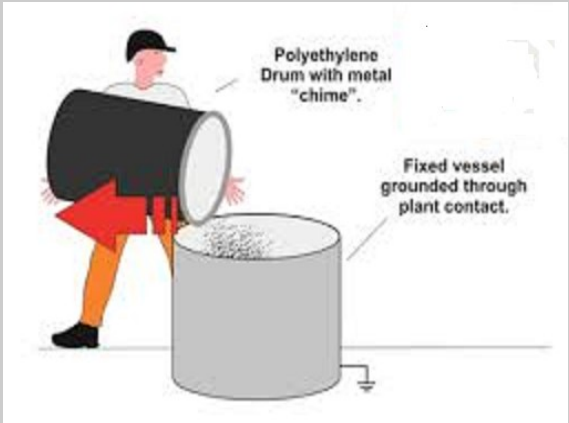
a technology that allows you to convey your powder safely and easily.

Pneumatic conveying of powders & solids—brief explanation

Moving solids from one place to another can present a variety of challenges in any process. Whether you are transferring high value API's, explosive organic powder, or food grade materials in bulk, the goal in all of these applications is to transfer the solids in a safe, contained, and efficient manner. There are various types of equipment for conveying solids, and most of all into one of three major categories – manual, mechanical or pneumatic. We here by discussing some basic questions about pneumatic conveying.



• What is "pneumatic conveying" and how does it transfer solids?

Pneumatic conveying is a technology that enables the transfer of solids in a closed system. It provides for the solids to be mixed into a stream of gas, and uses pressure and / or vacuum to convey the gas stream with the entrained solids. The solids : gas mixing ratio, and associated flow rates and pressures are monitored and controlled in order to effectively transport the solids from their primary source i.e. Drum / Silo to a secondary location such as reactor, mixer or any other machine or process related equipment. The powders/solids are then separated from the gas stream by a dust collection system or filter element, so it is typically one of the major design points of this type of technology.

• Is pneumatic conveying better than mechanical conveying?

There are many advantages to a pneumatic conveying system over mechanical conveying. A pneumatic transfer system has a relatively simple design that transfers material through an enclosed hose or pipe that can be routed around things in the path between the source equipment and the receiving unit. This arrangement provides the flexibility needed to integrate the system into an existing process that may require multiple directional changes. This is also helpful when space is an issue. Add in the facts that a pneumatic conveyor is a closed system with few moving parts, and you can begin to see the value of this technology over mechanical transfer systems.

But before make a choice of pneumatic transfer, there are some disadvantages and other facts that need to be taken into consideration. Pneumatic transfer typically requires more energy to operate than a mechanical conveyor of similar capacity. This required energy input can make the system more expensive to operate. Additionally, a pneumatic conveying system requires a dust collection or air filter unit. There are also some cases where the material being transferred is too large in particle size, or bulk density or is extremely sticky, which could cause possible blockage in a pneumatic system's transfer line. For these reasons, mechanical conveying systems can sometimes be more desirable.

Are there different types of pneumatic conveying systems?

There are two general classifications for pneumatic transfer. Dilute Phase & Dense Phase pneumatic conveying system.

Once you've decided pneumatic conveying is the right solution for your process, understanding these 2 modes of operation can help you to further distinguish which method of conveying is better suited for your application.

***Dilute phase* or *lean phase* conveying** takes place when material is suspended in air as it is blown or sucked through a pipeline. Virtually all material can be conveyed via this mode, regardless of particle size, shape or density. However, a relatively high velocity is required, which consumes large amounts of energy.

Particles that are abrasive, are not recommended to be transferred in this way as they can cause damage and erosion to the pipeline. Similarly, products that can be easily crushed or broken should not be transferred in this manner due to their fragility

***Dense phase* conveying**, on the other hand, moves material at a lower velocity in a non-suspension mode. There are two types of flow that are produced by this method of conveying:

- In *moving bed flow*, material is transported along the bottom of the pipeline. This type of flow is limited to material that has good air-retention characteristics, such as very fine powdered materials like fly ash, cement, or flour.
- In *plug flow*, material is transferred as full bore plugs separated by air gaps. This type of flow is possible when the material has good permeability. Pelletized materials and seeds are ideal candidates for this type of flow.

How do one can select a pneumatic conveying system for application?

There is no clear answer as to which conveying system - dilute phase or dense phase, is better. Scale and power requirements are often the deciding factors between which type of transfer is selected (what's best for one might not be best for someone else's application). The other elements that influence the decision process are:

- Material properties - powder characteristics including particle size and shape, bulk density, moisture content, abrasiveness, friability, cohesiveness, hygroscopicity, static charge, explosivity, toxicity, melt point (and more!)
- Pipeline bore
- Conveying distance - overall distance as well as direction and distance of pipeline runs (horizontal and/or vertical)
- Pressure available
- Conveying air velocity
- Transfer capacity – this calculation incorporates factors such as powder properties, transfer distance, and the packaging of the powder to be transferred.
- Transfer rate – how fast/frequently does you powder need to be transferred?

Product testing should always be conducted to ensure the method of conveying that is chosen will work properly.

How, one can know that product is suitable for a pneumatic conveying system?

Pneumatic conveying systems are designed to handle materials with a wide range of flow characteristics. Common dry materials that can typically be transferred using pneumatic conveying technology include various Pharmaceutical, Bulk Drugs, Chemicals, Food products, Flour, Fertilizers, Pesticides, Fly Ash, Cement, Sand, Plastic pellets, Paint powder and minerals.

Material with a large particle size and high bulk density, such as gravel or rocks, and extremely sticky & high density material, prove to be difficult to transfer via pneumatic conveying systems. Other materials such as slurry or paste generally aren't suited for this type of conveying. Some wet cakes are able to be transferred so it is important to conduct product testing in these instances.

Product Testing Options

Before purchasing equipment, a vendor should offer some type of testing option to determine more precise data that can ensure your product application will perform to your expectations. First, it's important to define the criteria that are specific to your application. Typical testing options that are available include:

- Send a sample of your product and the vendor will do a complete product test to confirm your product will transfer to your expectations (usually with the option for you to be present during testing procedures). Testing of this kind is generally only performed on material that is not extremely hazardous or explosive.

So what will you get out this? - detailed test results, including information about how successfully the system conveys your material, at what rate, and how much air the process consumes among other data.

For more information, Pl. contact

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