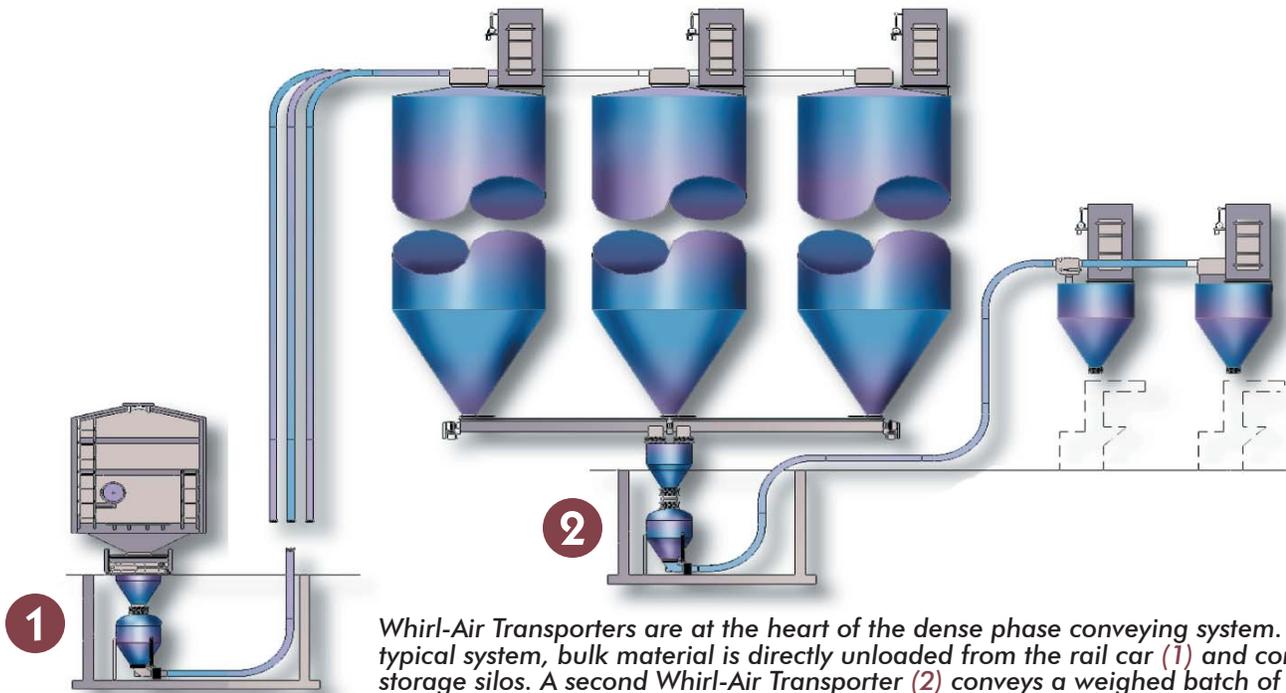


Transporters



WHIRL-AIR-FLOW

Whirl-Air Transporters efficiently convey bulk materials over long distances . . .



Whirl-Air Transporters are at the heart of the dense phase conveying system. In this typical system, bulk material is directly unloaded from the rail car (1) and conveyed to storage silos. A second Whirl-Air Transporter (2) conveys a weighed batch of material from the silos to processing bins.

Whirl-Air Transporters

Whirl-Air Transporters are designed to transport any flowable material in a pneumatic conveying system. The transporter unit receives materials from bulk supply, such as silos, trucks or rail cars and conveys the bulk materials to one or more destination points. The transporters operate on a cycling system and have virtually no moving parts. Operational functions of fill, pressurize and convey are all enabled by valves.

Transporter Applications

Whirl-Air Transporters are at the heart of a dense-phase pressure conveying system. These high output units are capable of transporting a broad range of materials in a dense phase system. Among the many bulk materials capable of being conveyed by Whirl-Air Transporters are: all forms of powders; sandy materials; granular products; fibrous materials and sticky materials.

