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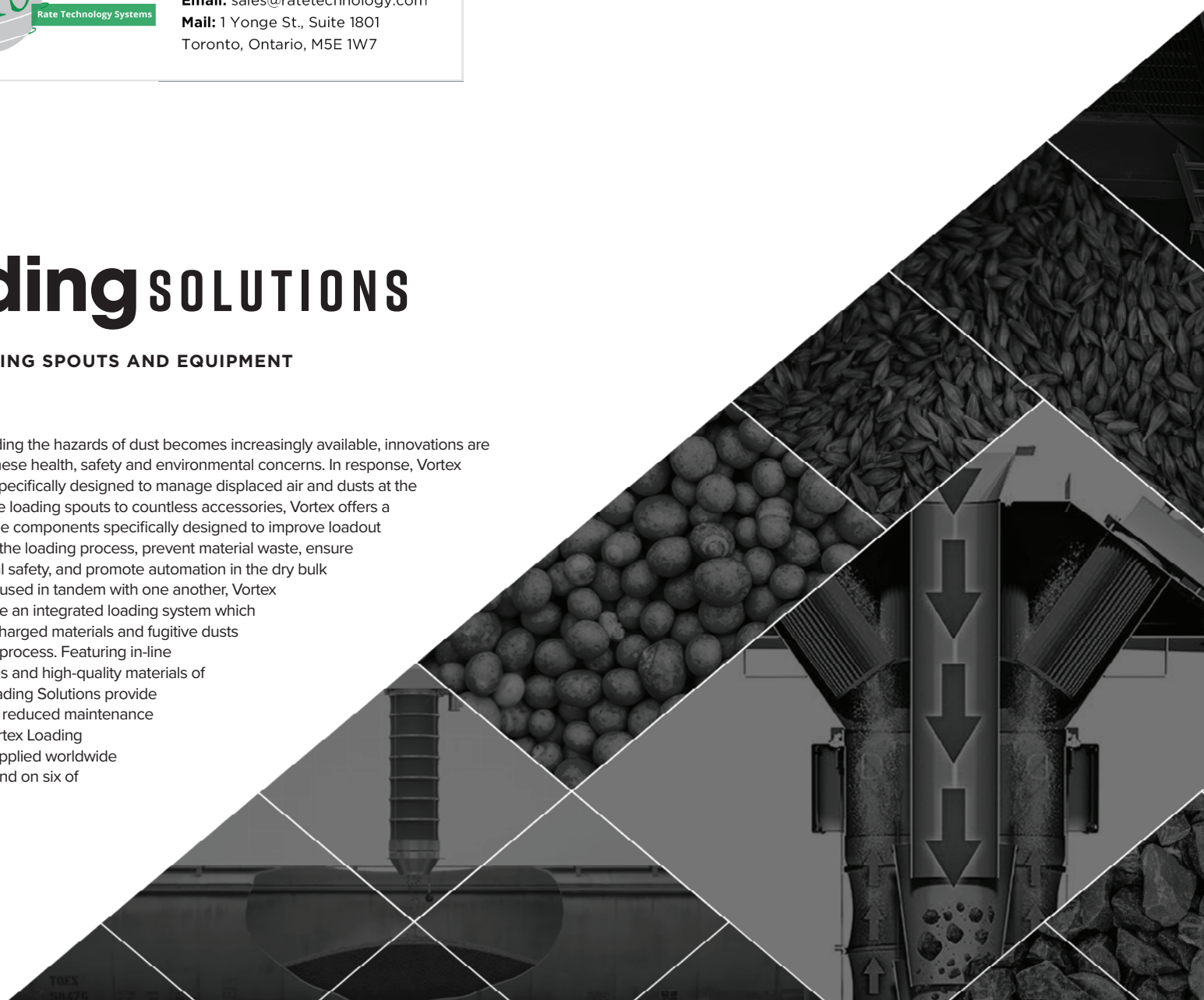
Loading SOLUTIONS

DUSTLESS LOADING SPOUTS AND EQUIPMENT

As knowledge surrounding the hazards of dust becomes increasingly available, innovations are necessary to address these health, safety and environmental concerns. In response, Vortex Loading Solutions are specifically designed to manage displaced air and dusts at the source. From retractable loading spouts to countless accessories, Vortex offers a complete line of versatile components specifically designed to improve loadout efficiencies, accelerate the loading process, prevent material waste, ensure plant and environmental safety, and promote automation in the dry bulk loading process. When used in tandem with one another, Vortex Loading Solutions create an integrated loading system which effectively controls discharged materials and fugitive dusts throughout the loading process. Featuring in-line maintenance capabilities and high-quality materials of construction, Vortex Loading Solutions provide long-term reliability and reduced maintenance costs. Thousands of Vortex Loading Solutions have been supplied worldwide – and today, can be found on six of the seven continents.



LOADING TYPES:

TRUCK & RAIL

When loading dry bulk solid materials into trucks and railcars, loadout speed is the primary concern. For optimal performance, the Vortex Loading Spout can be used in tandem with accessories specifically designed to accelerate the loading process.

KEY FEATURES

- Stacking, cone-in-cone spout design.
- Open or enclosed loading capabilities.
- Outer sleeve to contain fugitive dusts.
- For enclosed loading applications, the spout's outlet scavenger "seats" into the hatch to address dusting to atmosphere. For loading slotted railcars or vehicles with non-standard hatches, optional hatch adaptors can be easily removed and interchanged.
- For open loading applications, a Dust Control Skirt encompasses the peak of the material pile to address dusting to atmosphere.
- Vortex In-Line Filtration System at the material feed inlet to collect fugitive dusts by means of air withdrawal. Fugitive dusts are captured in pleated polyester filter cartridges. Throughout the loading process, automatic reverse pulse jets inject compressed air to purge the captured dusts back into the load.
- Single- and Dual-Axis Positioners to laterally move the spout. Positioners save time by allowing trucks and railcars to make approximated pulls into the loading station, rather than pulling in and out of the loading station several times before properly positioning itself beneath the spout. Instead, the spout's position is quickly adjusted.
- In open loading applications, a Material Level-Sensing Device complements an Auto-Raise System to automate the retraction process. Throughout the loading process, the spout maintains its proximity between the point of discharge (i.e. the outlet scavenger) and the material pile – even as the pile grows. Because of the outlet scavenger's close proximity to the material pile, dust control is enhanced. The automated retraction process also keeps the outlet scavenger from becoming buried in the material pile, which in turn prevents material build-up in the spout. In enclosed loading applications, a Material Level-Sensing Device is synchronized with a process gate or belt conveyor above to automatically halt flow once the specified load is achieved. This automates the loading process to avoid vessel overfilling and eliminate the need for visual monitoring.
- Option of installing a Vortex process gate above. When used in conjunction with a Vortex material flow control assembly, it allows metering through the spout.
- For enclosed loading applications, an optional Self-Sealing Discharge seals off the outlet scavenger to prevent dusting to atmosphere between loading cycles.
- Optional Aero-Bin Bottom. If a spout is mounted to a hopper or silo, an Aero-Bin Bottom can be installed between the hopper/silo and the spout. Its purpose is to fluidize a large area of material for easier flow.

LOADING TYPES:

STOCKPILING

When stockpiling dry bulk solid materials, stockpile size, spout length/retraction height, and handled material characteristics/service conditions are the primary concerns. The Vortex Loading Spout can be used in tandem with accessories designed to contain fugitive dusts and prevent dusting to atmosphere.

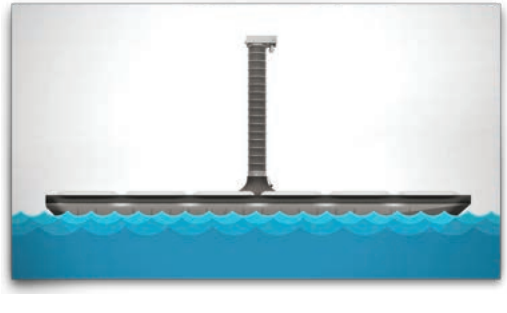
KEY FEATURES

- A stacking, cone-in-cone spout design can be used in tandem with a Vortex In-Line Filtration System at the material feed inlet. The In-Line Filtration System is designed to collect fugitive dusts by means of air withdrawal. The outer sleeve is intended to contain fugitive dusts. Fugitive dusts are captured in pleated polyester filter cartridges. Throughout the loading process, automatic reverse pulse jets inject compressed air to purge the captured dusts back into the load.
- A telescoping, tube-in-tube spout design can be used in tandem with a Vortex Discharge Filtration System at the point of discharge. The Discharge Filtration System is designed to collect fugitive dusts by means of high volume exhaust blowers. Fugitive dusts are captured in pleated polyester filter cartridges. Throughout the loading process, automatic reverse pulse jets inject compressed air to purge the captured dusts back into the load. The purpose of a Discharge Filtration System is to better collect fugitive dusts originating near the point of discharge.
- A Dust Control Skirt encompasses the peak of the material pile to address dusting to atmosphere.
- A Material Level-Sensing Device complements an Auto-Raise System to automate the retraction process. Throughout the loading process, the spout maintains its proximity between the point of discharge (i.e. the outlet scavenger) and the material pile – even as the pile grows. Because of the outlet scavenger's close proximity to the material pile, dust control is enhanced. The automated retraction process also keeps the outlet scavenger from becoming buried in the material pile, which in turn prevents material build-up in the spout.

LOADING TYPES:

BARGE LOADING

When loading dry bulk solid materials into barges, spout length, product dispersion and loadout speed are the primary concerns. For optimal performance, the Vortex Loading Spout can be used in tandem with accessories specifically designed for loading efficiency.



KEY FEATURES

- For spouts with shorter length, a stacking, cone-in-cone design can be used in tandem with a Vortex In-Line Filtration System at the material feed inlet. The In-Line Filtration System is designed to collect fugitive dusts by means of air withdrawal. An outer sleeve is intended to contain fugitive dusts. Fugitive dusts are captured in pleated polyester filter cartridges. Throughout the loading process, automatic reverse pulse jets inject compressed air to purge the captured dusts back into the load.
- For spouts with greater length, a telescoping, tube-in-tube design provides greater stability than the standard, stacking, cone-in-cone spout design. A telescoping, tube-in-tube spout design can be used in tandem with a Vortex Discharge Filtration System at the point of discharge. The Discharge Filtration System is designed to collect fugitive dusts by means of high volume exhaust blowers. Fugitive dusts are captured in pleated polyester filter cartridges. Throughout the loading process, automatic reverse pulse jets inject compressed air to purge the captured dusts back into the load. The purpose of a Discharge Filtration System is to better collect fugitive dusts originating near the point of discharge.
- Material Level-Sensing Device, to be used in tandem with an Auto-Raise System. At the outlet scavenger, a Material Level-Sensing Device automatically indicates when the material pile has grown to a specified level. When used in tandem with an Auto-Raise System, this triggers an automatic, incremental retraction of the spout. This automates the loading process to prevent material build-up in the spout, eliminate the need for visual monitoring, and avoid vessel overfilling.
- A Dust Control Skirt encompasses the peak of the material pile to address dusting to atmosphere.

CONE-IN-CONE

LOADING SPOUTS

Ideal Applications: Truck, railcar and barge loading applications. Can also be used in stockpiling applications.

TECHNICAL SPECIFICATIONS

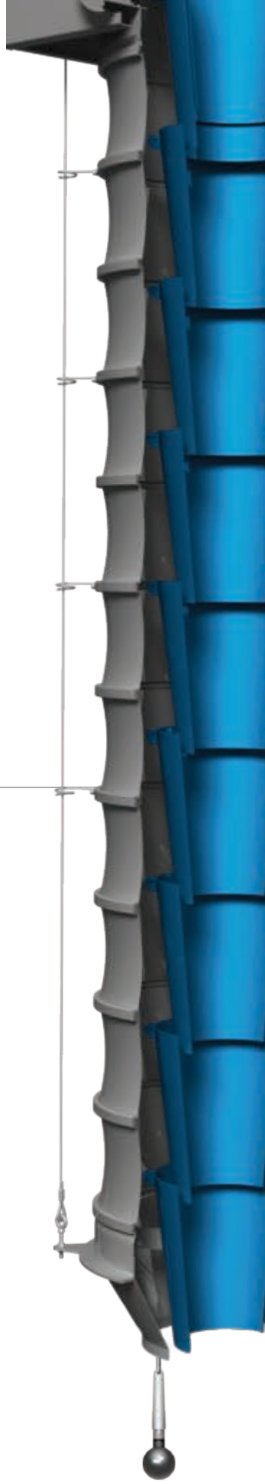
Spout Type	Stacking, cone-in-cone
Loading Type	Open and/or enclosed loading applications
Conveyance Type	Gravity drop in the presence of slight negative pressure
Material Temperatures	250°F | 120°C for standard spout, with modifications that allow up to 400°F | 205°C
Extended Travel	Spout lengths will vary, based on models and application. Contact us to discuss custom sizing options.
Overall Height (Retracted)	Overall height (retracted) will vary, based on models and application. Designed to be low profile, paying mind to clearance available overhead and extended travel required to reach the necessary vessel(s).
Considerations	Standard options are available. Some Vortex Loading Spouts may require additional design considerations to ensure their success in a given application.

Hoist Drive System

Four cable hoist drive system offers enhanced stability and improved cable service factor over traditional two and three cable hoist drive systems.

Power of Comparison: Because four cable hoist drive systems have one or two additional lifting cables, compared to traditional two and three cable hoist drive systems, it creates a more even weight distribution across a greater number of lifting cables. This results in less stress on each lifting cable, which reduces cable wear, increases cable service factor and prolongs cable service life.

Vortex lifting cables are breakage-resistant. Individually, they can withstand up to 400 lb | 180 kg of tension. Collectively, a spout's four lifting cables provide total breakage resistance of 1,600 lb | 725 kg of tension.

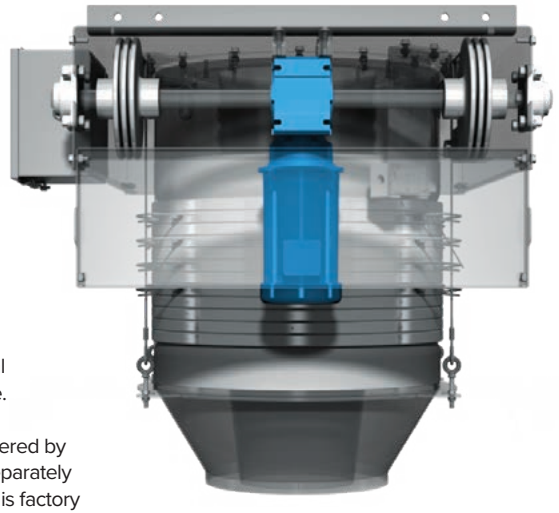


Center Mount Motor

Mounted beneath the main pan housing for better protection from the elements of its surrounding environment. The main pan housing is constructed from A36 mild steel.

