

Klein PLUG FLO® Sand Pneumatic Transporter



Conventional pneumatic conveying systems come in two broad categories: Dilute Phase and Dense Phase.

- **Dilute Phase** works by vacuum or low-pressure air (up to 20 psi) with velocities in the pipe of 4,000 feet per minute and higher.
- **Dense Phase** works by medium to high-pressure air (10 to 60 psi) with velocities in the pipe of 2,800 to 5,000 feet per minute. Dense Phase systems fluidize the sand for transport and use booster (injection of additional air along the pipeline) to keep the sand in the pipeline fluidized.

However, the high velocities of the sand grains traveling in the pipeline, with either the dilute or the dense phase system, wear out pipes and bends prematurely, even when Schedule 80 pipe is used – literally sand blasting the pipe walls – causing degradation of the sand and generating excessive fines/dust. It is not uncommon to see dilute and so called dense phase fluidized systems with transport velocities approaching 3000 feet per minute and more.

The success of these systems depends entirely on keeping the material in suspension at all times by installing boosters along the line, and because of the excessive velocities required a portion of the material is always pulverized during transport.

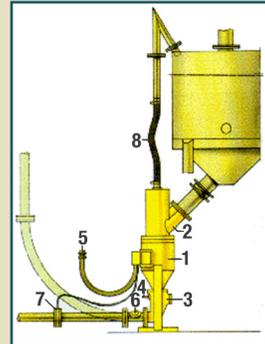
Result:

Waste of a good product, increased fines, higher resin usage, useless downtimes and repetitive expensive repairs.

Benefits:

Unlike conventional transporters, the KLEIN PLUG FLO® operates with:

- No fluidization requirement eliminating product segregation
- No boosters required, system efficiency is increased and installation costs are lower.
- lower transport velocities - Only 40 to 450 feet per minute transport velocity resulting in less material degradation and drastically reducing pipe wear.



System Components

1. Blow Tank
2. Inlet Housing
3. Discharge Housing
4. Discharge Flap Sensor
5. Compressed Air Inlet
6. Sight Glass
7. Air Control Flange
8. Vent Air

In contrast, the KLEIN PLUG FLO® system does not require fluidization or boosters to move the material through a conveying pipe line, but rather, uses the natural properties of the material to achieve their transport. Compressed air actually pushes the slugs of material formed at the outlet of the blow tank through the entire pipe line at lower velocities - typically 100 to 400 feet per minute - much like the canisters at a bank drive-in station are delivered. After filling the blow tank by gravity from a hopper, bin, or other bulk material source, the material inlet valve is closed and the tank is pressurized. Once the necessary transport pressure - which can be as low as 15-20 psi, depending on system layout - has built up in the blow tank the material is extruded into the conveying line in the form of slugs. The material continues to move in the form of slugs, separated by pockets of compressed air, until discharged into the receiver at the other end of the line. During this process the material is not fluidized by air, resulting in lower air consumption, lower transport velocities and therefore less wear and abrasion. When the blow tank is empty it is depressurized and refilled with material for another cycle.

- The lowest air consumption per ton, resulting in smaller dust collectors and considerable energy savings (up to 45%).
- Standard Schedule 40 pipe, which lowers system operation and installation costs.
- Minimal maintenance due to reduced wear and moving parts
- Rated for sand up to 125°F

The unique features of the KLEIN PLUG FLO® system make it possible to transport sand through pipelines with practically no degradation. Unlike dilute and dense phase conveying systems where grain fineness reduction of 5 points and more can be experienced the KLEIN PLUG FLO® system typically stays within one half point or less. Naturally, this can mean a great deal for your operations where grain fineness must be maintained to meet quality tolerances. Lower air pressure, lack of fluidization air boosters and the KLEIN PLUG FLO® principle result in lower air consumption and therefore smaller dust collection requirements system at the receiver. All system components are completely enclosed for dust free operation. The KLEIN PLUG FLO® system is especially suitable for granular, free flowing materials and offers lower wear and abrasion as well as minimum material separation or reaction during the transport phase.

Specifications

- Operating rates up to 20 Tons per Hour per Unit
- 3", 4", 5" diameter systems available

Options

- Multiple transport receiving bins
- System engineering assistance

Construction and Operation of the Transport Vessel Material Inlet Valve

The material inlet valve consists of an air-spring fixed in the center of the vessel holding a cast iron cone in position. When ready to fill the vessel the air spring is deflated and the cone drops down by gravity allowing sand to flow into the vessel. When the vessel is full (timed interval) the air spring is inflated, raising the cone, thereby closing the inlet opening. As the cone travels vertically up, a small amount of compressed air is injected sweeping the peripheral surface of the cone and keeping the sand away from the surface as it seals cleanly against the main seal.



Alb Klein PLUG FLO® pneumatic sand transporter system:

1. No fluidization –

- resulting in:

- ✓ up to 45% lower air consumption;
- ✓ less compressor energy required;
- ✓ fewer parts to install and maintain;
- ✓ lower operating costs;
- ✓ Schedule 40 pipe is standard. Schedule 80 pipe is not required

2. No boosters

- resulting in:

- ✓ lower compressed air usage;
- ✓ no extra booster piping and fittings;
- ✓ smaller dust collector;
- ✓ reduced installation labor;
- ✓ fewer parts to install;
- ✓ minimal maintenance;
- ✓ a less complicated system;

3. Lower transport velocities

- resulting in:

- ✓ considerable less pipeline wear;
- ✓ less wasted product;
- ✓ lower product cost;
- ✓ fewer costly repairs;
- ✓ fewer leaks and less waste of compressed air;

4. Lower Sand degradation

- resulting in:

- ✓ improved sand quality;
- ✓ less dust generation;
- ✓ savings in resin consumption;
- ✓ more efficient operation;
- ✓ improved casting quality;
- ✓ improved house keeping;

For more info, read "Little Known Facts About Sand Handling That Can Slash Your Operating Costs by up to 45%" by Chris Doerschlag at www.palmermfg.com