Among the many benefits of dense-phase pressure systems are:

- **Versatility** - able to handle abrasive, fragile, sticky and high temperature products.
- **High Performance** - conveys longer distances than dilute-phase systems.
- **High Capacity** - Capable of achieving higher capacities in a given line size than dilute phase systems.
- **Efficiency** - Lower air/gas consumption than dilute phase systems.
- **Low Maintenance & Easy To Operate** - Whirl-Air Transporters have no moving parts and typically use easily dried and cooled compressed air for conveying.



Built To Last

Whirl-Air-Flow is an ASME, Section XIII Code certified pressure vessel manufacturer. Every Whirl-Air Transporter is custom built from the ground up to the specifications of the application for which it is designed. As a result, Whirl-Air has complete control over every aspect of product quality and delivery.

. . . based on a time proven design with a problem free sequence of operation . . .

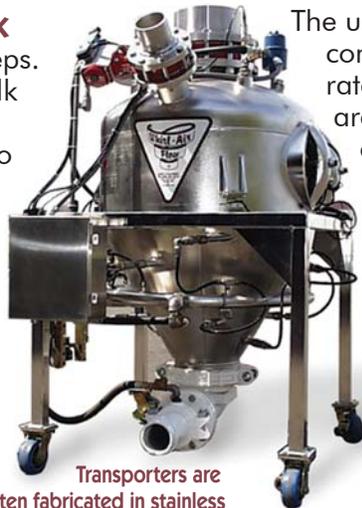
How Whirl-Air Transporters Work

Whirl-Air Transporters operate in four steps. First, the unit is filled with conveyable bulk material by gravity. The vessel is then pressurized with compressed air or gas to build conveying force. When the correct pressure is achieved, the material is conveyed to the destination. When the unit is empty, the complete cycle is repeated.

Whirl-Air Transporters are typically designed to cycle up to 20 times per hour. Special models can achieve considerably higher cycle rates dependent on the requirements of the application.

Application Flexibility

Whirl-Air custom builds each transporter in a broad size and configuration range without additional cost.



Transporters are often fabricated in stainless steel for food and chemical applications, and are also available as portable models.

The units are constructed to take all factors into consideration - floor space, capacity, cycle rates, integration and throughput. The units are constructed in a wide array of materials - carbon steel, stainless, lined, coated and polished, making Whirl-Air Transporters well suited for the broadest range of products.

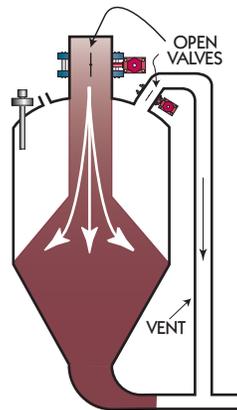
Shipped Ready To Install

All Whirl-Air Transporters are shipped fully assembled. Inlet and outlet valves are installed and compressed air piping is completed to a single air source connection. Electrical solenoids, level controls and pressure transmitters are wired to a terminal strip in a NEMA rated junction box. These extra features reduce

installation cost and wiring time, resulting in faster start-up. Whirl-Air will configure transporters to customer installation specifications prior to shipping.

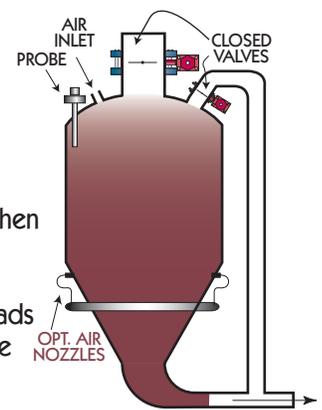
STEP 1 FILLING

Inlet and vent valves open allowing transporter to fill through the top and vent displaced air to the conveying line.



