tube Diverter<sup>™</sup> is specifically designed to eliminate material cross-contamination. It also offers the convenience of continuous conveying.





**KEY FEATURES** 



Can be shifted on a flowing column of materials – also known as, "shifting on the fly." *Note: Please consult an application engineer before doing so.* 



No material cross-contamination into the opposite line(s)



Live loaded, wear compensating hard polymer pressure plate seals



Conveyance Type	Gravity flow and dilute phase pneumatic conveying applications. Can handle differential pressures up to 15 psig   1 barg   0.1 MPa, depending on gate size. Can be used in pressure or vacuum systems.
Materials Handled	Non-abrasive to moderately abrasive powders, pellets and granules. Modifications available for handling corrosive materials and/or for wash-down.
Standard Sizes	2 – 8 in   50 – 205 mm ID & OD diameters are available. Schedule pipe sizes are also available.
Inlet & Outlets	Available in round sizes
<b>Overall Height</b>	35 – 100 in   875 – 2,545 mm
Weight	100 – 500 lb   45 – 225 kg
Connection Options	Compression couplings, ANSI #125/150 Custom flanges are available
Material Temperatures	180° F   80° C for standard gate, with modifications that allow up to 400° F   205° C
Body/Frame Construction	Aluminum
Housing Construction	304 stainless steel w/ clear polycarbonate viewport
Housing Construction Weldment Options	304 stainless steel w/ clear polycarbonate viewport Aluminum, 304 or 316L stainless steel, carbon steel
Housing Construction Weldment Options Hose Options	304 stainless steel w/ clear polycarbonate viewport Aluminum, 304 or 316L stainless steel, carbon steel Natural rubber w/ steel wire helix, 304 stainless steel
Housing Construction Weldment Options Hose Options Material Contact Options	304 stainless steel w/ clear polycarbonate viewport Aluminum, 304 or 316L stainless steel, carbon steel Natural rubber w/ steel wire helix, 304 stainless steel 304 or 316L stainless steel
Housing Construction Weldment Options Hose Options Material Contact Options Pressure Plate Options	304 stainless steel w/ clear polycarbonate viewport Aluminum, 304 or 316L stainless steel, carbon steel Natural rubber w/ steel wire helix, 304 stainless steel 304 or 316L stainless steel Nylon, PET
Housing Construction Weldment Options Hose Options Material Contact Options Pressure Plate Options Load Seal Options	304 stainless steel w/ clear polycarbonate viewport Aluminum, 304 or 316L stainless steel, carbon steel Natural rubber w/ steel wire helix, 304 stainless steel 304 or 316L stainless steel Nylon, PET Natural rubber and/or silicone rubber
Housing Construction Weldment Options Hose Options Material Contact Options Pressure Plate Options Load Seal Options Drive/Actuation	304 stainless steel w/ clear polycarbonate viewport Aluminum, 304 or 316L stainless steel, carbon steel Natural rubber w/ steel wire helix, 304 stainless steel 304 or 316L stainless steel Nylon, PET Natural rubber and/or silicone rubber Double-acting air cylinder, hand wheel, electric actuator (see pages 61 & 62)
Housing Construction Weldment Options Hose Options Material Contact Options Pressure Plate Options Load Seal Options Drive/Actuation Position Confirmation	304 stainless steel w/ clear polycarbonate viewport Aluminum, 304 or 316L stainless steel, carbon steel Natural rubber w/ steel wire helix, 304 stainless steel 304 or 316L stainless steel Nylon, PET Natural rubber and/or silicone rubber Double-acting air cylinder, hand wheel, electric actuator (see pages 61 & 62) Magnetic reed or proximity switches, and/or clear access panel for visual indication (see page 63)
Housing Construction Weldment Options Hose Options Material Contact Options Pressure Plate Options Load Seal Options Drive/Actuation Position Confirmation	<ul> <li>304 stainless steel w/ clear polycarbonate viewport</li> <li>Aluminum, 304 or 316L stainless steel, carbon steel</li> <li>Natural rubber w/ steel wire helix, 304 stainless steel</li> <li>304 or 316L stainless steel</li> <li>Nylon, PET</li> <li>Natural rubber and/or silicone rubber</li> <li>Double-acting air cylinder, hand wheel, electric actuator (see pages 61 &amp; 62)</li> <li>Magnetic reed or proximity switches, and/or clear access panel for visual indication (see page 64)</li> <li>Sealed body air purge (see page 64)</li> </ul>
Housing Construction Weldment Options Hose Options Material Contact Options Dressure Plate Options Load Seal Options Drive/Actuation Position Confirmation Other Options Compliance	<ul> <li>304 stainless steel w/ clear polycarbonate viewport</li> <li>Aluminum, 304 or 316L stainless steel, carbon steel</li> <li>Natural rubber w/ steel wire helix, 304 stainless steel</li> <li>304 or 316L stainless steel</li> <li>Nylon, PET</li> <li>Natural rubber and/or silicone rubber</li> <li>Double-acting air cylinder, hand wheel, electric actuator (see pages 61 &amp; 62)</li> <li>Magnetic reed or proximity switches, and/or clear access panel for visual indication (see page 63)</li> <li>Sealed body air purge (see page 64)</li> <li>ATEX Zone 20 (internal), ATEX Zone 21 (external), FDA</li> </ul>