Motor Voltage Options:
- 400 volt/50 hertz
- 460 volt/60 hertz
- 575 volt/60 hertz

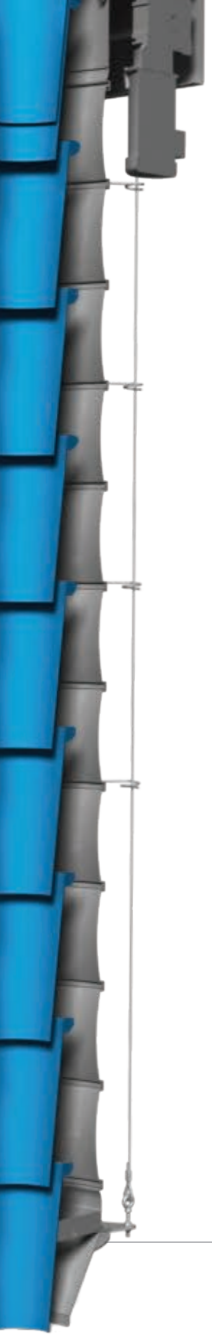
***Other motor voltage options available upon request.*



Vortex® Loading Spout motors are three-phase motor/reducer drive units which feature an integral braking system. Single-phase motors are available.

Power of Comparison: In other loading spouts offered by the industry, a braking system must be sourced separately from the spout's motor. The Vortex Loading Spout is factory supplied with an integral braking system, as a standard.

**One year warranty on all motor and electrical components.*



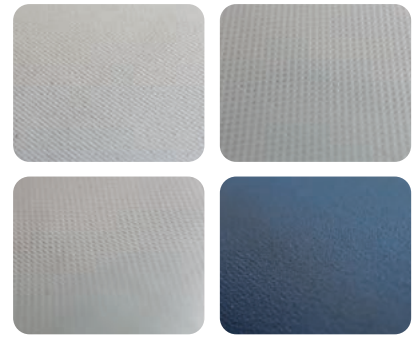
Machined Pulleys

The Vortex® Loading Spout's three-piece pulleys are computer numerical control (CNC) machined with rounded edges and precision cable grooves.

Power of Comparison: Many alternative loading spouts offered by the industry feature standard pulleys as part of their hoist drive systems. Often, these standard pulleys have rough edges which cause the lifting cables to fray. To eliminate cable fraying, the Vortex Loading Spout features two CNC-machined three-piece pulleys with rounded edges and precision cable grooves. This design prevents cable failure and other costly downtime for cable repair. Vortex is confident in the durability of their lifting cables, compared to other industry suppliers; so much so that Vortex Lifting Cables carry a 10-year warranty for wear, tear and workmanship. With less cable wear comes reduced maintenance cost, which allows for more efficient loading operations.

In other loading spouts offered by the industry, fabricated pulley grooves can be inconsistent, which can cause the lifting cables to bind or overlap. This results in poor lifting performance, accelerated cable wear, spout imbalances and backlash. To address this concern, the Vortex Loading Spout's CNC-machined pulleys are also designed with precision cable grooves to ensure smooth, balanced spout extensions and retractions.

**Travel or rotary limit switches are available to set boundaries on spout full-extension and full-retraction. An absolute encoder is available to set boundaries for intermediate positions.*

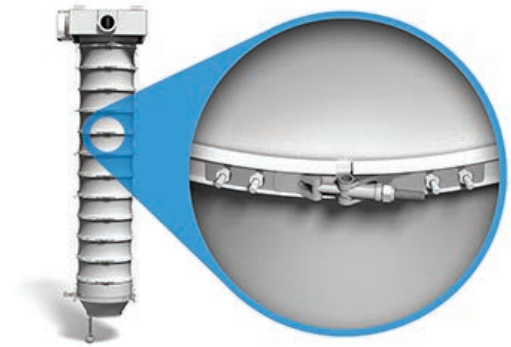


Outer Sleeve Material Options

The purpose of the Vortex Loading Spout's outer sleeve is to encompass the spout's internal stacking cones and contain fugitive dusts generated during the loading process. Vortex outer sleeve material construction options are flexible and durable, allowing the spout to extend and retract without creating tears or other wear points along the outer sleeve.

Options:

- Vinyl (PVC)-coated polyester (18 & 22 oz.)
- Hypalon synthetic rubber
  Static dissipative for potentially explosive materials
  Material Temperatures:
  -40° F – 220° F | -40° C – 105° C
- Silicone fiberglass
  For high temperature materials
  FDA compliant to 21CFR170-199
- Neoprene Polyester (ATEX)



Sleeve Support Rings Construction

The Vortex Loading Spout incorporates low profile inner support rings, used in conjunction with extruded outer support rings. The rings are fastened together using a high performance clamping method. Both the inner and outer support rings are constructed from aluminum.

Power of Comparison:
Many alternative loading spouts offered by the industry feature inner and outer support rings which are fastened together using rivets, nuts, bolts and/or screws. In order to thread these fasteners, punctures must be made in the outer sleeve material. This creates vulnerable areas where the outer sleeve can cut, tear or experience other forms of failure early on in the spout's lifecycle. To resolve this issue, Vortex's high performance clamping method eliminates punctures in the outer sleeve material.

Also, over time, the mechanical fasteners used in alternative loading spout designs can break and/or loosen, allowing them to fall away into the material load. To eliminate this potential source of foreign metal fragment contamination, the Vortex Loading Spout's high performance clamping method rids the inner support rings of exposed mechanical fasteners.

Motor Starter Panel

As a convenience to the end user, all Vortex Loading Spouts can be factory supplied with a Motor Starter Panel. The Vortex Motor Starter Panel is specifically designed to be compatible with the Vortex Loading Spout's three-phase motor requirements, as well as the spout's other electrical components. Without a Vortex Motor Starter Panel, end users must supply a motor starter panel before the spout can be operated, which can be a timely and expensive process.

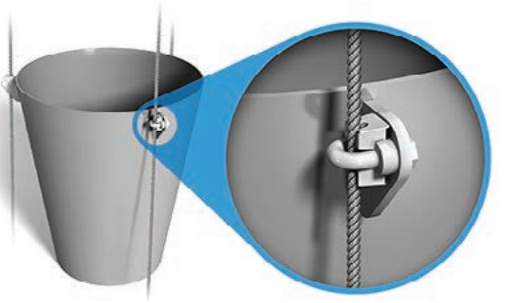
Stacking Cones

Vortex® Loading Spouts are designed with internal cones which stack upon one another as the spout retracts. In doing so, the spout's overall height is condensed to a low profile that maximizes clearance available overhead.

Cone Material Construction Options

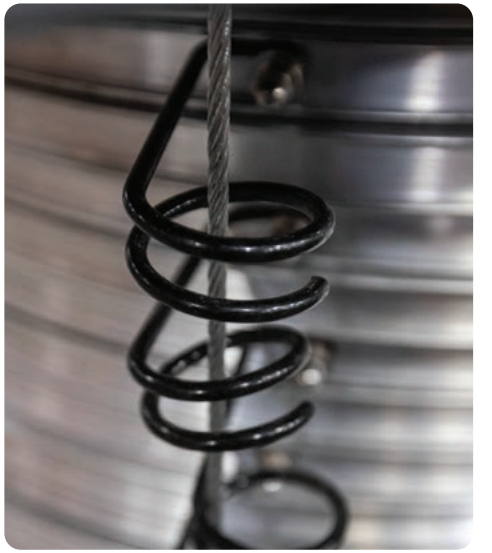
- 304 stainless steel
- 316L stainless steel
- 235 BHN abrasion-resistant steel
- 400 BHN abrasion-resistant steel
- Polyurethane
- Ceramic-lined steel

FOOD FRIENDLY OPTIONS



Cone Cable Clips Construction

The Vortex Loading Spout's stacking cones are suspended from three internal cables. As a standard, each cone is fastened to the internal cables by a series of u-bolt and nut harness guides. This fastening method provides ease of maintenance. If a cone must be maintained or replaced, that cone's u-bolts and nuts can be simply unfastened and the cone removed from service without manipulating other cones above or below it.



Outer Cable Guides Construction

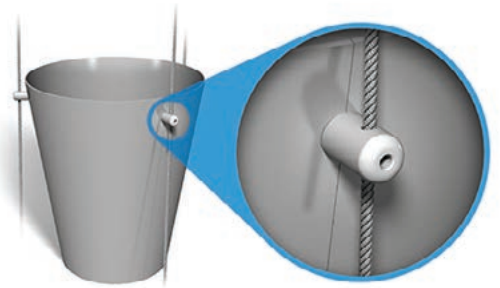
The Vortex Loading Spout is designed with spiral cable guides to assist with lifting cable and/or outer sleeve maintenance and replacement. For strength and durability, the spiral cable guides are constructed from spring steel.

Power of Comparison: Many alternative loading spouts offered by the industry incorporate eyebolts to guide the sleeve support rings during spout extension/retraction. The primary disadvantage to eyebolts is their maintainability. If either the lifting cables or the outer sleeve must be replaced, eyebolts must either be:

1) Removed from the sleeve, which is challenging while the lifting cables are still connected; or

2) Physically distorted (i.e. "opened") in order to free the sleeve from the lifting cables.

To resolve this maintainability issue, the Vortex Loading Spout incorporates four spiral-shaped cable guides along the circumference of each outer support ring. The primary advantage of spiral guides over eyebolts is that the lifting cables and/or the outer sleeve can be removed without having to manipulate the spiral guides. The lifting cables can be extracted from the spiral guides while the guides remain connected to the sleeve support rings.



Food Friendly Cone Cable Clips

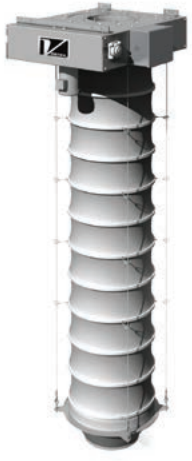
The Vortex Loading Spout's standard u-bolt and nut harness guides are replaced with steel pegs. Each steel peg features a precision-drilled hole for the cable to pass through. The peg is locked in place along the internal cables using a Loctite®-treated set screw.

Power of Comparison: When using u-bolt and nut harness guides in food grade applications, either of the fasteners can break and/or loosen, allowing them to fall away into the material load. To eliminate this potential source of foreign metal fragment contamination, machined steel pegs are welded to the outside of each stacking cone to replace the standard u-bolt and nut harness guides.

An added benefit to steel pegs is they reduce the number of crevices and pockets where materials can become lodged as they pass through the spout. This brings ease to sanitation procedures.

Cone-in-Cone
Loading Spout

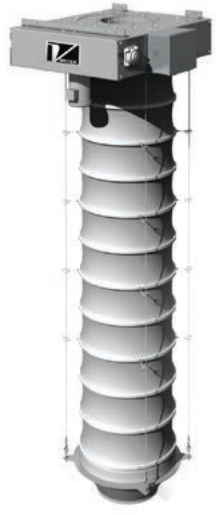
SIZING OPTIONS



VES-10/VOS-10

Load rate capacity:
- 100 ft³/min (CFM) | 3 m³/min (CMM)
- 6,000 ft³/hr (CFH) | 170 m³/hr (CMH)
- 4,820 bushels/hr

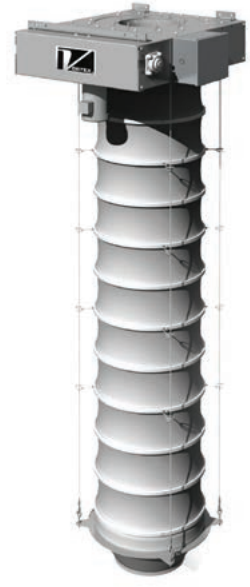
Material feed inlet size: 10 in | 255 mm
Outlet scavenger size: 13 in | 330 mm



VES-25/VOS-25

Load rate capacity:
- 250 ft³/min (CFM) | 7 m³/min (CMM)
- 15,000 ft³/hr (CFH) | 425 m³/hr (CMH)
- 12,055 bushels/hr

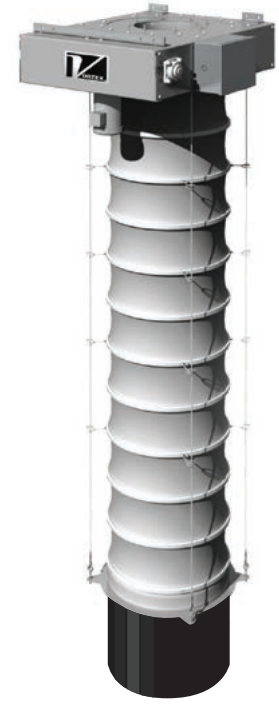
Material feed inlet size: 14 in | 355 mm
Outlet scavenger size: 16 in | 405 mm



VES-40/VOS-40

Load rate capacity:
- 400 ft³/min (CFM) | 11 m³/min (CMM)
- 24,000 ft³/hr (CFH) | 680 m³/hr (CMH)
- 19,285 bushels/hr

Material feed inlet size: 20 in | 510 mm
Outlet scavenger size: 23 in | 585 mm

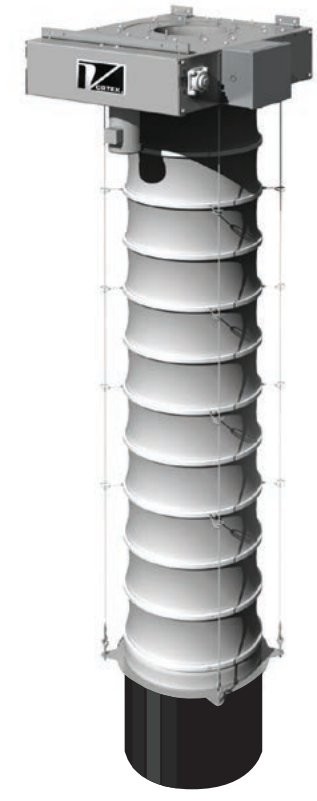


VOS-70

Load rate capacity:
- 700 ft³/min (CFM) | 20 m³/min (CMM)
- 42,000 ft³/hr (CFH) | 1,190 m³/hr (CMH)
- 33,750 bushels/hr

Material feed inlet size: 24 in | 610 mm
Outlet scavenger size: 43 in | 1,090 mm

**VOS-70 Vortex® Loading Spouts are limited for use in open loading applications only*



VOS-120

Load rate capacity:
- 1,200 ft³/min (CFM) | 35 m³/min (CMM)
- 72,000 ft³/hr (CFH) | 2,040 m³/hr (CMH)
- 57,855 bushels/hr

Material feed inlet size: 30 in | 760 mm
Outlet scavenger size: 52 in | 1,320 mm

**VOS-120 Vortex® Loading Spouts are limited for use in open loading applications only*

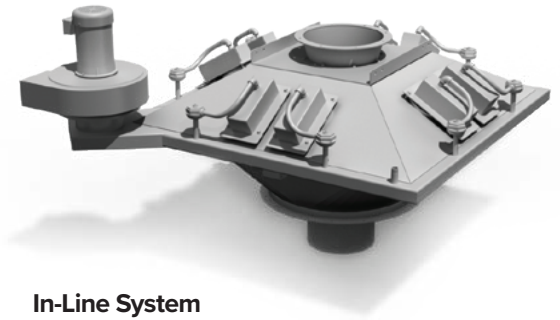
CONE-IN-CONE

FILTRATION SYSTEMS

Vortex® Filtration Systems are specifically designed to:

1) Displace dust-laden air from its source;
2) Separate dusts from the air;
3) Exhaust the cleaned air to atmosphere; and
4) Re-entrain the filtered dusts back down into the load.