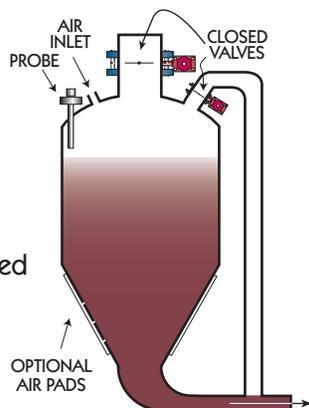
STEP 2 PRESSURIZING

Inlet and vent valves close when material reaches full sensor. Vessel is pressurized through the top and/or through air pads or nozzles, depending on the material being conveyed.



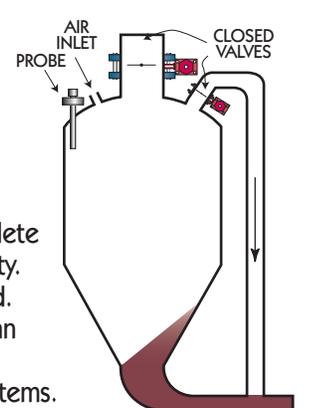
STEP 3 TRANSPORTING

When conveying pressure is reached material is transported to its destination.



STEP 4 EMPTYING

The conveying cycle is complete when the transporter is empty. The fill cycle is then repeated. Purges can be added to clean out the lines or the lines can remain full on continuous systems.

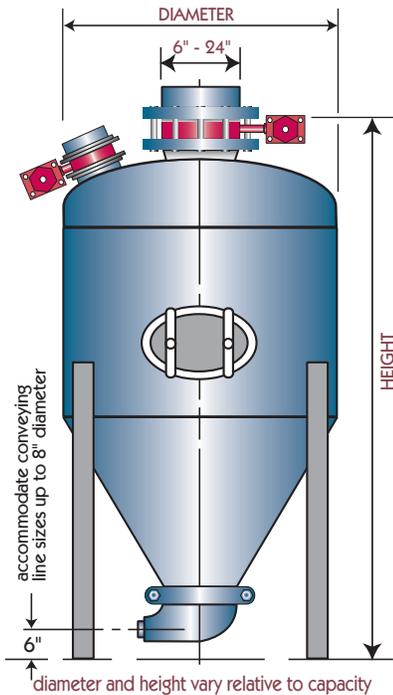


... and are specifically designed and built for each individual application

Model BF Transporters handle the broadest range of bulk material capacities. Because every Whirl-Air Transporter is custom built to customer-specific application parameters, considerable flexibility in transporter size, configuration and capacity is available. For example, Whirl-Air manufactures transporters as small as 6" in diameter with 0.15 ft³ capacity to 12' diameter with a 5,500 ft³ capacity.

Further, transporters in all sizes can be built to specific physical size configurations. Where floor space is at a premium, taller transporters can achieve the same tons per hour (TPH) as shorter transporters with larger diameters.

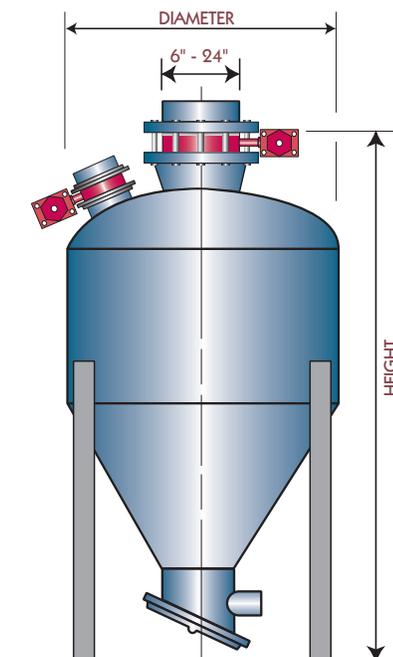
The charts below demonstrate how the same capacity is achieved with different vessel diameters and heights.