### THE POWER OF COMPARISON

### Vortex Flex Tube Diverter vs. Alternatives

• Many alternative pneumatic diverters rely on soft rubber seals which are directly exposed to the material flow stream. These seals rapidly erode or tear away in service, which allows materials and dusts to leak into the opposite line(s) and to atmosphere. Seal damage can also cause actuation issues and several other maintenance concerns. The Vortex® Flex Tube Diverter<sup>™</sup> addresses these issues by incorporating "live loaded" hard polymer pressure plate seals. Hard polymer provides greater wear resistance and longer service life than alternative sealing materials. The hard polymer seals are "live loaded" with compressed rubber backing to ensure even as the polymer experiences frictional wear from many actuations over time, the rubber load seals continuously force the polymer seals against the blade. The seals are also shielded from the material flow stream, to protect them from abrasion. This design maintains the diverter's positive seal of materials/dust-tight seal with infrequent maintenance intervention.

 Many alternative pneumatic diverters have open cavities where materials can wedge and prevent positive material shut-off. Wedging can also create seal wear and material degradation, and cause a valve to seize and bind. Wedged materials also create risk for cross-contamination and spoilage. To prevent wedging, the Flex Tube Diverter's sliding blade is designed to mechanically clear materials away from the sealing surfaces with each actuation. This ensures migrant materials are forced back out of the seals and are discharged into the process line, rather than packing in the seals and causing actuation issues.

Many valves with sliding blades allow metal-on-metal sliding, which creates galling. This
causes a valve to seize and bind, and can create foreign metal fragment contamination. The
Flex Tube Diverter's hard polymer seals eliminate metal-on-metal contact to resolve each of
these concerns.

 Alternative pneumatic diverters can pack and grind materials against the seals. This causes seal wear, material degradation and damaged product quality. To address these issues, the Flex Tube Diverter's "scissoring" action tapers off material flow as it shifts between lines. In keeping the pressure plate seals clear of materials, their service life is also extended.

 Many alternative pneumatic diverters have blade(s) and seals which are directly exposed to the material flow steam. This disrupts convey line pressures and obstructs material flow as they pass through the valve, which can cause line plugs and other maintenance concerns. To resolve these issues, the Flex Tube Diverter's sliding blade is machined with an unobstructed, full-bore orifice that maintains convey line pressure and allows unrestricted material movement.

Many alternative flexible hose diverters feature an exposed flexible hose. When installed
outdoors, this subjects the flexible hose to its surrounding environment. Regarding operator
safety, an exposed flexible hose also creates hazardous pinch points. To address these
issues, the Flex Tube Diverter is designed with a housing that protects the flexible hose and
encloses all moving parts.

# GRAVITY VEE DIVERTER

**Ideal application:** Replacement for conventional bucket diverters and flap diverters used to divert dry bulk solid materials from one source toward two destinations in gravity flow applications. The Vortex® Gravity Vee Diverter<sup>®</sup> is ideal for use in high cycle applications.

