

# Shifting Powder

## The advantages of using air-gravity conveyors.



An air-gravity conveyor is a device for moving dry, light-weight, easily fluidized powders. The conveyor consists of a rectangular chamber separated by an air-permeable, porous media material. The media creates two separate chambers within the conveyor: A top chamber to handle the product to be conveyed, and a bottom chamber to handle compressed air.

Air-gravity conveyors are typically manufactured in 10 ft (3 m) sections. Shorter sections are used to make up the exact required length of the total conveyor.

When installed, an air-gravity conveyor is sloped slightly downward – normally at a 6 – 8° angle. The length of an air-gravity conveyor is limited only by the headroom needed for the unit's slope. Hypothetically, a conveyor can be infinitely long – depending on the height required. Conveyors 200 – 300 ft (61 – 91 m) in length are not uncommon.

### How they Work

Low pressure, dry air (typically 1 psig or 0.7 bar) provided by a blower or fan is injected into the bottom chamber. The air permeates through the porous media to fluidize/aerate the product to be conveyed (think of an air hockey table). The product, with the help of gravity, flows “like water” down the conveyor’s upper chamber.

### Materials Handled

Air-gravity conveyors are used to handle a variety of dry, light-weight, easily fluidized powders, such as activated carbon, alumina, bentonite, calcium carbonate, cement, clays, detergent powders, fly ash, gypsum, lime, pulverized ores, silica sand, soda ash and talc, among others. To evaluate whether a powder is well-suited for air-gravity conveyance, a general rule of thumb is that the particle size is normally smaller than 50 mesh.

### Industry Comparison: Air-Gravity Conveying Equipment

Several equipment manufacturers supply air-gravity conveyors. However, deficiencies may exist across product designs. Taking the time to pre-qualify the design quality of an air-gravity conveyor will pay huge dividends in the future!



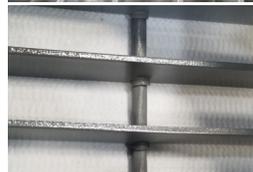
### a. Media material

Many manufacturers utilize a woven material. Problems exist with woven materials in that they require stretching prior to installation, and unravel when cut or punched. For added durability, a superior material is non-woven, needled polyester.



### b. Media support bars

Some manufacturers utilize random cross bars or flimsy screens for support beneath the media material. In these cases, the media will tend to sag over time – creating pockets that can trap product and create conveying inefficiencies. Seek out a conveyor where the media material is firmly supported by a durable grate, supported by equally spaced parallel and perpendicular cross bars.



### c. Fabric media coverage

The media material should completely cover the area between the top and bottom chamber. If any gaps exist, air may create an air column in the top chamber that may create material pile-up and blockage within the system.



### d. Media retainer bars

The media retainer bars at each end of the air chamber should be bolted in. Some manufacturers utilize pop rivets. Pop rivets tend to break over time, creating an air path issue within the conveyor.



### e. Rain ledges

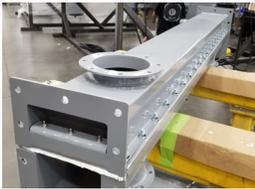
The unit should contain a rain ledge. Rain ledge construction is such that the side flanges of the top chamber overlap the side flanges of the bottom chamber. This greatly helps in keeping the media material dry – especially in outdoor applications.

**f. Inlet ports**

An inlet port is required within each section of the unit, to introduce air into the bottom chamber for product transport. The port valves are used to adjust the amount of air being introduced.

**g. Inspection ports**

Each section of the unit should contain an inspection port, should internal, visual inspection become necessary.

**h. Clean-out ports**

Each section of the unit should contain a clean-out port at the bottom of the conveyor, in case product needs to be removed when maintenance is required.

**Economic Advantages of Air-Gravity Conveyors:**

- Cost-effective
- Simple installation
- No moving parts (reduce wear, spare parts & prolongs service life)
- Minimal maintenance requirements
- Low energy consumption (low-pressure air)
- Requires a single power source (fan or blower)
- No damage to product handled (reduce waste)
- Increased conveying capacities

**Environmental Advantages of Air-Gravity Conveyors:**

- Dust-tight to atmosphere
- Low energy consumption
- Low noise levels (fan or blower is remote from the conveyor)

**Safety Advantages of Air-Gravity Conveyors:**

- No moving parts (lessens operator safety risks)
- Low noise levels (fan or blower is remote from the conveyor)
- Dust-tight to atmosphere (prevent health & safety hazards)

**Air-Gravity Conveyor Considerations:**

One must also realize that with any type of conveying system, disadvantages may exist. This is no different when considering air-gravity conveyors.

The following instances may create blockage within the system:

- If the moisture content of the product handled is too high, the product may become too heavy to be properly fluidized.
- If the air entering the bottom chamber is too moist, it may combine with the product handled or create clogs in the media material's pores.

- Occasionally, overnight temperature drops may create condensation within the system. If product is introduced with this moisture present, blockage may result.
- If the installation angle of the conveyor is not steep enough, blockage may result.

**System Options:**

- Turn Boxes: Used to divert product flow.
- Side Discharges: Allow product to be directed toward other processes between the beginning and end of the conveyor.
- Slide Gates or Drum Valves: Used to shut off and regulate product flow through the top chamber.
- Dust Collection Vent: Mounted at the end of the conveyor to collect fugitive dust.
- Bin or Filter: With the air-gravity conveyor, air is introduced into the system to convey the product. At some point, this air must be properly vented through a bin or filter within the system.

A systems analyst can advise if any of these options should be considered for a particular air-gravity conveying system.

**Vortex Air-Gravity Conveyors**

Among their equipment offerings, Vortex manufactures air-gravity conveyors. Typical sizes range from 6 - 24 in (152 - 610 mm). Vortex works closely with systems groups and engineering firms to design air-gravity conveyors which fulfill every requirement of a customer's specific application.

**About Vortex**

Vortex designs, manufactures and globally supplies slide gates, diverter valves, retractable loading spouts, spout positioners and filters for handling dry bulk materials.

**About the Author**

Kevin R. Peterson is the Business Development Director for Vortex's Titan Products Division. He has written many articles that address material handling in the dry, bulk materials industry, as well as hundreds of case studies that feature Vortex products.

For additional information on Vortex Aero-Slides and Loading Equipment go to:



[www.vortexglobal.com](http://www.vortexglobal.com)