Drawings, specifications and extensive size charts are available in the transporter section at www.whirlair.com.
Model BF Typical Volumes In Various Sizes

Volume ft ³	Diameter x Height	Size Option B	Size Option C
1 cu. ft.	1.0' x 3.15'	1.33' x 2.78'	
3 cu. ft.	2.0' x 3.19'		
5 cu. ft.	2.0' x 3.84'	2.5' x 3.76'	
7.5 cu. ft.	2.5' x 4.29'		
10 cu. ft.	2.5' x 4.81'	3.0' x 4.63'	
20 cu. ft.	3.0' x 6.04'	3.5' x 5.69'	
30 cu. ft.	3.5' x 6.76'	4.0' x 6.46'	
50 cu. ft.	4.0' x 8.10'	4.5' x 7.60'	5.0' x 7.35'
100 cu. ft.	4.5' x 10.54'	5.0' x 9.97'	6.0' x 9.20'
200 cu. ft.	6.0' x 12.81'	7.0' x 11.49'	8.0' x 11.11'
500 cu. ft.	9.0' x 15.80'	10.0' x 15.24'	
1000 cu. ft.	10.0' x 21.80'	12.0' x 19.17'	
2000 cu. ft.	12.0' x 28.13'		

The specification chart shows sample vessel sizes. Each transporter is custom designed to match customer requirements for material handled and throughput.



Model APT Transporters

APT series transporters are specifically designed for powders. The Model APT uses our unique aeration bottom to fluidize materials for greater conveying efficiency. APT transporters are also available in Mini Models, featured on the following page.

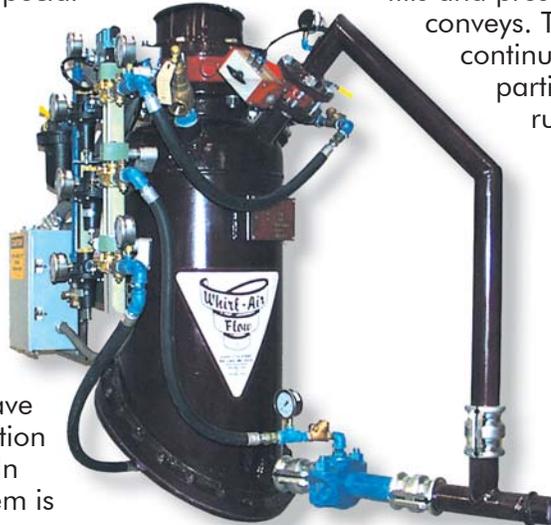
Model APT Typical Volumes In Various Sizes

Volume ft ³	Diameter x Height	Size Option B	Size Option C
10 cu. ft.	2.0' x 5.87'	3.0' x 4.93'	
20 cu. ft.	3.0' x 6.39'	3.5' x 5.96'	4.0' x 5.99'
30 cu. ft.	3.5' x 7.03'	4.0' x 6.80'	4.5' x 6.82'
50 cu. ft.	4.0' x 8.43'	4.5' x 8.11'	5.0' x 7.95'
100 cu. ft.	5.0' x 10.57'	6.0' x 9.70'	
200 cu. ft.	6.0' x 13.31'	7.0' x 11.98'	8.0' x 11.62'
500 cu. ft.	9.0' x 16.17'	10.0' x 16.26'	
1000 cu. ft.	10.0' x 22.73'	12.0' x 19.69'	
2000 cu. ft.	12.0' x 28.66'		

application specific & custom built . . .

Each Whirl-Air Transporter is built customer and product specific in terms of capacity, cycle rate and material throughput. Dependent on material being conveyed, a specific model will be used. Whirl-Air also uses special system designs for different applications. A few of the system designs employed are detailed below.

