Diverter Valves

In the modern world of pneumatic conveying and bulk material transfer, almost every system will need to incorporate some form of diverter. Whether it be a single source feeding one of many downstream machines, or a single machine being fed by one of many upstream sources, the diverter is essential.

Considerations

In systems where multiple lines diverge from a single source or converge to a single point, there can be an issue of contamination of the product stream. In some cases this may not be a concern if the product is consistent and not prone to spoilage. However in some cases there is a need to ensure that each stream coming into or exiting the diverter is independent or that there are no areas inside the valve itself which will hold or trap material. Because of the wide variety of applications and requirements it is essential that the specific application be considered when choosing an appropriate diverter.

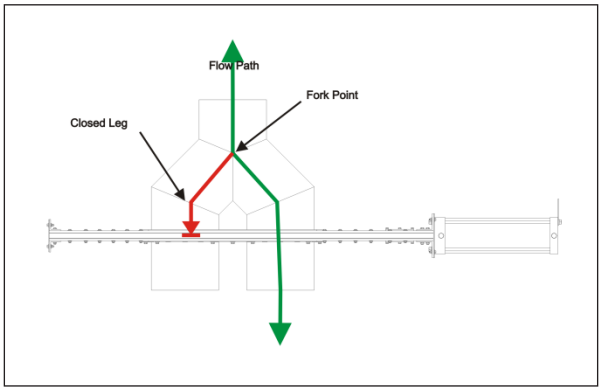
Sealing of the diverter valve is also an important consideration to be included in the selection process. Diverters can be sealed internally to isolate the various flow paths or sealed to atmosphere to prevent contamination from entering the product stream or to prevent product or dust escape, preventing environmental contamination or waste.

Types

Diverter Valves can be classified according to the type of system they are designed for: Low Pressure (including low vacuum) or Gravity. To achieve the diverter action, each type of valve can employ one of two mechanisms. The valve can either have an internal blade which slides or pivots to open one outlet and close another or the entire flow path can be altered by means of a moveable section to switch the flow paths.

Pressure Diverters

Diverters designed for pressure applications typically fall into two categories – low pressure and high pressure. Low pressure diverters are intended for dilute phase pneumatic conveying systems (run at a pressure of 15psig) and dense phase systems (typically run at 90psig). Each type of pressure diverter will provide seals between the inlet and outlets as well as from inside the valve to atmosphere. This is crucial for the correct operation of the pressure system. Diverters for pressure systems can typically also be used for vacuum systems. In order to achieve this pressure seal, these Diverter valves typically employ a sliding blade mechanism.



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Diverter Valves utilizing a sliding blade mechanism have multiple inlet orifices which make up the various paths through the valve. Each orifice is attached to a line originating from an upstream fork, which provides the actual split in the flow path, while the sliding blade controls which orifice is open or closed. This is an effective and reliable means of diversion as there is only one moving part within the system (Blade). The disadvantage of this is that the Closed Leg (Upstream segments of tubing between the fork and the closed orifice) will remain filled with product. This can lead to contamination issues if various types of material are passed through the same line or if the material is prone to spoilage. Also this type of diverter can introduce a significant pressure loss, which must be accounted for when determining the overall power requirement of the system.

Where this is a major concern, a valve which utilizes a moving section can be used. This type of valve typically uses a flexible line or tube, which physically shifts between each orifice position. Since there is only a single inlet line, there is no closed leg to hold material. Another advantage of this type of valve is that since the direction changes in a flexible line are more gradual than in a solid line diverter, there is less of a pressure drop, which reduces the overall power requirements of the system.

Both types offer seals between the various orifices as well as to atmosphere to prevent dust escape, product loss and pressure loss.

Configurations

A single diverter valve unit is often limited to a '1 to 2' or a '1 to 3' configuration. However, by utilizing multiple valves, almost any configuration can be achieved, with the only limitation being the physical space available to install the system. Typically diverter valve manufacturers will offer standard '1 to 3' and '1 to 4' multiple valve configurations.

Gravity Diverters

Gravity diverters are designed for gravity feed situations only, such as discharge from a hopper or silo. Gravity diverters are typically offered as sealed or unsealed units and employ a pivoting blade which directs the flow to one of the outlets.

Sealed

Sealed Gravity diverters offer a seal from inside the valve to atmosphere and a seal between the legs of the diverter when in the fully closed position. However, due to the design of the valve, while the valve is transitioning between positions product will be able to flow between all the outlet legs. These valves are ideal for situations where dust control is essential such as where escaped dust could pose an explosion hazard, or where the product size may be very small and a seal is required to effectively stop the flow of material.

Unsealed

Unsealed Gravity Diverters are simple units. They are typically lower cost alternatives to Sealed Gravity Diverters and do not offer any internal seals. These diverters are well suited for applications where internal sealing, such as where dust is not an issue and the product size is relatively large (the large size prevents it from passing through the small internal gaps).

Configurations

Both sealed and unsealed gravity diverters are offered in 'y' or 'straight' configurations, with two or three outlets.

'Y' Configurations are ideal for applications where the flow of product is equally shared between one of two paths set at either 30° or 45° from vertical. Since the valve is symmetrical, the flow rates will be identical in each leg, but since each leg requires a change in direction there will be a pressure drop introduced. A Straight Through configuration is ideal for situations where there is one dominant path (straight through) with occasional direction to a secondary path at an angle (typically 30° or 45°).

Special Applications

There are a variety of special application diverters also available:

- Aggregate Diverters - Specifically designed to handle aggregates and other abrasive materials and are constructed from heavy gauge/abrasion resistant carbon steel.
- By Pass Load Diverters – Pressure system diverter specifically configured for hopper fill applications.
- Line Controllers – Configured with two separate actuators controlling each flow path, allowing independent control of each branch.

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