Vortex Filtration Systems are “active units,” meaning an air withdrawal forcibly pulls displaced air and dusts through the filter cartridges to initiate the filtration process.



In-Line System

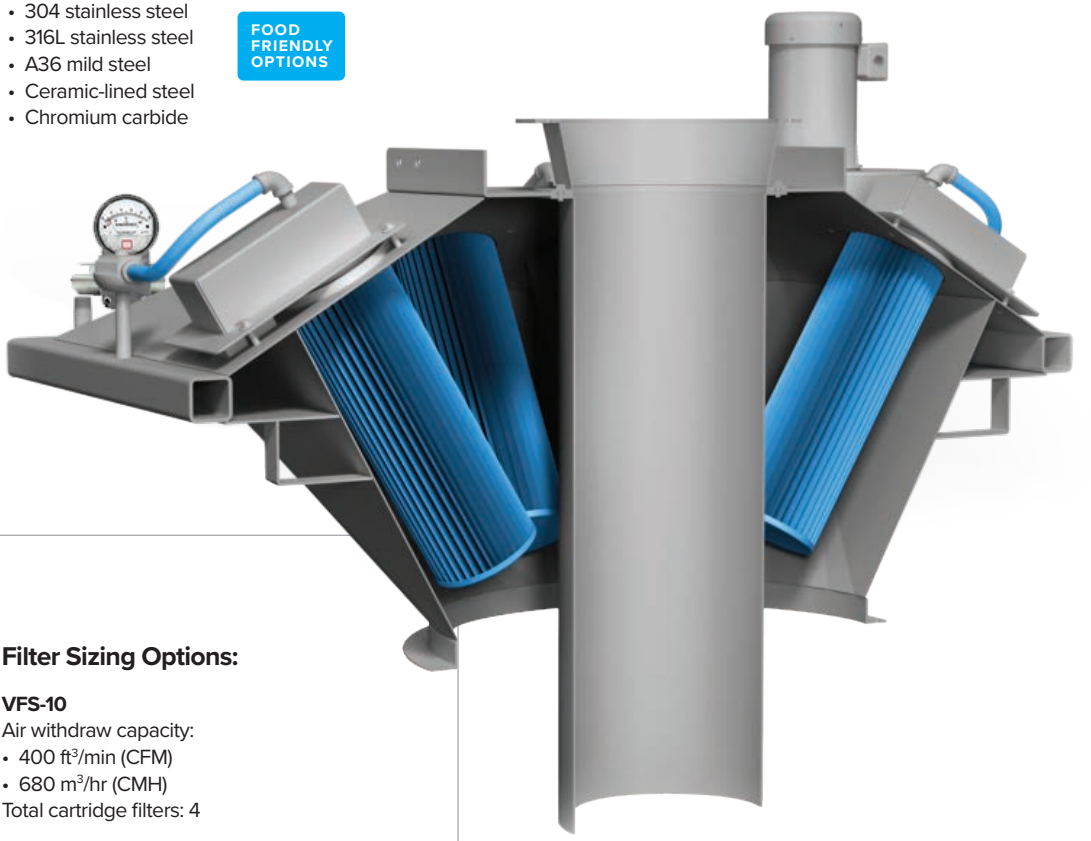
Designed to collect fugitive dusts by means of air withdrawal. Once the loading process begins, the attached blower draws up fugitive dusts as they are generated by the material flow stream. Once arriving at the In-Line Filtration System, the fugitive dusts are captured in a series of pleated polyester filter cartridges. Throughout the loading process, automatic reverse pulse jets inject compressed air to purge the captured dusts back into the load. Thus, the In-Line Filtration System is designed to minimize product loss and prevent dusting to atmosphere.

**To reduce energy consumption, compressed air is only forced through the reverse pulse jet system during loading operations. It is not a continuously running system.*

Material Contact Options:

- 304 stainless steel
- 316L stainless steel
- A36 mild steel
- Ceramic-lined steel
- Chromium carbide

FOOD FRIENDLY OPTIONS



Filter Sizing Options:

VFS-10
Air withdraw capacity:
- 400 ft^3/min (CFM)
- 680 m^3/hr (CMH)

Total cartridge filters: 4

VFS-25
Air withdraw capacity:
- 1,000 ft^3/min (CFM)
- 1,700 m^3/hr (CMH)

Total cartridge filters: 8

VFS-40
Air withdraw capacity:
- 1,600 ft^3/min (CFM) | 45 m^3/min (CMM)
- 96,000 ft^3/hr (CFH) | 2,720 m^3/hr (CMH)
- 77,140 bushels/hr

Total cartridge filters: 8

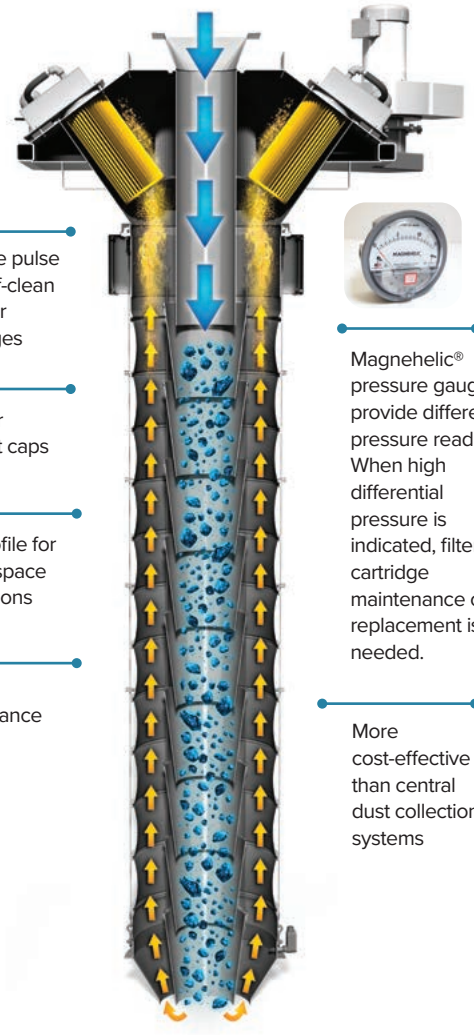
Filter Cartridge Options:

Pleated, spun-bound polyester media
Efficiency ratings (based on dry dust particle sizes):
- ½ micron: 99.7% efficiency
- 1 micron: 99.8% efficiency
- 2 micron: 100% efficiency

Emission ratings (based on dry dust particle sizes):
- ½ micron & larger: No more than 0.005 grains/dscf of air

PTFE-coated media
Emission ratings (based on dry dust particle sizes):
- ½ micron & larger: No more than 0.004 grains/dscf of air

KEY FEATURES



Reverse pulse jets self-clean the filter cartridges

Filter air exhaust caps

Low profile for limited space installations

In-line maintenance features

Magnehelic® pressure gauges provide differential pressure readings. When high differential pressure is indicated, filter cartridge maintenance or replacement is needed.

More cost-effective than central dust collection systems

Quick-lock filter cartridge access
Panels are hinged and secured by a handled, stationary clamping mechanism to accelerate the inspection and maintenance processes, and for interior access without tools.

POWER OF COMPARISON

- Central dust collection systems often require the installation of additional ductwork, a discharge airlock, and some way to dispose of collected dusts – or, some way to reintroduce collected dusts back into the manufacturing process. The Vortex® In-Line Filtration System is more cost-effective than central dust collection systems because it is a self-contained unit.

- Compared to central dust collection systems, the Vortex In-Line Filtration System is a better performing unit. This is because central dust collection systems are exactly that: centralized. Often times, the central dust collector is located away from the point of loading. A central dust collector also supports other equipment throughout the process, which creates multiple "pick-up points" in the dust collection system. In order for the central dust collector to be connected to each of these processes, ductwork can become lengthy and with many bends. In addition, faulty connections may allow air and dusts to escape to atmosphere. Each of these variables can impact the strength and balance of air withdrawal, which limits the overall performance of a dust collection system. Because the Vortex In-Line Filtration System is a self-contained unit which keeps captured dusts at the point of loading, it ensures that air withdrawal strength and other performance factors are kept constant.

- Central dust collection systems often incorporate larger-sized exhaust blowers, typically ranging from 20-100 horsepower (HP) – and sometimes, even larger. Because central dust collection systems also support other stages in the process, the exhaust blowers are running almost constantly – even when loading operations are not being performed. This results in high electrical consumption. Alternatively, the Vortex In-Line Filtration System features a stand-alone exhaust blower which runs only when loading operations are being performed. Therefore, the Vortex In-Line Filtration System significantly reduces energy costs.

- Other in-line filtration systems offered by the industry have bulky designs, making them challenging to install in limited space applications. The Vortex In-Line Filtration System's compact, square-shaped design is ideal for limited space installations.

- Other in-line filtration systems offered by the industry have horizontally mounted filter cartridges, which allow heavy, high density dusts to build up in the filters. These dusts may not be dislodged by pulse cleaning. To address this issue, the filter cartridges can be periodically accessed and maintained to help dislodge dusts – but this recreates the original workplace safety problem of employee dust exposure and its potential health risks. The Vortex In-Line Filtration System's filter cartridges are vertically mounted to allow dusts to release from the filter pleats without having to fight gravity. This reduces the load on a filter cartridge and helps extend its service life. Vertical mounting also reduces employee dust exposure, since the filter compartments must only be opened for filter cartridge replacement or infrequent maintenance.

- The Vortex In-Line Filtration System is not a dust "collector"; it is a dust "filter." The primary difference being that with the Vortex In-Line Filtration System, dusts are temporarily captured before being purged back out of the filter cartridges and back into the material flow stream. By better managing dusts at the point of loading instead of routing them to a central dust collection system, it results in the following benefits:

- Improved profitability by loading out the dusts as product, rather than moving them to a central dust collector as waste.

- By continuously purging dusts back out of the filters, it keeps the filters clear and increases their service life.

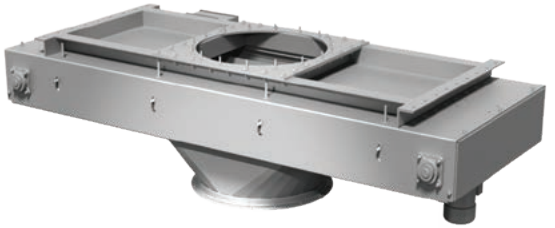
- If a central dust collection system's waste storage container is not regularly emptied, dusts may back up in the system and create clogs. This can result in dust overflow, which may cause dusts to escape to atmosphere and can create potential hazards in the workplace. Because the Vortex In-Line Filtration System is a self-contained unit which continuously filters and reintroduces dusts back into the material flow stream, rather than collecting dusts, this concern is addressed.

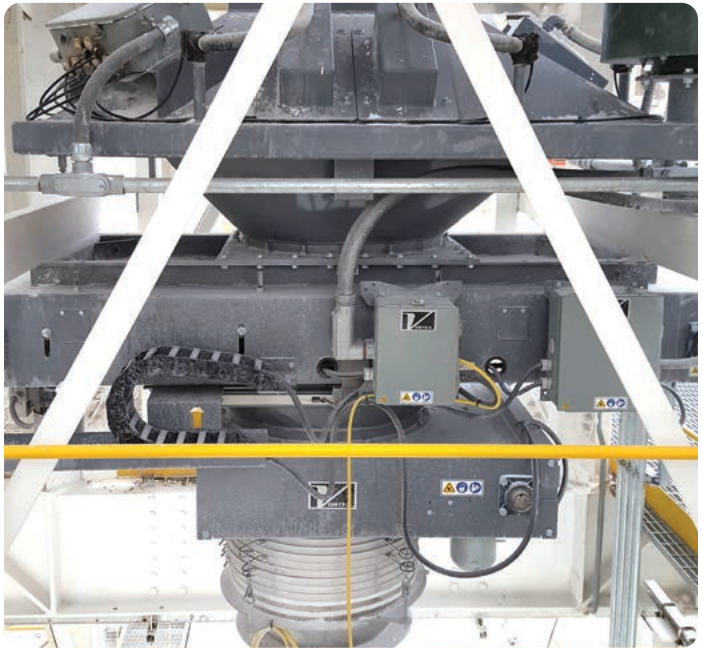
- Many in-line filtration systems incorporate two spiral hoses at each filter cartridge: one hose to force compressed air into the filter cartridges, and a second hose to exhaust spent air back out of the filter cartridges. Over time, these hoses can rot and crack, which may cause failures in the reverse pulse jet system. To reduce spare parts necessity and other maintenance costs, the Vortex In-Line Filtration System has replaced the second (exhaust) hose with an exhaust cap. The exhaust cap draws spent air directly through the filter cartridge before it is exhausted to atmosphere.

CONE-IN-CONE

SPOUT POSITIONERS

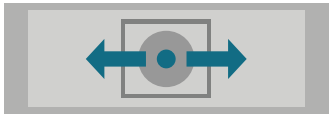
Vortex® Spout Positioners are designed so that materials pass through a fixed inlet. Below, a traversing hopper slides across a fixed support pan. A loading spout is attached beneath the traversing hopper to allow exact positioning of the spout above a truck or railcar waiting below.