**Purpose:** The Gravity Vee Diverter incorporates a "dual gate" design with independent controls. This allows material flow to be diverted through both outlet chutes simultaneously, each chute individually, or a complete material shut-off. For total control over flow rates, the Gravity Vee Diverter is also compatible with Vortex material flow control assemblies (see pages 65 & 66), in order to achieve proper batchweights, ensure accuracy and provide repeatability in the manufacturing process.



Round





**KEY FEATURES** 

Allows material flow through both outlet chutes simultaneously, each chute individually, or a complete material shut-off



Replaceable bonnet seals for in-line maintenance



Live loaded, wear compensating hard polymer bonnet and side seals

Conveyance Type	Gravity flow only. Contact us to discuss suitability for use in low pressure/vacuum applications.
Materials Handled	Non-abrasive to moderately abrasive powders, pellets and granules. Modifications available for handling sticky and/or corrosive materials & for wash-down.
Standard Sizes	6 – 24 in   150 – 610 mm Contact us for custom sizes
Inlet & Outlets	Available in square or rectangular sizes. Round transition options are available (see page 67)
Overall Height	25 – 60 in   660 – 1,525 mm
Weight	130 – 400 lb   60 – 180 kg
Outlet Chute Angle Options	45° or 60° from center Contact us for custom angles
Flange Options	Standard flange, ANSI #125/150, DIN PN10 Custom flanges are available
Material Temperatures	180°F   80°C for standard gate, with modifications that allow up to 400°F   205°C
<b>Body/Frame Options</b>	6061-T6 aluminum, 304 or 316L stainless steel
Material Contact Options	304 or 316L stainless steel, carbon steel
Bonnet & Side Seal Options	PET, 25% glass-filled PTFE
Load Seal Construction	Silicone rubber
Roller Options	PET, hardened steel 25% glass-filled PTFE, stainless steel and bronze available by request
End Seal Options	UHMW-PE, polyurethane, PET, 25% glass-filled PTFE
Drive/Actuation	Double-acting air cylinder, hand wheel, electric actuator (see pages $61\&62$ )
Position Confirmation	Magnetic reed, proximity or mechanical limit switches, and/or clear bonnet covers for visual indication (see page 63)
Material Flow Controls	AVP, IVP, VPO, VPC (see pages 65 & 66)
Other Options	Dual cylinder actuators (see page 61) Sealed body air purge (see page 64)
Compliance	ATEX Zone 20 (internal), ATEX Zone 21 (external), FDA

### THE POWER OF COMPARISON

### Vortex Gravity Vee Diverter vs. Alternatives

- Flap diverters should not be shifted through a flowing column of material. Doing so can damage the blade and blade shaft. Instead, it is recommended to shut off material flow before shifting the flapper blade. To do so often requires an additional isolation gate above the diverter valve. The Vortex® Gravity Vee Diverter<sup>™</sup> is a dual-purpose valve, used as both a diverter valve and as an isolation gate. Both gates can be open to divert through both outlet chutes simultaneously, one gate can be open to divert through one outlet chute independently, or both gates can be closed for a positive material shut-off. It is an ideal solution because it eliminates the need to purchase an additional gate above, and it improves processing speeds by shifting through a flowing column of material, rather than closing off the system to shift a bucket or flap diverter.
- To eliminate metal-on-metal contact, the Gravity Vee Diverter incorporates hard polymer bonnet seals and side seals. Hard polymer provides greater wear resistance and longer service life than alternative sealing materials. The hard polymer seals are "live loaded" with compressed rubber backing to ensure even as the polymer experiences frictional wear from many actuations over time, the rubber load seals continuously force the polymer seals against the blades. This design maintains the diverter's positive seal of materials/dust-tight seal with infrequent maintenance intervention.
- A problem inherent in alternative diverter designs is material packing along the bucket or flapper blade and its seals, resulting in actuation and sealing issues. To ensure positive material shut-off, the Gravity Vee Diverter's sliding blades are designed to mechanically clear materials away from the sealing surfaces with each actuation. With each closing stroke, the sliding blades mechanically self-clean their side seals. With each opening stroke, each gate's bonnet seals prevent the blade from carrying materials back into the bonnet area. Both of these design features ensure migrant materials are forced back out of the seals and are discharged into the process line, rather than packing in the seals and causing actuation issues.
- If materials and dusts begin to migrate and collect in either gate's bonnet area, it indicates that the
  gate's bonnet seals have partially worn and the compression load is lessened, causing the seals to
  no longer be forced against the sliding blade as they should be. With this maintenance indication,
  both gates feature access slots on each side of the gate that allow bonnet seal replacement while
  the diverter remains in-line. Using simple tools, new bonnet seals are driven into one access port as
  the worn bonnet seals are simultaneously ejected on the other side of the gate, through the
  opposite access port.
- When the gates are closed, if materials and dusts begin to leak past the sliding blades, it indicates that the gate's side seals have partially worn and the compression load is lessened, causing the blade to no longer be forced against the side seals as it should be. With this maintenance indication, the Gravity Vee Diverter's gates feature cam-adjustable rollers that can be utilized to restore the gate's dust-tight seal. Using simple tools, the cam rollers can be adjusted to lift the sliding blade against the side seals and restore the compression load. This maintenance process can be performed while the diverter remains in-line, and can be repeated several times before the side seals must be replaced.