Whirl-Air Standard Systems - Suitable to most applications, Whirl-Air Standard Transporters convey most free flowing materials in a fill, close, seal, pressurize and convey cycle. The cycle ends when both the transporter and conveying line have been fully evacuated. Full evacuation is detected by a pressure sensor. In standard configurations, the system is capable of up to twenty full cycles per hour and employs a fill, close, pressurize, convey sequence - applicable to most materials and rates.



Compact Air-Pad Transporters are designed specifically for powders.

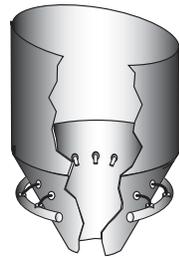
Whirl-Air Continuous Conveying Systems - For long runs, or high throughput rates, Whirl-Air Continuous Conveying Systems use dual transporters to obtain peak performance. In this system, one transporter fills and pressurizes while a second transporter conveys. This configuration ensures a continuous flow of material and is particularly well suited to conveying runs often exceeding 1,000 feet.

Whirl-Air "Keep Full" Conveying Systems - These systems are designed for use with materials where achieving zero breakage is a concern. "Keep Full" systems minimize turbulence within the conveying line by evacuating only the transporter before beginning a new cycle. A sensor within the transporter detects empty. Compressed air inside the transporter is then vented to a dust collector prior to starting a new conveying cycle.

Special Handling Features

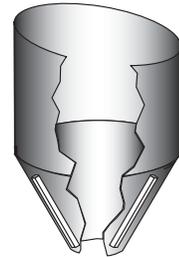
Whirl-Air Model BF Transporters are used to transport the widest range of flowable bulk materials. To match transport requirements to the application, Model BF Transporters can be outfitted with special equipment for smooth transport of materials with particular handling characteristics. These may include special nozzles or air injection as illustrated here, as well as special feeding or evacuation fitments to meet precise throughput requirements.

AIR PAD OPTION FOR POWDERY MATERIALS



The injection of additional air through nozzles aids transporting fine materials.

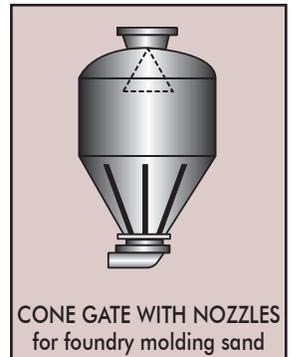
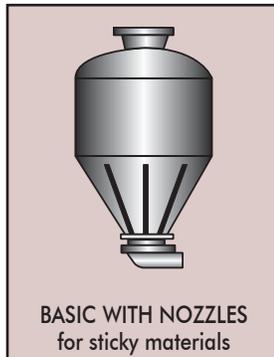
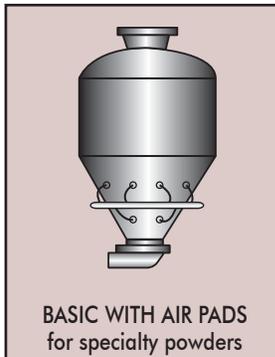
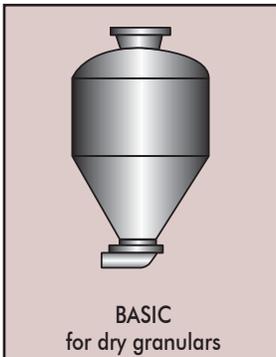
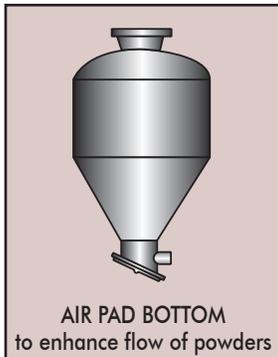
NOZZLE OPTION FOR STICKY MATERIALS



Air injection with nozzles is used to facilitate the smooth flow of sticky materials.