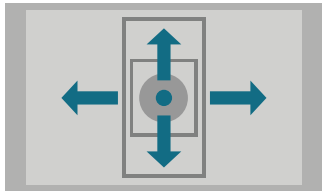
Single-Axis Positioner

The Vortex Single-Axis Positioner allows spout movement along either an X-axis or a Y-axis. Depending on orientation, a Single-Axis Positioner can either be moved from front-to-back or side-to-side above a loading vessel.



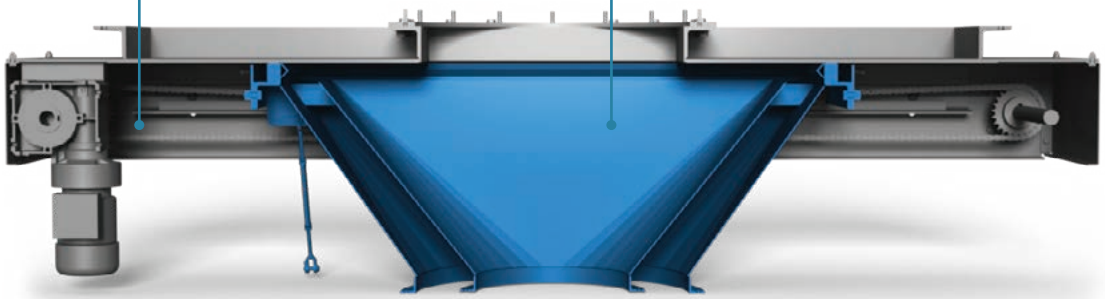
Dual-Axis Positioner

The Vortex Dual-Axis Positioner allows spout movement along both an X- and Y-axis, allowing it to traverse from front-to-back and side-to-side above a loading vessel.



Fixed Support Pan
The support pan stays stationary, allowing the hopper to easily slide and find its destination.

Traversing Hopper
The traversing hopper connects to the spout and allows for exact positioning.



Materials of Construction
The inlet cone and traversing hopper are constructed from the same metal material(s) as specified for the loading spout's material contact areas (i.e. stacking cones). The fixed support pan is constructed from A36 mild steel.

Options:
- 235 BHN abrasion-resistant steel
- 400 BHN abrasion-resistant steel
- 304 stainless steel
- 316L stainless steel

FOOD FRIENDLY OPTIONS

Motor Specifications
- Single-Axis Positioner: (qty. 1) 1 HP motor with 80:1 gear reducer
- Dual-Axis Positioner: (qty. 2) 1 HP motors with 80:1 gear reducers

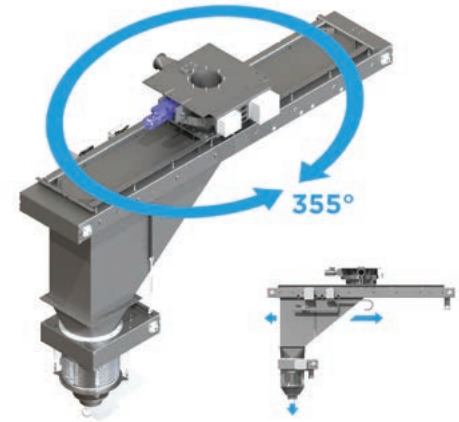
Vortex® Spout Positioner motors are three-phase motor/reducer drive units which feature an integral braking system. Single-phase motors are available.

Standard Sizes
- Single-Axis Positioners: 2 – 10 ft | 0.6 – 3 m
- Dual-Axis Positioners: 2x2 – 6x4 ft | 0.6x0.6 – 1.8x1.2 m

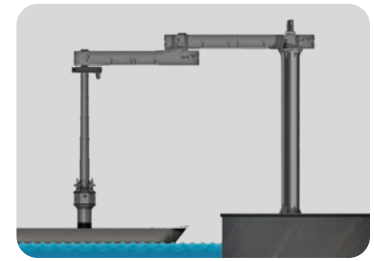
Aerial Camera System
For added visibility throughout the loading process, the Vortex Loading Spout can be equipped with an Aerial Camera System. At the main pan housing, a video camera is installed externally to provide an aerial view of the spout's position, relative to the loading vessel below. The live video feeds back to a monitor for real-time observation as the operator moves the spout into position.

Rotating Positioner
The Vortex Rotating Positioner rotates 355° and travels horizontally, allowing the loading zone to be a diameter. This allows the loading spout to be positioned over a vehicle hatch and eliminates the need for a driver to reposition the vehicle. Compared to a Dual-Axis Positioner with a similar loading zone, the Rotating Positioner may weigh less, which can be critical when replacing current installations.

Vortex Spout Positioners are internally vented, allowing for dust control during the loading process. While the hopper and spout remain attached to the Rotating Positioner, hopper seal replacement can be easily performed.



Articulating Arm Consult a Vortex engineer



CONE-IN-CONE LOADING

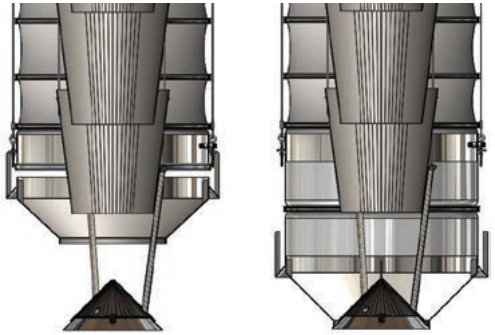
ACCESSORIES

A wide variety of options and accessories are available for your Vortex® Loading Spout. For improved efficiency and functionality, consider...

Dust Control Skirt

The Vortex Dust Control Skirt is intended for open loading applications. It is constructed from heavy, durable neoprene rubber. Rather than flaring the skirt from a common piece of neoprene rubber, each flared section is a stand-alone neoprene rubber strip. Each strip of rubber is overlapped to prevent pathways for dust emissions to atmosphere. By flaring larger, the Vortex Dust Control Skirt is able to fully encompass the peak of the material pile, to better contain fugitive dusts.

Power of Comparison: Alternative loading spouts offered by the industry are specifically constructed for use in either an open or enclosed loading application. For clients that require both open and enclosed loading from a single source, those spout designs limit their capabilities – and often require the purchase of two loading spouts. To address this issue, Vortex offers an optional detachable Dust Control Skirt. By including this option, a spout can be supplied with an outlet scavenger to accommodate enclosed loading applications; then, to properly equip for open loading applications, the Dust Control Skirt can be attached along the upper perimeter of the outlet scavenger. Because of this capability, a Vortex Loading Spout can serve dual purposes.



Self-Sealing Discharge

A dust collection system is able to collect the majority of fugitive dusts generated during the loading process. However, once loadout is complete, trace amounts of material and dusts may remain within the spout's outer sleeve. As the spout extends and retracts, those materials and dusts can shake loose and create material spillage and/or dusting to atmosphere. To address this in enclosed loading applications, a Self-Sealing Discharge (SSD) can be installed beneath the spout's outlet scavenger.

By design, the Self-Sealing Discharge is simply a closure cone that extends and retracts to allow or forbid materials from discharging through the outlet scavenger. Between loading cycles, the SSD is retracted to create a "lid" over the loading spout's outlet scavenger. As the loading spout is extended toward an enclosed truck or railcar, the SSD remains closed. Once the spout's outlet scavenger is seated into the loading hatch, the SSD extends to allow material discharge. As the spout begins to retract out of the loading hatch, the SSD immediately closes to once again seal off the outlet scavenger.

The Self-Sealing Discharge does not require power and operates automatically, without operator command.

Spin Loader

Mounted beneath the outlet scavenger. The purpose of a spin loader's disc-shaped vane is to evenly disperse lightweight materials over a large surface area.

Material Sampling Unit

The Vortex Manual Material Sampling Unit allows a small material sample to be manually extracted as materials pass through the spout's outlet scavenger. This provides a final test of product quality at the point of loading.

Contact us to discuss automated material sampling options

Vibratory Kits

Mounted along the outlet scavenger. To conclude the loadout process, vibrators can continue to be run briefly to encourage residual materials to fall away from the spout's outer sleeve and down into the load, prior to spout retraction.

Material Level-Sensing Devices

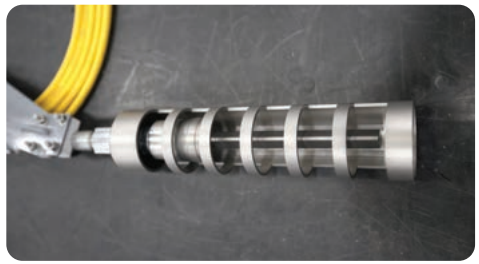
For open loading applications, the purpose of a material level-sensing device is to automate the spout retraction process. In doing so, material level-sensing devices prevent material build-up in the spout, eliminate the need for visual monitoring throughout the loading process, and avoid vessel overfilling.

For enclosed loading applications, the purpose of a material level-sensing device is to detect product level within the vehicle. Once detected, several actions can be initiated, depending on a facility's preferred level of automation. There are several types of material level-sensing devices. Each performs exactly the same function; they are simply alternatives to one another. However, certain loading circumstances call for certain material level-sensing technologies.

Tilt Probe & Auto-Raise System

In enclosed loading applications, a Tilt Probe is mounted beneath the outlet scavenger so that it can be lowered into the loading hatch. As materials fill near the top of the vessel, the Tilt Probe will come in contact with the material pile and gradually begin to tilt. Once the probe is tilted to approximately 16°, several actions can be initiated, depending on a facility's preferred level of automation. Options range from visual indication (via lights) to automated halt of material flow and automated spout retraction – all the way to upstream process control.

In open loading applications, a Tilt Probe is mounted at the outlet scavenger. The outlet scavenger and the Tilt Probe are typically separated by a Vortex® Dust Control Skirt. As the material pile grows beneath the Dust Control Skirt, the Tilt Probe gradually begins to tilt. When used in tandem with an Auto-Raise System, once the probe is tilted to approximately 16°, it triggers an automatic, incremental retraction of the spout as materials continue to discharge. Once the specified load is achieved, the Tilt Probe can be synchronized with the process gate (or belt conveyor) above to automatically halt material flow before the spout is fully retracted.



Vibratory Probe or Pneumatic Probe & Auto-Raise System

Both Vibratory Probes and Pneumatic Probes are primarily used when handling lightweight and/or fine dry bulk solid materials.

Similar to a tuning fork, a Vibratory Probe puts out a consistent vibration frequency throughout the loading process. When contacted by the material pile, the probe's vibration frequency is altered.

Alternatively, with a Pneumatic Probe, a sensor head applies an air stream throughout the loading process. When the sensor head is covered by the material pile, it creates back pressure.

In either case, in enclosed loading applications, this triggers an auto-command to the process gate (or belt conveyor) above to halt material flow. This prevents vessel overfilling and triggers an automated spout retraction process.

In open loading applications, either probe is often used in tandem with an Auto-Raise System. Once the probe's signal is altered, this triggers an automatic, incremental retraction of the spout as materials continue to discharge. Once the specified load is achieved, the probe can be synchronized with the process gate (or belt conveyor) above to automatically halt material flow before the spout is fully retracted.

Rotary Paddle Probe

Rotary Paddle Probes are primarily used in enclosed loading applications – and more specifically, in tandem with a Self-Sealing Discharge (SSD). When applied in this way, the Rotary Paddle Probe is mounted below the SSD's closure cone and is protected by a metal housing. A Rotary Paddle Probe consists of a paddle which continually revolves throughout the loading process. As materials fill near the top of the vessel, the paddle will come in contact with the material pile, causing its revolutions to slow or cease. This triggers an auto-command to the process gate (or belt conveyor) above to halt material flow. This prevents vessel overfilling and triggers an automated spout retraction process.

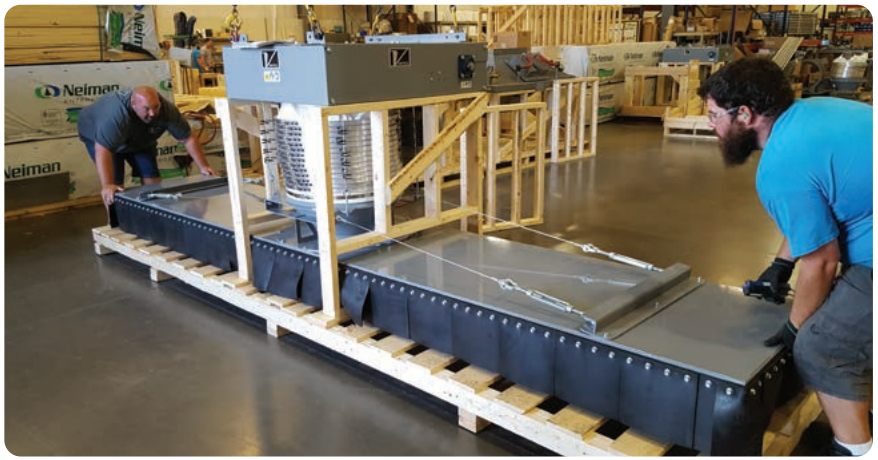
Hatch Adaptors

For enclosed loading applications, a Vortex® Loading Spout can be supplied with optional Hatch Adaptors.

Common scenarios for a Vortex Hatch Adaptor include:

- If a facility is loading trucks and/or railcars with non-standard loading hatch configurations. Vortex Hatch Adaptors are custom-designed to match the unique hatch(es).
- If a Vortex Loading Spout is sized to meet a client's load rate capacity requirements, but that spout size is intended for filling vessels of a different size. Example: To meet a client's load rate capacity requirements, a Vortex VES-25 Loading Spout is supplied. Standard outlet scavenger size for a VES-25 Loading Spout is 16 in | 405 mm. Typical loading hatch size for a truck is 20 in | 500 mm, while typical loading hatch size for a railcar is 30 in | 760 mm. To compensate for the sizing differences, Vortex Hatch Adaptors ensure a Vortex Loading Spout's proper fit into larger hatch sizes.

Vortex Hatch Adaptors are available in either round or rectangular options. Rectangular Hatch Adaptors are intended to address environmental issues when loading railcars that contain elongated loading hatches, also known as "trough hatches." Its purpose is to confine airborne particulate generated during the loading process.