For more information & technical resources, please visit:

# FILL PASS DIVERTER

Ideal application: Filling one or more tanks or scale hoppers when pneumatically conveying dry bulk solid materials via a closed loop system. Vortex® Fill Pass Diverters<sup>™</sup> are stackable so that several convey lines can be compacted to route toward a common source.





Single

**KEY FEATURES** 

Stacked





Shimming system for in-line maintenance



The diverter's spread stack offers better separation of air and materials



Material deflector to direct material flow and minimize material carryover

Conveyance Type	Dilute phase pneumatic conveying applications. Can handle differential pressures up to 15 psig   1 barg   0.1 MPa, depending on gate size. Can be used in pressure or vacuum systems.
Materials Handled	Non-abrasive to moderately abrasive powders, pellets and granules. Modifications available for handling corrosive materials and/or for wash-down.
Standard Sizes	2 – 6 in   50 – 150 mm ID & OD diameters are available. Schedule pipe sizes are also available.
Inlet & Outlets	Available in round sizes
<b>Overall Height</b>	7 – 13 in   90 – 165 mm
Weight	60 – 115 lb   25 – 50 kg
"Fill" Angle Options	30° or 45° from center Contact us for custom angles
<b>Connection Options</b>	Compression couplings
Material Temperatures	180° F   80° C for standard gate, with modifications that allow up to 400° F   205° C
ody/Frame Construction	Aluminum
Weldment Options	304 or 316L stainless steel
laterial Contact Options	304 or 316L stainless steel
Pressure Plate Options	Nylon, PET, 25% glass-filled PTFE
Load Seal Options	Natural rubber and/or silicone rubber
<b>Drive/Actuation</b>	Double-acting air cylinder (see pages 61 & 62)
Position Confirmation	Magnetic reed or proximity switches, and/or clear bonnet cover for visual indication (see page 63)
Other Options	Sealed body air purge (see page 64)
Compliance	ATEX Zone 20 (internal), ATEX Zone 21 (external), FDA

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### THE POWER OF COMPARISON

### **Vortex Fill Pass Diverter vs. Alternatives**

• Many alternative pneumatic diverters rely on soft rubber seals which are directly exposed to the material flow stream. These seals rapidly erode or tear away in service, which allows materials and dusts to leak into the opposite line(s) and to atmosphere. Seal damage can also cause actuation issues and several other maintenance concerns. The Vortex® Fill Pass Diverter" addresses these issues by incorporating "live loaded" hard polymer pressure plate seals. Hard polymer provides greater wear resistance and longer service life than alternative sealing materials. The hard polymer seals are "live loaded" with compressed rubber backing to ensure even as the polymer experiences frictional wear from many actuations over time, the rubber load seals continuously force the polymer seals against the blade. The seals are also shielded from the material flow stream, to protect them from abrasion. This design maintains the diverter's positive seal of materials/dust-tight seal with infrequent maintenance intervention.

• The Fill Pass Diverter is specifically designed to provide a positive seal of materials/dust-tight seal, in order to prevent material leakage into hoppers below. Especially in applications where batchweights are critical, the Fill Pass Diverter ensures accurate scaling of materials. Also lending to fill accuracy, the Fill Pass Diverter can be quickly shifted on a flowing column of materials – also known as, "shifting on the fly." *Note: Please consult an application engineer before doing so.* 

 Alternative pneumatic diverters can pack and grind materials against the seals. This causes seal wear, material degradation and damaged product quality. Materials may also wedge in the seals, causing the diverter to seize and bind. To address these issues, the Fill Pass Diverter's "scissoring" action tapers off material flow as it shifts between lines. In keeping the pressure plate seals clear of materials, their service life is also extended.