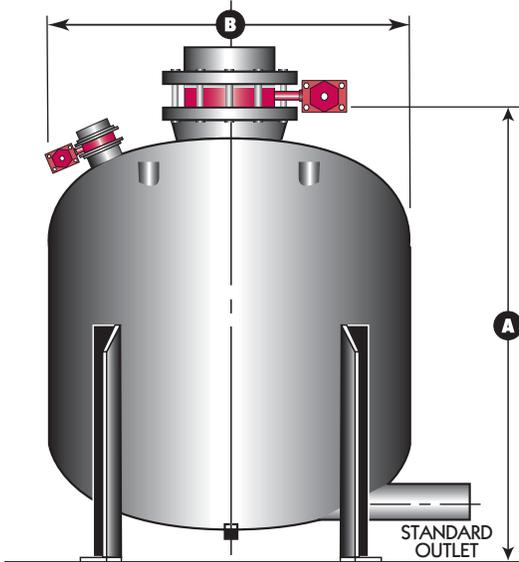
Transporter Models Specific To Product

Every Whirl-Air Transporter is designed with consideration to the unique handling characteristics of the product being conveyed. Standard configurations of the Model BF Transporter are illustrated here.



special use transporters & options

Whirl-Air has vast experience transporting materials with diverse handling characteristics. The company manufactures transporter models for specific product handling requirements and applications.



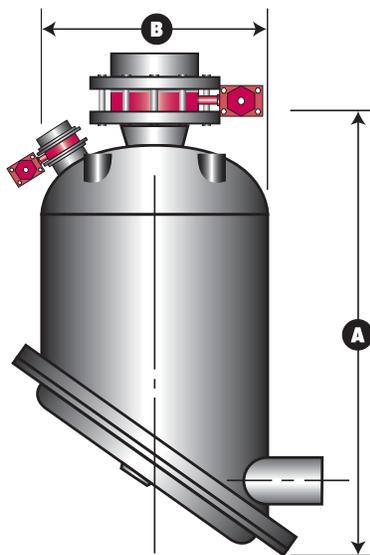
Model ED Transporters

ED Series Transporters are designed to convey granular products, like silica sand used in the foundry industry. Model ED Transporters are a low cost, low profile design.

Model ED Typical Sizes & Specifications

Model	Capacity	Height (A)	Diameter (B)
ED10	1 cu. ft.	2.71'	1.0'
ED30	3 cu. ft.	2.69'	2.0'
ED50	5 cu. ft.	2.95'	2.5'
ED100	10 cu. ft.	3.61'	3.0'
ED200	20 cu. ft.	5.07'	3.0'

The specification chart reflects typical transporter sizes. Each transporter is custom designed to match customer requirements for material handled and throughput.



Mini Model APT Transporters

APT series transporters are specifically designed for powders, like cement products. The APT Series handles powders with the lowest amounts of compressed air.

Model APT Typical Sizes & Specifications

Model	Capacity	Height (A)	Diameter (B)
APT10	1 cu. ft.	2.370'	1.33'
APT20	2 cu. ft.	3.121'	1.33'
APT30	3 cu. ft.	3.872'	1.33'
APT40	4 cu. ft.	4.623'	1.33'
APT50	5 cu. ft.	4.705'	2.0'
APT100	10 cu. ft.	5.535'	2.0'

The specification chart reflects typical transporter sizes. Each transporter is custom designed to match customer requirements for material handled and throughput.

Whirl-Air Product Lines

- Dense phase vacuum and pressure conveying systems
- Dilute phase vacuum and pressure conveying systems
- Pneumatic Batch Blenders • Transporters
- Dust Collectors • Weigh-Veyors • Whirl Slides
- Bulk Bag Unloading Systems • Manual Bag Emptiers
- Central Vacuum Systems • Industrial Whirl-A-Vac Vacuums
- Pressure Vessels and specialty fabrication



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Since 1946, Whirl-Air-Flow has built a reputation for excellence in designing and building systems and equipment transporting dry bulk materials. Our 50,000 sq. ft. state-of-the-art facility is located in Big Lake, Minnesota, USA.