How it Works: Once a loading spout is lowered atop a railcar, the rectangular Hatch Adaptor fully covers the railcar's rectangular opening. When used in tandem with a dust collection system, the rectangular Hatch Adaptor effectively closes off the opening to foster a strong and consistent air withdrawal throughout the loading process. Along the perimeter of a rectangular Hatch Adaptor is a Vortex Dust Control Skirt. The neoprene rubber skirt prevents pathways for dust emissions to atmosphere.

Remote Control Pendants

Put simply, a remote control pendant is a handheld push-button device. Remote control pendants enable automation by allowing loading spout operators to guide the spout into position using programmed controls. Such commands include auto-extend, auto-raise, auto-material start, auto-material stop, full-extension and full-retraction, among others. For safety reasons, remote control pendants are attractive because they allow spout operation to be performed away from hazardous catwalks; walkways; and the tops of trucks, railcars, barges and ships.

Spout Caution System

For enclosed truck and railcar applications, Vortex Loading Spouts can be equipped with a Spout Caution System. This includes a flashing overhead light which works in tandem with an audible alarm system. The purpose for both is to inform the loading spout operator and the truck driver or railroad engineer that the spout is not fully retracted. This reduces the risk of damaging the spout, truck or railcar, as a result of premature pull away.

How it Works: When the loading process is complete, the process gate above is closed or the belt conveyor becomes idle. Once material flow is halted, a relay switch sends an electrical transmission to the Spout Caution System to initiate the flashing overhead light and the audible alarm system. The beacon and horn systems run throughout the spout retraction process, which typically lasts 5 – 10 seconds.

CASE STUDY

Loading System Handling Talc

Application: Previously, the client used chutework to convey talc from a storage bin to a loadout station. At the loadout station, a loading sock with a skirt was used to fill enclosed trucks.

Challenges:
- Constant truck repositioning.
- Talc would suspend and dust to atmosphere.
- Lack of engineering controls caused frequent truck over/underfilling.
- Bridging in the storage bin created flow issues.

Collectively, these issues created long load times, product loss, and profitability concerns.

Solutions:
- Aerated Bin Bottom
- Aero-Slide Conveyor
- Aero-Slide Gate & Drum Valve
- Titan Maintenance Gate
- Clear Action Gate
- In-Line Filtration System
- Single-Axis Spout Positioning System
- Loading Spout

Results: Assisted by aeration, air-gravity conveyance, metering and flow control, and automated engineering controls, this new loading system has significantly reduced loading times, dusting and product loss, and has made an immediate impact on profitability and efficiency.

CASE STUDY

Loading System Handling Fertilizer

Application: Fertilizer is conveyed off of barges and into a storage bin at a truck transloading facility. Fertilizer is loaded into enclosed trucks for local distribution.

Solutions:
- Loading Spout with In-Line Filtration System
- A custom square-to-round transition flange allowed the loading system to mate up to a pre-existing storage bin.
- A material level-sensing kit avoids truck over/underfilling.

CASE STUDY

Loading System Handling Industrial Sand

Application: Industrial sand is conveyed out of rail cars and into storage bins at a truck transloading facility. Industrial sand is loaded into enclosed trucks for local distribution.

Solutions:
- Loading Spout
- An In-Line Filtration System to control silica dusts at the point of loading. This is to address workplace health and safety concerns.
- A Dual-Axis Spout Positioning System solved the client's issue of constantly repositioning trucks before loadout.

CASE STUDY

Loading System Handling Cement

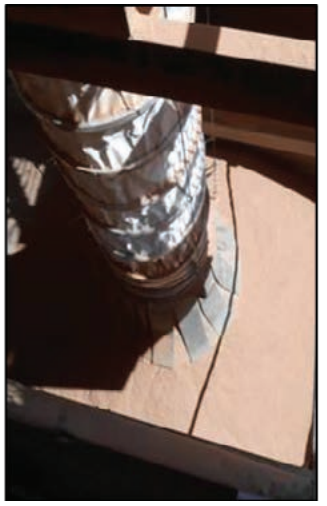
Client: Ash Grove Cement — Chanute, Kansas, USA
- 5th largest cement manufacturer in North America.
- Largest US-owned cement company.
- 8 plants; each produces approximately 1 million tons per year.

Application: In 2014, the Chanute plant sought improved dust management and accelerated load times.

Solutions:
- Loading Spout
- A Dual-Axis Spout Positioning System (4 ft | 1.2 m front-to-back travel; 2 ft | 0.6 m side-to-side travel) solved the client's issue of constantly repositioning trucks before loadout. More accurate positioning eliminated operators manually guiding the spout into the loading hatch, and also reduces wear to the stacking cones. This prolongs cone service life, for reduced maintenance and spare parts costs.

Results: Ash Grove has already saved significant labor hours, making it a much more efficient operation. Their maintenance team particularly enjoys that the Vortex Loading Spout is specifically designed to reduce cable wear and the maintenance and downtime costs associated with it.

Throughout the equipment acquisition and installation processes, Ash Grove enjoyed Vortex's continuous customer service — and even provided on-site field service support when installation challenges arose.



TECHNICAL ARTICLE

Controlling Dust Emissions in Bulk Loading

Over the decades, more strict regulation has forced companies to find solutions for decreasing or eliminating the presence of fugitive dust in loading processes.

Dust Management: Why it is Important

The loading of bulk materials into trucks, railcars, barges, ships or stockpiles is fraught with health, safety and environmental issues. Dust emissions in bulk loading terminals can lead to respiration problems for employees, cause slip hazards in the workplace, propagate a potentially explosive atmosphere, and contaminate local waterways and neighborhoods.

When material is discharged in mass flow, dust becomes airborne due to impact forces, air entrainment and friction between material particles. This is exacerbated by the displacement of air within vessels, which often creates clouds of unmanageable dust in the loading area.

There are many methods currently used across industries to reduce dust emissions. The following are the most common practices used in manufacturing processes today:

1. Loading Socks

A cylindrical tube of sewn, tapered fabric – much like a windsock. Made from canvas or polyurethane fabric.

Pros:
- Flexible.
- Low-cost.

Cons:
- Cannot be automated.
- Does not control displaced air at the point of loading.
- Wears quickly.

2. Telescopic Chutes

A tube-in-tube metal chute that travels downward to load, and upward to clear the transport vessel.

Pros:
- Can “follow the load” and progressively retract.
- Longer service life, compared to loading socks.

Cons:
- Does not control displaced air at the point of loading.
- Its heavy, high-plugged load creates dust on material impact.

3. Dust Suppression Hoppers

A hopper that attempts to lessen the agitation of particles, in order to reduce dust.

Pros:

- A cost-effective solution for certain materials and applications.

Cons:

- Cannot “seat” into a truck or rail car’s loading hatch.
- Does not control displaced air at the point of loading.
- Limited in application scope.
- Material flow is exposed to atmosphere.

4. Cascading Chutes

Designed with angled cones to reduce the velocity of material flow, thus reducing frictional forces and material impact.

Pros:

- Can eliminate the need for a dust collection system in open loading applications.
- Is a “soft loading” solution, reducing material degradation.

Cons:

- Does not control displaced air at the point of loading.
- Heavy and oversized to overcome capacity constraints.
- High acquisition costs.
- Not effective in enclosed loading applications without a dust collection system.

5. Loading Spouts

The aforementioned methods can be effective in limited applications, but all fail to address the primary cause of fugitive dust: the extraction of displaced air. This is key to dust management.

Vortex loading equipment is specifically designed to control this problematic mixture of air and dust, addressing the health, safety, and environmental issues faced by the industry. Vortex loading systems are designed per the demands of each application and address air displacement at the source.

Enclosed Loading

In enclosed applications, such as truck or railcar loading, the Vortex Loading Spout seats into the vessel’s loading hatch and works in tandem with a dust collection system or a filtration system to manage displaced air and dusts by means of air withdrawal.

With the Vortex In-Line Filtration System, the displaced air and dust mixture is:

- Aspirated out of the enclosed vessel;
- Dusts are captured in filter cartridges above. The cleaned displaced air which remains is exhausted to atmosphere;
- The captured dusts are purged back out of the filter cartridges and reintroduced into the material flow.

This creates a closed cycle, which minimizes material loss.

Open Loading

This approach can also be used in open loading applications, such as open truck beds and rail cars, barges, or stockpiles. This is achieved by attaching a dust skirt at the outlet of the spout, which rests over top of the peak of the material pile to seal the air withdrawal as materials flow.

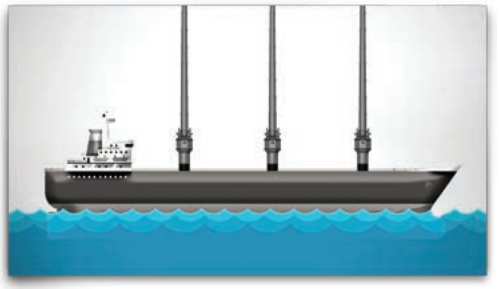
Which Technique is Best?

Controlling dust at loading terminals is a critical concern for many companies. Acquiring equipment that does not manage displaced air and dust can lead to costly health, safety, and environmental issues. Therefore, the Vortex Loading Spout is recommended for optimal dust management at the point of loading.

LOADING TYPES:

SHIP LOADING

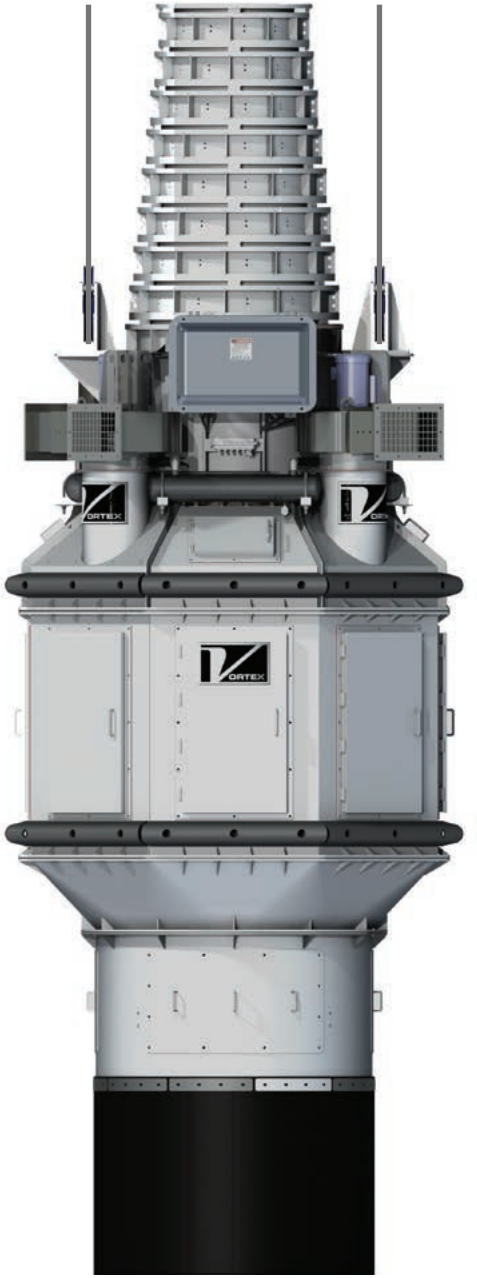
When loading dry bulk solid materials into bulk carriers, spout length, product dispersion and loadout speed are the primary concerns. For optimal performance, the Vortex® Ship Loading Spout can be used in tandem with accessories specifically designed for loading efficiency.



Historically, cargo ships, barges and other bulk carriers have gradually and consistently been built larger. The reasoning is simple: By using only one large ship to transport cargo instead of 3-5 smaller ships to haul the same quantity, it allows the transportation company to scale. Less ships. Less fuel usage. Less manpower. Less cost.

But at the port, it is quite expensive to acquire equipment and other resources necessary to expand and redevelop the port, in order to adjust to such dramatic changes in load rate capacities. Therefore, dry cargo ports are concerned with improving loadout speeds and efficiencies while reducing operating costs, so that operations continue to be profitable for them as well.

While many ports continue to lag in these areas by using pre-existing equipment, the Vortex Ship Loading Spout is specifically designed to meet evolving capacity requirements.



TECHNICAL SPECIFICATIONS

Spout Type	Telescoping, tube-in-tube
Materials Handled	Ideal for grain handling applications
Applications	Intended for ship loading applications. Can also be used in larger-scale stockpiling applications.
Conveyance Type	Gravity drop in the presence of slight negative pressure, if dust collection or filtration is applied
Material Temperatures	250°F | 120°C for standard spout, with modifications that allow up to 400°F | 205°C
Extended Travel	Spout lengths will vary, based on application. Contact us to discuss custom sizing options.
Considerations	To ensure success in its given application, each Vortex Ship Loading Spout is designed and manufactured on a case-by-case basis

"The most critical features of ship loading equipment are reliability and environmental safety. Nowadays, ports worldwide consider pollution prevention a primary objective – paying special mind to reducing dust emissions and preventing cargo overflow or spillage. To address these concerns, it is critical to incorporate sophisticated engineering controls and dust control measures capable of fulfilling the highest environmental standards."