Many alternative pneumatic diverters used in closed loop systems are poorly designed to exhaust air
pressure from inside the hopper(s) below. This causes inefficient filling and inaccurate batchweights. To
address this concern, the Fill Pass Diverter is designed with a "stack" inlet and outlet. As materials are
pneumatically conveyed into the hopper through the inlet stack, the spent air is immediately exhausted back
out of the hopper through the outlet stack. This allows exhausted air pressure to continue downstream, away
from the hopper(s).

- The Fill Pass Diverter incorporates a spread stack concept. A cyclonic effect is created in the inlet stack for better separation of air and materials as they enter the hopper(s) below. Below the inlet stack, a material deflector intervenes to prevent material carryover. The spread stack concept ensures efficient material movement and reduced fill times.
- The Fill Pass Diverter's FDA-compliant materials of construction make it an ideal solution for the Food & Beverage industries most notably, bakeries and confectionary manufacturers.
- The Fill Pass Diverter features flanged inlet and outlet stacks. This makes Fill Pass Diverters stackable so that several convey lines (of uniform or differing sizes) can be connected to route several material types toward a common source via a compact and efficient process. This capability is especially beneficial in applications where several materials must be blended, mixed or compounded in a common batch.
- The Fill Pass Diverter's double-acting air cylinder provides instant response to actuation commands. This allows for highly accurate and repeatable scaling, based on desired weights, fill levels or time intervals.

### (Continued) FILL PASS DIVERTER



**Ideal application:** Filling one or more tanks or scale hoppers when pneumatically conveying dry bulk solid materials via a closed loop system.



**Fill Pass Diverter** 









### CASE STUDY

### **Multi-Port Diverter Handling Flour**

### Client: Pasta producer

**Application:** Pneumatically convey/divert flour from a main supply line into 8 silos. Eash silo feeds a separate production line. Each line produces a different pasta type.

### **Results:**

The client previously used a manual hose switching station in this process. They were concerned about labor intensity, workplace safety, profitability, explosion potential, waste reduction and maintenance costs, among other things.

With the Vortex Multi-Port Diverter, the automated system ensures the different grades of flour are conveyed into their proper silo. The client has already saved dollars and labor hours, plus avoided potential porcessing errors and improved plant safety.



### CASE STUDY

### Seal Tite Diverter Handling Pet Food

Quantity: 4

**Special Features:** Spin knobs, for easy in-line access without using tools.

**Application:** Divert kibble into two disc conveyors, to be transported to a packaging line.





### Iris Valve Handling Powdered Drink Mix

### Quantity: 2

**Application:** Avoid contamination when handling food & beverage materials.

**Special Features:** A Teflon-coated body was specified because Teflon does not chemically react or corrode from material contact, which would otherwise compromise taste and create contamination. Teflon also assures food purity because it does not absorb preservatives. Because Teflon is non-stick, it also provides ease of maintenance.

### CASE STUDY

### **Gates & Diverters Handling Plastics**

Client: Manufacturer of styrofoam cups, plates & bowls

### Application:

- Reintroduce plastic scrap/regrind into the extrusion process.
- · Convey resins/compounds into the extrusion process.

Converge resins from various holding bins into a common convey line.

### Valves:

- 7 Roller Gates
- 31 Wye Line Diverters
- 32 Orifice Gates

### Results:

This client operates 5 shifts, 24 hours per day — and all but two days each year.

With the addition of Vortex gates and diverters, this client has a solution for automated material transport — and has reduced their manufacturing waste to less than 1%.



### **TECHNICAL ARTICLE**

### How to Select a Valve for Solids & Bulk – Handling

Valve suppliers should have the application engineering knowledge and experience to know what valves and modifications should be applied for certain application parameters. Make sure your supplier is asking the right questions.

