AIRLOCKS FREQUENTLY ASKED QUESTIONS

VOLUME 1

Airlock valves are critical in dust collection and process systems, yet they are often overlooked. They isolate the conditions inside the dust collector from the conditions outside while allowing the collected material to pass outside of the system. If not operating properly, they can cause issues with the system operation, removal efficiency, require constant repairs, provide maintenance headaches, etc. We have put together some frequently asked questions that we come across in regards to airlock valves. We hope this helps you choose your next airlock.

Q1 Do I need an airlock under my dust collector?

The quick answer to this is yes. Without an airlock under your dust collector, you will allow air to enter/leave the system through the dust discharge opening. If your system is under pressure, air will leave through the dust discharge opening, blowing dust around your facility. If your system is under vacuum, outside air will enter the system. This will re-entrain dust into the clean airstream, thereby lowering removal efficiency. It will also lower the airflow at the hoods and pickup points. So unless you designed the system allowing for the air entering the dust collector discharge flange, the airflow at the pickup points will be lower than designed, allowing dust to escape the system and enter the working area.

Q2 How do I decrease maintenance on my rotary valve?

There are a variety of alternatives for a rotary valve. However, if you require an airlock to comply with NFPA to prevent the propagation of an explosion, then currently, a rotary valve will be required. If you don't need to stop explosion propagation then you can use a trickle valve, double dump valve, or knife gate / butterfly valves.

A trickle valve, ex. Aerodyne's Vacu-Valve uses the vacuum of the system to seal the system. The Vacu-Valve, unlike single gate gravity valves, will hold a vacuum during discharge. Trickle valves do not work in positive pressure application. They also do not work well with particulate that bridges, is sticky, or very light. They are usually inexpensive and require low maintenance.

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A double dump valve is ideal for applications where the particulate is bulky and abrasive or you want to minimize air leakage. The double dump valve can be gravity driven, motorized, or pneumatic. Gravity units must have vacuum above to work properly. A motorized unit can handle low pressure and pneumatic valves can handle much higher pressures. The double dump valve works by opening the top gate, while the lower gate is closed. The top gate then closes while to bottom gate opens, letting the particulate pass. This way there is no direct opening between the process above and the outside.

Knife gates and butterfly valves are used when you don't require keeping an airlock during particulate discharge. They are simple in design. The main drawback is that when the valve opens, it will allow the inside atmosphere access to the outside atmosphere. Therefore, it is harder to keep the process above at a steady condition. These valves are used when keeping the operating condition isn't as important or if the particulates require special consideration.

Q3 When can I use a Vacu-Valve?

The Vacu-Valve is a low cost alternative to a rotary valve. It operates by using the system vacuum above to seal the sleeve. Since the sleeve is split, gravity will slowly pull the solids down through the sleeve until they exit the sleeve and fall into the collection hopper. As you can see from the description above, not all solids will easily pass through this. The ideal particulate would be sand. It's small, spherical shape and density allows it to easily pass through the valve. It doesn't bridge easily.

The main things to remember when looking at a Vacu-Valve:

1) Vacuum above must be: 0" W.C. < P <- 16" W.C.
2) The dust must be fine and free flowing (not too large, irregular shaped, sticky)
3) The dust cannot bridge
4) The dust cannot be too light
5) The Vacu-Valve is not an explosion isolator

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Q4 When is it beneficial to use a double dump valve instead of a rotary valve?

Double dump valves can be better airlocks than rotary valves on certain types of applications. First off, current double dump valves do NOT isolate the dust collector during an explosion. Certain rotary valves are designed for this. So if you have an explosive dust, use a rotary valve designed for explosion isolation.

For non-explosive applications, the double dump valve will let less air into or out of the process than a rotary valve. The rotary valve has a gap located between the rotor and the housing that allows air to constantly leak by. A double dump valve however, always isolates the process from the outside. While one chamber is open, the other is closed. The only leakage will be caused by the chamber equalizing with the adjacent area while open. Small amounts of air/pressure will leak from the higher pressured area to the lower.

The double dump valve also has the full opening available to pass dust from one area to the next. This allows larger particulate, clumps, and agglomeration to pass. The rotary valve has the rotor blocking the free flow of dust through. Larger or stringy material can plug or jam the rotary valve.

Q5 Are knife gates considered airlocks?

A knife gate can act as an airlock while the knife gate is closed; however, once you open up the knife gate to allow the discharge of dust from the hopper, the airlock is lost. This means in a vacuum system, outside air will leak into the system, re-entraining dust from the hopper. In a pressurized system, air will blow out of the bottom and blowing dust to the area around the knife gate.

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Knife gates work well as an airlock for batch applications, where you are collecting the dust in the hopper during operation and emptying the hopper once the system is off. They do not however work well in applications where the dust needs to be emptied during operation. Knife gates are often used as an isolation valve above an airlock so the knife gate will only be closed while repairs are made to the main airlock. This allows a system to continue running to maintenance.

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Q2)

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Q3)

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Q4)

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Q5)

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Think Differently

At Aerodyne, we approach problems differently, with unique technology and fresh perspectives that solve your tough dust challenges.