– Mark Schaberg P.E., Chief Engineer, Vortex

KEY FEATURES

Telescoping, tube-in-tube design

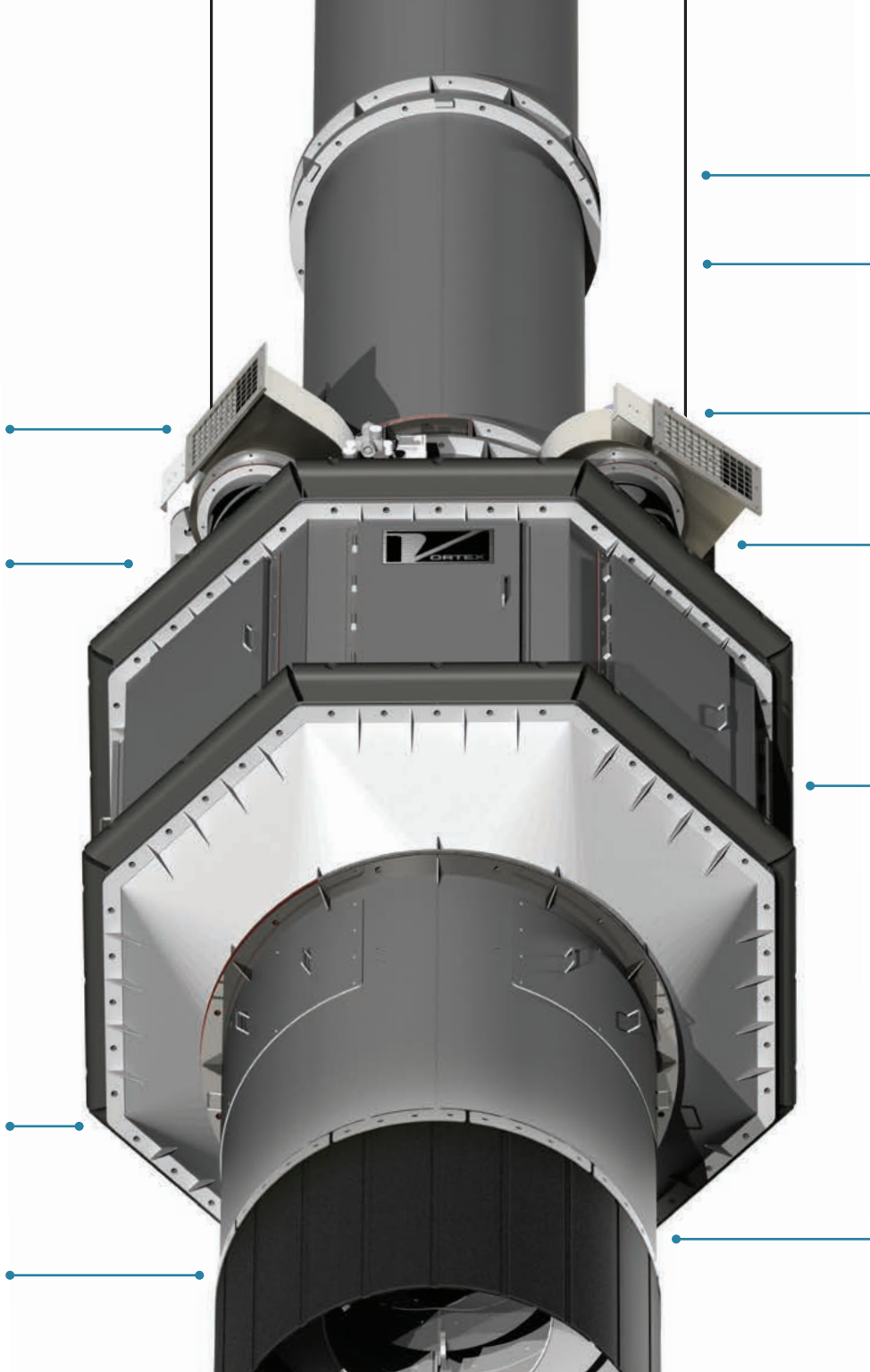
Filter access doors for easy filter cartridge maintenance

Sizing Options

**Not available in standard sizes. Vortex® Ship Loading Spouts require significant engineering consideration to ensure their success in each application. Therefore, Vortex Ship Loading Spouts are designed and manufactured on a case-by-case basis.

Optional trimming spoon horizontally disperses materials to fill hard-to-reach areas

Dust Control Skirt encompasses the peak of the material pile to prevent dusting to atmosphere



Rotation-resistant lifting cables

Tube flange seals

Two cable, dual-drum, two-part reeving hoist drive system

Two-position rotary limit switch

Discharge Filtration System captures fugitive dusts and reintroduces them back down into the load

Material Level-Sensing Device and Auto-Raise System indicate when the material pile has grown to a specified level and automatically raise the spout to prevent burying and avoid vessel overfilling

TUBE-IN-TUBE

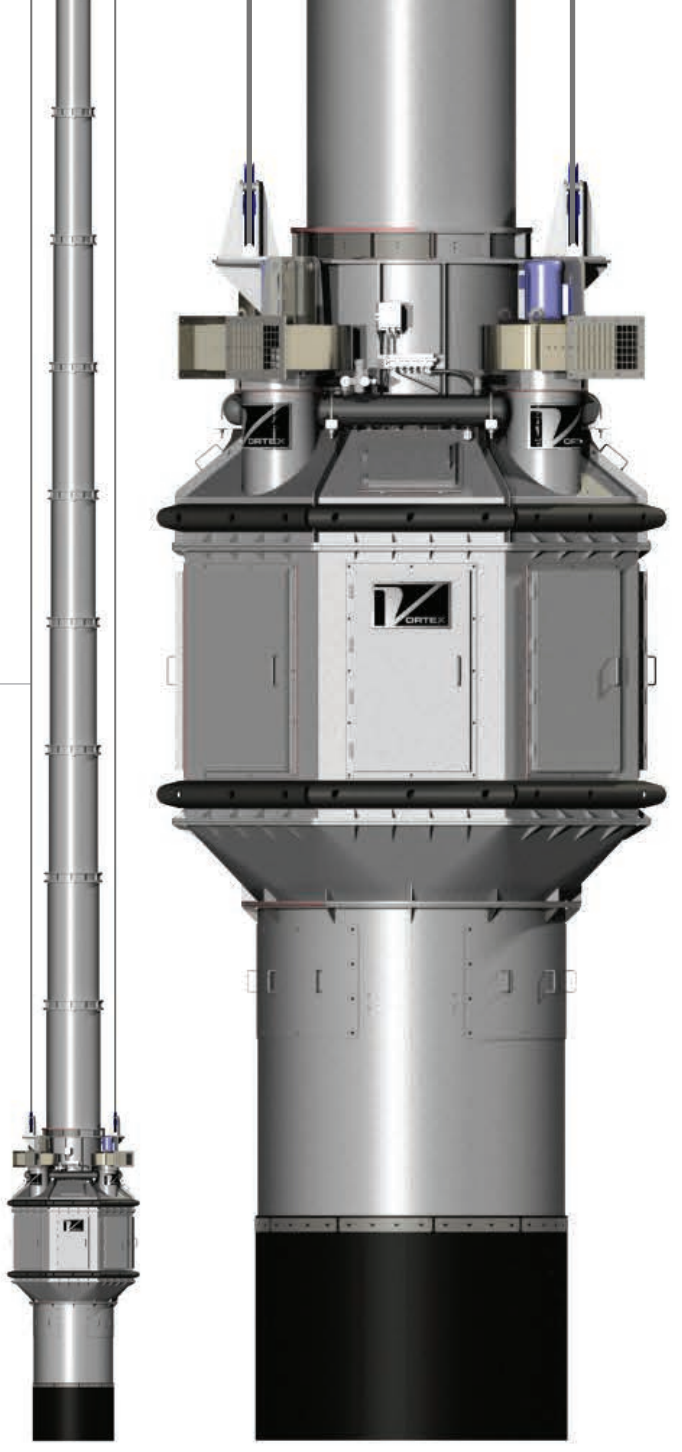
TELESCOPING SYSTEM

- Vortex® Ship Loading Spouts are constructed from telescoping tubes which slide into one another as the Ship Loading Spout retracts. In doing so, the Ship Loading Spout's overall height is condensed to allow vessels safe entry and exit at the port.
- The top flange of each tube is sealed using a layer each of plastic and rubber materials. This fills the void between each telescoping tube.

Tube Material Construction

By constructing Vortex Ship Loading Spouts from durable metal materials, the spout is protected from the elements of its surrounding environment, is protected against wear and abrasion from the material(s) handled, and is provided added stability in applications with especially long extended travel.

- 304 stainless steel
- 316L stainless steel
- A36 mild steel
- Ceramic-lined tubes
- Chromium carbide
- 400 BHN abrasion-resistant steel



TUBE-IN-TUBE

HOIST DRIVE SYSTEM

- Two cable, dual-drum, two-part reeving hoist drive system to better distribute the spout's weight. Therefore, the force required to extend and retract a Vortex Ship Loading Spout is cut in half.
- Vortex designs winch systems at 5:1 service factor for lifting cables. Rotation-resistant lifting cables are also available upon request.

  Note: Total breakage resistance may vary, based on weight and overall size of the Vortex Ship Loading Spout.
- Two-position rotary limit switch to set boundaries on spout full-extension and full-retraction. The rotary limit switch is driven by the output shaft, located on the main drive assembly. This device is factory supplied pre-wired into an electrical panel, which will also be mounted on the main drive assembly.
- Optional rotary absolute encoder provides analog output for intermediate positions. A rotary absolute encoder is direct-coupled to the output shaft, located on the main drive assembly. This device is factory supplied pre-wired into an electrical panel, which will also be mounted on the main drive assembly.

TUBE-IN-TUBE

FILTRATION SYSTEMS

Vortex® Filtration Systems are specifically designed to:

1) Displace dust-laden air from its source;
2) Separate dusts from the air;
3) Exhaust the cleaned air to atmosphere; and
4) Re-entrain the filtered dusts back down into the load.

Vortex Filtration Systems are “active units,” meaning an air withdrawal forcibly pulls displaced air and dusts through the filter cartridges to initiate the filtration process.

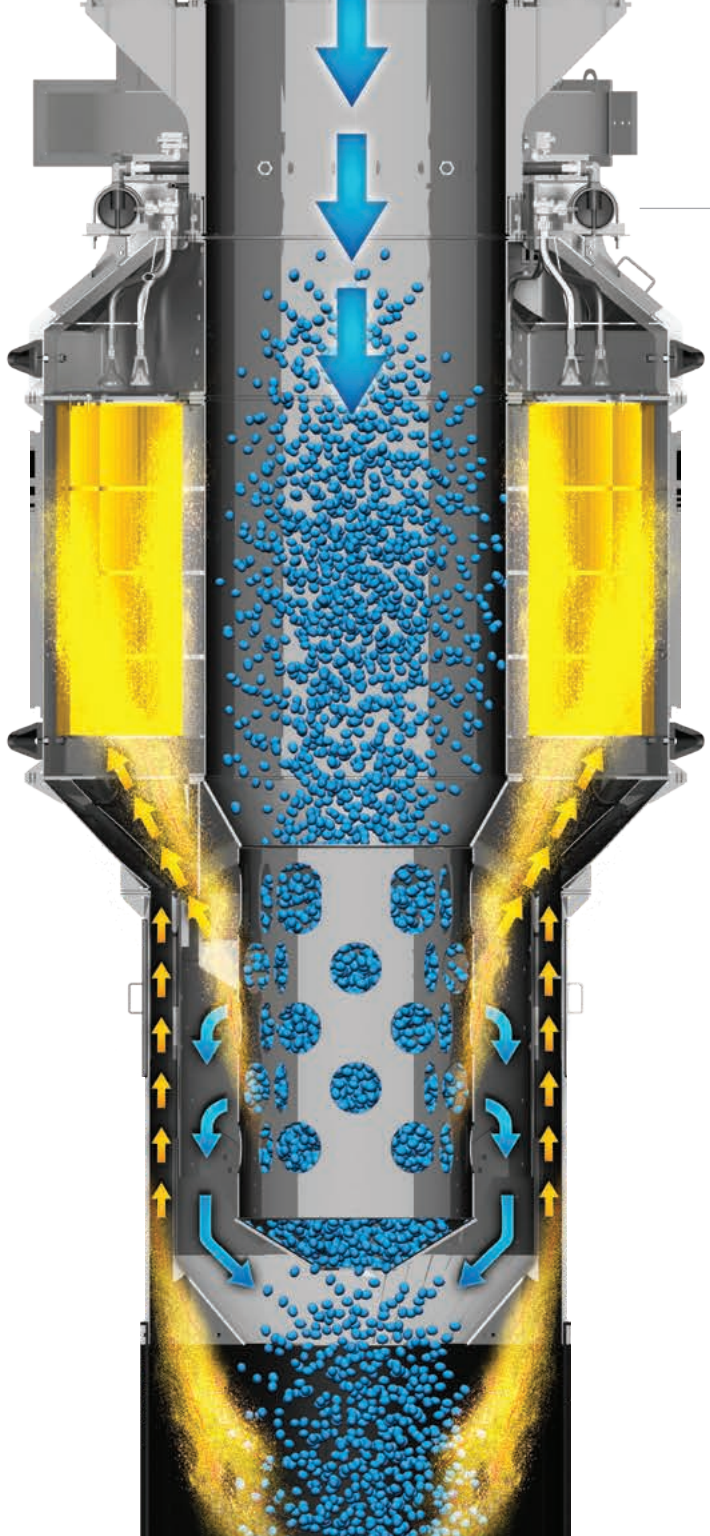
Discharge System

Designed to collect fugitive dusts by means of high volume exhaust blowers. Once the loading process begins, the blowers draw up fugitive dusts as they are generated by the material flow stream. The fugitive dusts are captured in a series of pleated polyester filter cartridges. Throughout the loading process, automatic reverse pulse jets inject compressed air to purge the captured dusts back into the load.

Thus, the Discharge Filtration System is designed to minimize product loss and prevent dusting to atmosphere.

A Discharge Filtration System is necessary in spouts with longer travel distances.

**To reduce energy consumption, compressed air is only forced through the reverse pulse jet system during loading operations. It is not a continuously running system.*



Key Features

- Reverse pulse jets self-clean the filter cartridges
- MERV 16-rated high efficiency filter cartridges

Material Contact Options:

- 304 stainless steel
- 316L stainless steel
- A36 mild steel
- Ceramic-lined material contact areas
- Chromium carbide

Filter Cartridge Options

- Pleated, spun-bound polyester media

Efficiency ratings (dry dust particle sizes):
- 99.98% @ 1/3 micron
- 99.99% @ ½ micron
- 100% @ 1 micron

TUBE-IN-TUBE LOADING

ACCESSORIES

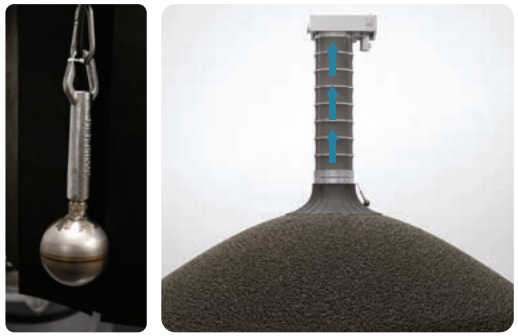
Material Level-Sensing Devices

For open loading applications, the purpose of a material level-sensing device is to automate the spout retraction process. In doing so, material level-sensing devices prevent material build-up in the spout, eliminate the need for visual monitoring throughout the loading process, and avoid vessel overfilling.

Dust Control Skirt

The Vortex® Dust Control Skirt is intended for open loading applications. It is constructed from heavy, durable neoprene rubber. Rather than flaring the skirt from a common piece of neoprene rubber, each flared section is a stand-alone neoprene rubber strip. Each strip of rubber is overlapped to prevent pathways for dust emissions to atmosphere. By flaring larger, the Vortex Dust Control Skirt is able to fully encompass the peak of the material pile, to better contain fugitive dusts.