Many people think that selecting a slide gate or diverter valve for handling dry bulk solid materials is a relatively simple process. They typically assume the only information needed is:

- Opening shape & size
- Available stack-up height
- Matching connections or bolt hole patterns

But in reality, valve suppliers need much more information to be able to identify the right valve for the application. The more information a valve supplier has about the application parameters, costly mistakes are avoided. Misinformation can put you on either end of the spectrum — whether it be using an expensive valve for a simple application, or an inexpensive valve that is poorly designed for the application.

### 1. Valve Selection

The most critical questions are:

- What is the valve intended to do?
- Is a slide gate, diverter valve, iris valve or butterfly valve needed to best fulfill the application?
- Follow-up questions include:
- What is the valve's opening size? Is the opening square, round or rectangular?
- What is the shape and size of the conveying line? Are the lines tube or pipe? If the lines are pipe, is it schedule 10 or 40?
- Will the valve be used in a pressure, vacuum or gravity flow application? If pressure or vacuum, how much? If pressure, will the system convey material in dilute or dense phase?
- Will the valve be installed indoors or outside?
- What is the temperature of the air and materials being conveyed?

- What should the valve be constructed from (aluminum, stainless steel, carbon steel, etc.)?
- Will the valve be subject to wash-downs? If so, will it be washed with hot water or a caustic liquid?
- If the valve is installed below a bin or silo Will there be flow aides (aeration, vibration, etc.)? What is the sequence of operations for the system (e.g. When are the flow aides activated, in relation to the cycle of the gate valve)? How is material conveyed into the bin or silo?

Then, you must consider material characteristics:

- What is the material?
- Is it in powder, pellet or granular form?
- What is its particle size?
- What is its weight per cubic foot?
- Is it sticky? Abrasive? Corrosive?
- Is there sanitary or spoilage concerns?
- If multiple materials will pass through a common
- conveying line, is there cross-contamination concerns?

### 2. Actuator Selection

- The most critical questions are:
- What is your power availability? Is compressed air available?
- What is the cycle frequency?
- Will the valve close on material? If yes, will the material be a standing or flowing column?
- Does actuation speed matter?
- If only intended for maintenance purposes, can I use manual actuation?
- If installed outside, will the valve be subject to cold temperatures?
- · What are the cost variables for replacement and repair?
- Will the valve operate in a potentially explosive environment?

### **3. Standard Modifications**

Your valve supplier should offer standard modifications to suit your application/material-specific requirements.

When selecting valve modifications, some

- application-specific factors that should be considered are: • Is the application high-cycle?
- Is the material handled abrasive duty? Corrosive? Friable? Food-specific?
- Is chemical compatibility a concern?
- How often will the valve be serviced? Are in-line maintenance features desired?

### 4. Valve Location & Orientation

The most critical questions are:

- Where will the valve be installed (e.g. below a bin/silo, etc.)?
- Will it be installed in a vertical or horizontal orientation?

This helps determine which accessories may be required for your application. For example, if a slide gate is mounted below a surge hopper, a variable positioning assembly may be required to meter material into the weigh hopper.

#### 5. Features Selection

- Common modifications include:
- Abrasion-resistant blade & liners
- Adjustable blade rollers
- Custom valve sizes
- Sealed body with an air purge assembly
- Replaceable seals, liners & wetted parts
- Wear-compensating seals
- Wear-reducing material deflectors
- Wear-resistant blade, bucket blade or pivoting chute

...to name a few.

### 6. Accessory Selection

When specifying valve accessories, there are four distinct areas:

- Variable positioning assemblies Vortex offers a VPO/VPC (relay control with manual adjustability); AVP (PLC control with manual adjustability); and an IVP (infinite positioning via a 4-20mA signal).
- Feedback Vortex offers push-button control panels, and valve/sensor manifold technologies with a variety of PLC interfaces.
- Safety devices A vented ball valve should always be installed in front of the air control valve, in order to bring the slide gate or diverter valve to a "zero mechanical" state before servicing. This type of ball valve bleeds off any residual downstream pressure contained in the air lines supplying the air cylinder. The ball valve should always be installed within arm's reach of the air control.
- Fabricated accessories Fabricated transitions provide flexibility when mating up to existing equipment. This includes matching special bolt hole patterns, tube stubs, or blind flanges that allow in-the-field hole placement and installation.