Power of Comparison: Alternative loading spouts offered by the industry are specifically constructed for use in either an open or enclosed loading application. For clients that require both open and enclosed loading from a single source, those spout designs limit their capabilities – and often require the purchase of two loading spouts. To address this issue, Vortex offers an optional detachable Dust Control Skirt. By including this option, a spout can be supplied with an outlet scavenger to accommodate enclosed loading applications; then, to properly equip for open loading applications, the Dust Control Skirt can be attached along the upper perimeter of the outlet scavenger. Because of this capability, a Vortex Loading Spout can serve dual purposes.



Tilt Probe & Auto-Raise System

In open loading applications, a Tilt Probe is mounted at the outlet scavenger. The outlet scavenger and the Tilt Probe are typically separated by a Vortex Dust Control Skirt. As the material pile grows beneath the Dust Control Skirt, the Tilt Probe gradually begins to tilt. When used in tandem with an Auto-Raise System, once the probe is tilted to approximately 16°, it triggers an automatic, incremental retraction of the spout as materials continue to discharge. Once the specified load is achieved, the Tilt Probe can be synchronized with the process gate (or belt conveyor) above to automatically halt material flow before the spout is fully retracted.

Motor Starter Panel

As a convenience to the end user, all Vortex Loading Spouts can be factory supplied with a Motor Starter Panel. The Vortex Motor Starter Panel is specifically designed to be compatible with the Vortex Loading Spout's three-phase motor requirements, as well as the spout's other electrical components. Without a Vortex Motor Starter Panel, end users must supply a motor starter panel before the spout can be operated, which can be a timely and expensive process.

Aerial Camera System

For added visibility throughout the loading process, the Vortex Loading Spout can be equipped with an Aerial Camera System. At the main pan housing, a video camera is installed externally to provide an aerial view of the spout's position, relative to the loading vessel below. The live video feeds back to a monitor for real-time observation as the operator moves the spout into position.

Trimming Spoon

Mounted below the outlet scavenger. The purpose of a trimming spoon is to rotate around the outlet scavenger, in order to horizontally disperse materials to fill hard-to-reach areas.

CASE STUDY

Ship Loading Spout Handling Whole Grains

Client: Grain Elevator – South USA

Application: Situated on the Gulf Coast, this client loads whole grains and other agricultural commodities into ships and barges.

A belt conveyor is used to transport grains out of storage, toward the loading station. Upon arrival at the loading station, grains are discharged via gravity drop through a Vortex Ship Loading Spout, into a bulk carrier below.

Quantity: 3 Vortex Ship Loading Spouts

Main Drive Features:

- Vertical travel distance: 70 ft | 20 m
- Main pan housing constructed from A36 mild steel structure.
- Main drive assembly includes a 20 HP/230-460 V/three-phase/60 Hz electric brake motor with integral motor braking system (weatherproof).
- Hoist drive system incorporates 8 transfer sheaves to support 2 lifting cables.
- Encoder/controls specifications: 24 VDC voltage, 4-20 mAmp output signal, Rated for IP65
- Magnetic GO switches to detect end of travel
- Two-position rotary limit switches (rated for NEMA 4) to back-up the GO switches.

Ship Loading Spout Features:

- Material feed inlet size (diameter): 2 ½ ft | 0.75 m
- Each spout consists of 10 telescoping tubes.
- 1st & 2nd telescoping tubes constructed from 450 Brinell Hardness Number (BHN) abrasion-resistant steel (thickness: ¼ in | 6 mm), to address the abrasiveness of whole grains.
- 8 remaining tubes constructed from A36 mild steel (7-gauge thickness).
- The exterior of all 10 telescoping tubes is finished with industrial-strength grey epoxy coating.

Discharge Filtration System Features:

- Material feed inlet size (diameter): nearly 4 ft | 1.2 m
- Material contact areas constructed from 450 BHN abrasion-resistant steel (thickness: 3/16 in | 5 mm).
- Rest of unit constructed from A36 mild steel, finished with industrial-strength grey enamel.
- Equipped with 4 high-volume exhaust blowers (powered by a 5 HP/230-460 V/three-phase/60 Hz TEFC electric motor); rated for Class II Div 1 Groups F & G; enclosure rated for NEMA 4.
- Equipped with 16 filter cartridges (size: 1 x 4 ½ ft | 0.3 x 1.3 m); constructed from pleated, spun-bound polyester with PTFE coating.
- 12 AWG/30 conductor heavy-duty cord reel system transfers electrical to the Discharge Filtration System.
- Heavy-duty hose reel system (ID: ¾ in | 20 mm) supplies compressed air to the Discharge Filtration System.

Dust Control Skirt Features:

- Constructed from thick, neoprene rubber strips (length: 4 ft | 1.2 m).

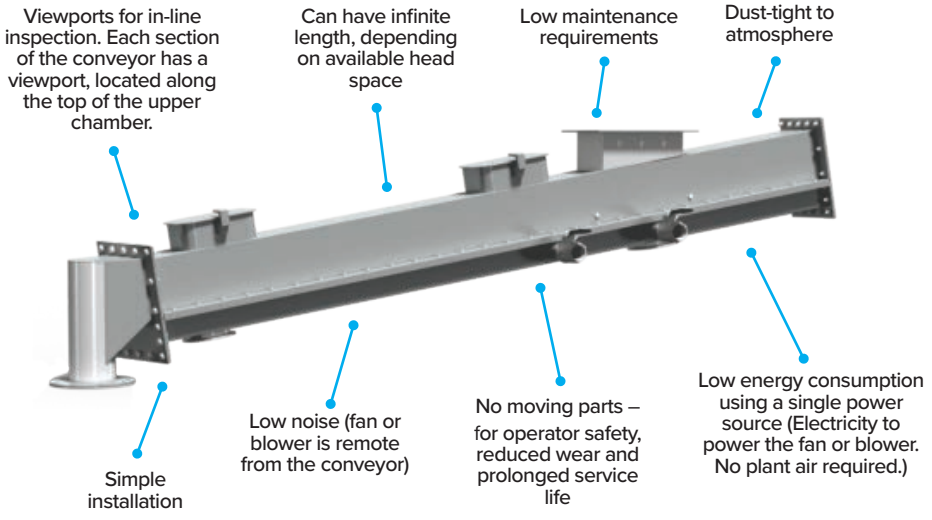
Results:
In total, each unit is estimated to have an operating weight of approximately 33,285 lb | 15,100 kg. Each unit's overall height is approximately 100 ft | 30 m when extended, and 30 ft | 9 m when retracted. These Vortex Ship Loading Spouts have a load rate capacity of approximately 1 ton per second.

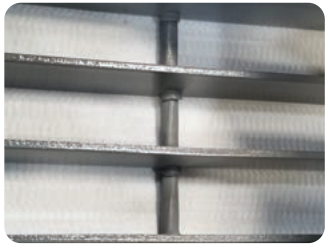
AERO-SLIDE CONVEYOR

The Vortex® Aero-Slide™ Conveyor consists of a rectangle-shaped convey line which is horizontally separated by an air-permeable, porous media to create an upper and lower chamber. To encourage material flow, the Aero-Slide Conveyor is installed at a slight downward slope – typically 6-8° from horizontal. In the upper chamber, handled materials are transferred along the porous media. Through the lower chamber, a fan or blower injects low pressure, dry air – typically 1 psig | 6.9 kPa. As air is pumped into the lower chamber, it permeates upward through the porous media. When counterbalanced by gravity, the air-gravity conveyor uses physics similar to an air hockey table to fluidize/aerate handled materials as they flow downstream through the upper chamber. Once materials are transferred downstream, the excess air is vented through a system bin or filter.

Optional Accessories:

- Dust collection vent at the end of the conveyor run.
- Mesh screen, to be installed atop the porous media. Intended for conveying fine materials – and especially, sand. The purpose of a mesh screen is to prevent heavier, granular materials from settling along the porous media, causing it to sag.





Porous media is supported by a durable steel grate

Cleanout ports to inspect for product in the lower air chamber and maintain, if necessary. Each section of the conveyor has a cleanout port, located along the bottom of the lower air chamber.

Rain ledge prevents precipitation from leaking into the conveyor

Inlet ports with ball valves to adjust the amount of air being injected into the air-gravity conveying system. Each section of the conveyor has inlet ports, located along the side of the lower air chamber.

Several options for porous media material of construction, based on application and material characteristics

TECHNICAL SPECIFICATIONS

Materials Handled	Lightweight, fluidizable dry bulk solid powders
Moisture Content	< 1% (Otherwise, materials can become too heavy to transfer and/or can harden inside the conveyor, creating blockages.)
Particle Size	< 50 mesh Contact us to discuss your material type
Material Temperatures	180°F | 80°C for standard conveyor, with modifications that allow up to 400°F | 205°C
Conveyor Construction Options	304 stainless steel, 316L stainless steel, A36 mild steel
Media Construction Options	Needled polyester, stainless steel media, porous stone, plastic
Media Support Grate Construction Options	A36 mild steel, 304 or 316L stainless steel
Conveyance Type	Low pressure, air-gravity conveyance only
Aeration Type	Dry air, using a centrifugal pressure blower or a positive displacement blower. Regulated compressed air from the plant service air system can contain moisture and/or oil, which can combine with materials and create clogs along the porous media.
Recommended Air Pressure	1 psig | 6.9 kPa, to be introduced at the beginning of every 10 ft | 3 m section. *This recommendation is subject to change, based on handled material characteristics. Contact us to discuss your application.*
Inlet/Outlet Options	Available in square or rectangular sizes
Standard Size/Conveyor Width	6 – 24 in | 150 – 610 mm *Dimensions may vary, depending on material(s) handled and application. Contact us to discuss custom sizing options.*
Standard Size/Conveyor Slope	Typically, Aero-Slide Conveyors are installed at downward slopes of 6 – 8° from horizontal. Depending on bulk density and other material characteristics, different materials may necessitate different sliding angles (2 – 16° from horizontal). Contact us to discuss options.
Standard Size/Conveyor Length	Conveyor length may vary, depending on transfer distance needed in a given application. Aero-Slide Conveyors are manufactured in sections of 10 ft | 3 m length. Shorter sections can also be manufactured to accommodate exact length. Contact us to discuss custom sizing options.
Flange Options	Standard flange pattern, ANSI, DIN, JIS Custom flanges are available

***Depending on slope and overall length of an Aero-Slide Conveyor, head space needed for installation may vary. Contact us to discuss options.*

POWER OF COMPARISON

• Alternative air-gravity conveyors offered by the industry incorporate a woven fabric media. A primary disadvantage to woven materials is they can be easily unraveled, cut, have holes punched in them, or be otherwise damaged. This results in frequent and expensive downtime for media replacement. To address this durability issue, the Vortex Aero-Slide Conveyor incorporates a needled polyester fabric media as a standard.

• Alternative air-gravity conveyors offered by the industry incorporate cross bars or metal screens beneath the porous media to provide it with additional structure and support. Often times, the gap between cross bars is too large, or the metal screens are simply too flimsy to support the weight of the material(s) handled. In either case, the porous media will begin to sag and create “dead spots” where materials become trapped along the conveyor. This creates conveying inefficiencies. For improved media support, the Vortex Aero-Slide Conveyor incorporates a durable steel grate beneath the porous media. The grate features equally spaced, intersecting cross bars which run latitudinal and longitudinal to the porous media.

• At the ends of each section of an air-gravity conveyor, media retainers ensure the porous media stays firmly in place. Alternative air-gravity conveyors offered by the industry use pop rivets to fasten the media retainers. Over time, pop rivets tend to wear and break, creating an air path issue within the conveyor. For added durability, the Vortex Aero-Slide Conveyor instead uses bolts to fasten the media retainers.

Additional Considerations:

• Outdoor installation or non-climate controlled indoor installation: Overnight temperature drops may create condensation within the conveyor. If materials are transferred through the conveyor before condensation has escaped, moisture can combine with dry bulk solid materials and create clogs along the porous media; or, moistened materials can harden and create blockages in the conveyor.

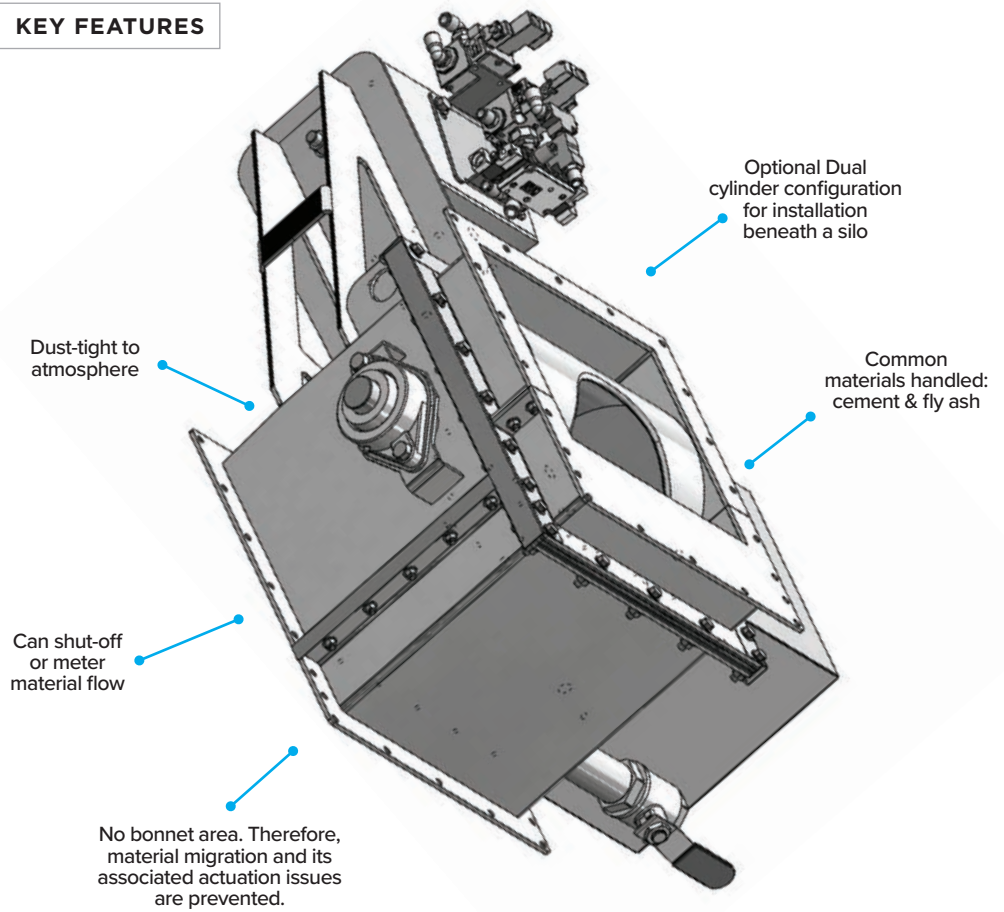
• For proper function, the porous media must be undamaged and must span the full length and width of the Aero-Slide Conveyor. Otherwise, materials can migrate into the lower chamber and disturb the aeration path, which creates conveying inefficiencies.

AERO DRUM VALVE

Ideal application: The Vortex® Aero-Drum™ Valve is specifically designed to be used in tandem with the Vortex® Aero-Slide™ Conveyor. Unlike the Vortex® Aero-Slide™ Gate, which is primarily intended for material shut-off, the Aero-Drum Valve is well-designed for metering material flow. The Aero-Drum Valve features a rotating, cylindrical-shaped blade with a V-notched bore. This provides for more precise metering control.

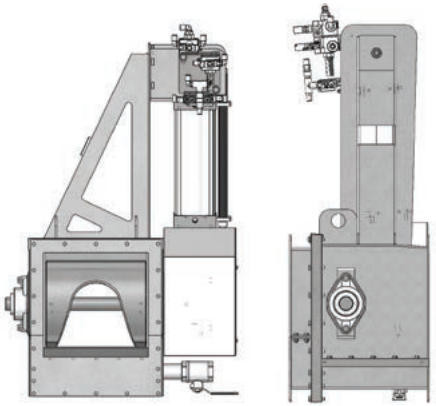
The Aero-Drum Valve is a self-contained unit that prevents material packing, dusting to atmosphere and other valve failures.

KEY FEATURES



TECHNICAL SPECIFICATIONS

Conveyance Type	Low pressure, air-gravity conveyance only
Materials Handled	Lightweight, fluidizable dry bulk solid powders
Standard Sizes	6 – 24 in | 150 – 610 mm Contact us for custom sizes
Opening	Available in square or rectangular sizes
Material Temperatures	180°F | 80°C for standard valve, with modifications that allow up to 400°F | 205°C
Body/Frame Options	304 or 316L stainless steel, carbon steel
Material Contact Options	304 or 316L stainless steel, carbon steel
Seal Construction	Felt
Drive/Actuation	Double-acting air cylinder (single or dual cylinder)



FRONT **SIDE**

For more information & technical resources, please visit:

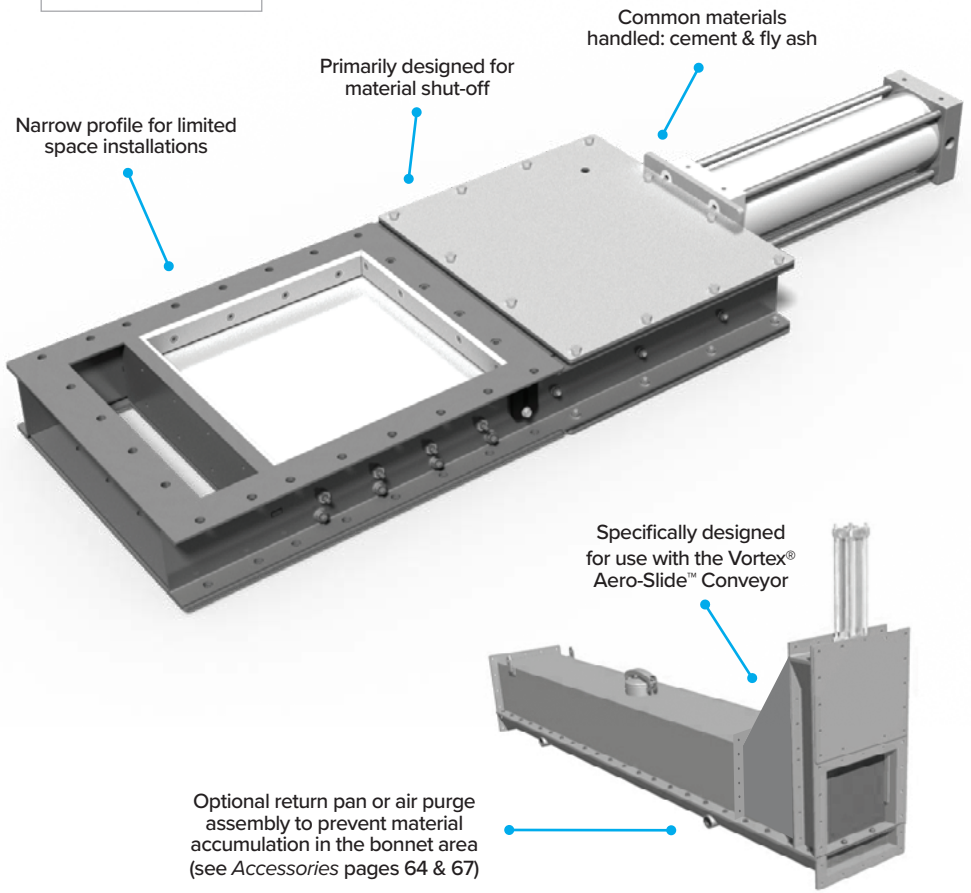
www.vortexglobal.com

AERO SLIDE GATE

The Vortex® Aero-Slide™ Gate is specifically designed to be used in tandem with the Vortex® Aero-Slide™ Conveyor. Designed much like a conventional Vortex roller-supported slide gate, the Aero-Slide Gate features a vertical-mounted blade with a downward closing stroke. While the Aero-Slide Gate can be used for metering, it is primarily intended to shut-off material flow.

Depending on application, the Aero-Slide Gate can either be installed within the convey line or beneath the silo discharge, at the Aero-Slide Conveyor's inlet.

KEY FEATURES



TECHNICAL SPECIFICATIONS

Conveyance Type	Low pressure, air-gravity conveyance only
Materials Handled	Lightweight, fluidizable dry bulk solid powders
Standard Sizes	6 – 24 in | 150 – 610 mm Contact us for custom sizes
Opening	Available in square or rectangular sizes
Material Temperatures	180°F | 80°C for standard gate, with modifications that allow up to 400°F | 205°C
Body/Frame Options	304 or 316L stainless steel, carbon steel
Material Contact Options	304 or 316L stainless steel, carbon steel
Seal Material Options	25% glass-filled PTFE, natural rubber, nylon, PET, silicone rubber, UHMW
Blade Roller Options	Hardened steel, nylon, 304 or 316L stainless steel
End Seal Construction	Pressure-loaded UHMW lined with polyethylene polymer
Modifications	Dual cylinder actuators (see page 61) Sealed body air purge (see page 64) Return Pan (see page 67)
Drive/actuation	Double-acting air cylinder, electric actuator, hand crank, chain wheel
Position Confirmation	Magnetic reed, proximity or mechanical limit switches
Material Flow Controls	AVP, IVP, VPO, VPC (see pages 65 & 66)

For more information & technical resources, please visit:

www.vortexglobal.com

CASE STUDY

Aero-Slide Conveyor Handling Cement 1

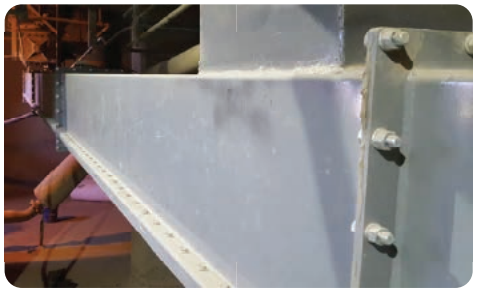
Product: Aerated Conveyor

Handling: Cement

Locations: Cement Packaging Facility
- Southeastern USt

Features: This 16” x 16” x 60’ (18 m) Vortex aerated conveyor replaced a screw conveyor used to transport cement from multiple storage silos to a cement bag filling station.

Application: For this particular product the aerated conveyor offers many advantages: less expensive, more energy efficient, creates less wear, requires minimal maintenance, and is environmentally friendly (being dust tight to atmosphere).



CASE STUDY

Aero-Slide Conveyor Handling Trona

Size: 6” x 6” (152 mm x 152 mm)

Handling: Trona

Location: Trona Processor
- Western United States

Features: Vortex air-gravity conveyors offer superior features for long-lasting performance:

- Non-woven, needled polyester media material
- Media is supported by a heavier grate that is supported by equally spaced crossbars
- Media retainer bars – bolted in (no pop rivets)
- Overlapping rain ledge between chambers
- Air inlet port, inspection port, and clean-out port in each section

Application: For this application the customer ordered two separate Vortex aero-slides: One was 25’ (7.6 m) long, the other was 158 ‘ (48 m) long.

CASE STUDY

Aero-Slide Conveyor Handling Cement 3

Size: 18” x 18” (457 mm)

Handling: Cement

Location: Rail Trans load Facility
- Eastern US

Features: Aerated conveyors are designed to economically move fluidizable powders across a low pressure cushion of air. They offer minimal maintenance and are dust tight to atmosphere.

Application: Vortex manufactures aerated conveyors and shut off gates as components for system groups, contractors, and installers utilizing this means of conveyance for material handling.

CASE STUDY

Aero-Slide Conveyor Handling Cement 2

Product: Aerated Conveyor

Handling: Cement

Locations:
Rail Trans Load Facility
- Eastern US

Features: The porous media material inside the Vortex aero-slide™ conveyor is supported by a heavier metal grate that is reinforced by cross supports within the conveyor chute itself. This method eliminates the problems created when the media is supported by a flimsy, expanded metal base or with cross supports alone.

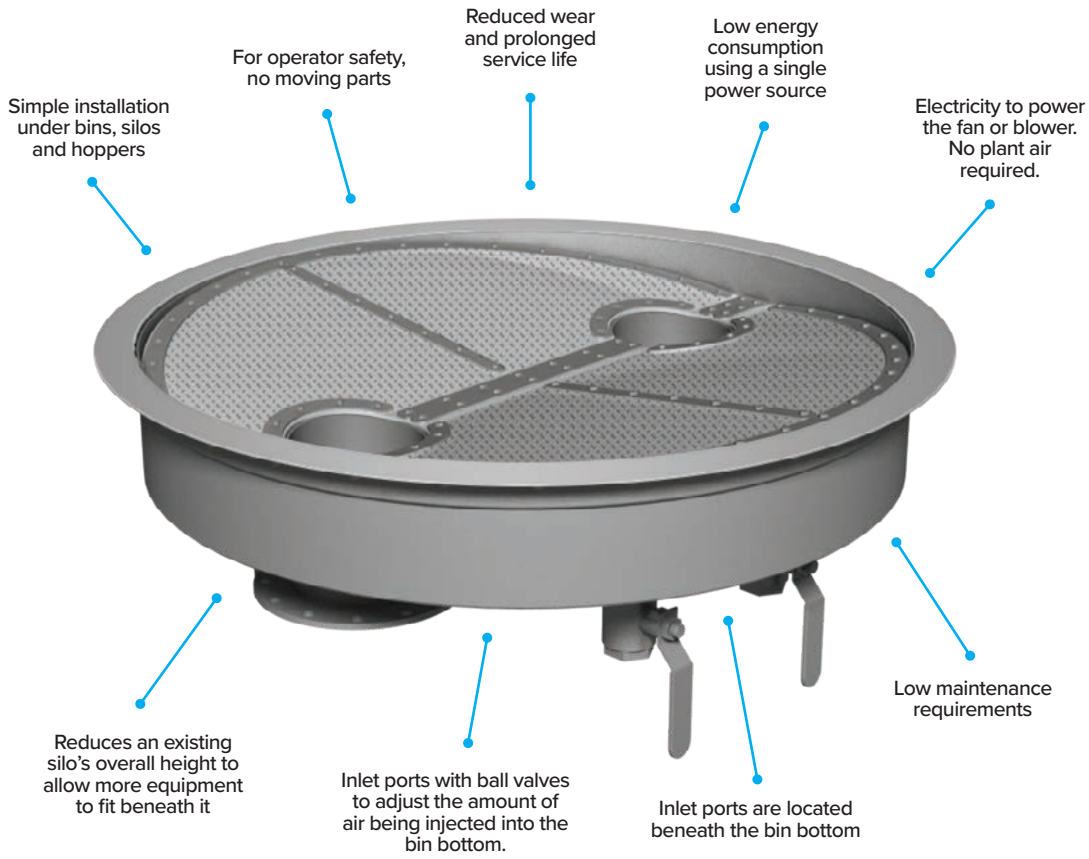
Application: Aero-slide™ conveyors provide an economical means of conveying light powders such as alumina, bentonite, cement, clay, fly ash, gypsum, limestone, and certain sand. This aero-slide™ is conveying cement from a storage bin to a Vortex retractable spout for truck loading.

AERO-BIN BOTTOMS

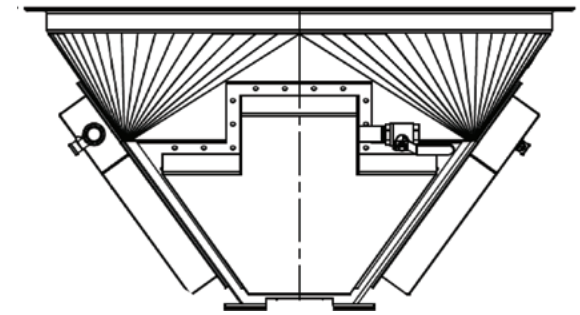
The Vortex® Aero-Bin™ Bottom is attached to the bottom of flat- or conical-shaped silos and hoppers; in particular, storage silos with especially large diameter. It contains two main design features:

- A full-bore silo outlet; and
- A porous aeration bed

KEY FEATURES



TECHNICAL SPECIFICATIONS



As materials begin to discharge through the silo outlet, a fan or blower injects low pressure, dry air (typically 6 psig | 41 kPa) upward into the silo via the aeration bed. As pneumatic pressures permeate the silo, the materials handled become fluidized. This encourages a consistent, continuous discharge of materials, in order to prevent bridging, rat holing and other discharge inefficiencies.

Because materials are air-gravity discharged, the Aero-Bin Bottom is among the most cost-effective solutions for discharging lightweight, fluidizable dry bulk solid powders.

For more information & technical resources, please visit:

www.vortexglobal.com