

## Top 5 Applications Where Standard Dust Collectors Fail

Dust collection is often one step in a series of steps used to treat an airstream or process stream. Often times the airstream will require heating or cooling, gas scrubbing, and/or dilution of gas stream, etc. All of these processes usually require additional equipment to work in tandem with the basic dust collector. Adding additional equipment is not only expensive, but it consumes floor space and often purchasing new equipment will get overlooked simply due to lack of space to accommodate it.

Standard dust collectors often have operational issues with abrasive, sticky, and fibrous dusts. Standard pre-filters for these applications can have high maintenance costs, however without a pre-filter the particulate will often foul or erode the process equipment. Sticky dust will plug filters and foul heat exchangers. Abrasive dust will prematurely wear heat exchangers and dust collectors. Fibrous dust will foul in tight areas. Wet scrubber applications can experience higher water usage when the particulate amount increases.

Standard dust collectors are designed for dust collection and nothing beyond that. They can't easily cool/heat the airstream or provide a method of changing the oxygen content in the airstream. For any of these options to take place in the dust collection process, additional equipment will be necessary.

There are 5 applications that utilize standard dust collectors:

- Temperature Adjustment of an Airstream
- Abrasive Dust
- Sticky and Hygroscopic Dust
- Fibrous Dust
- Oxygen Reduction

Here we'll discuss the issues with each of these applications and examine the benefits of the Aerodyne SplitStream cyclone, which offers a unique advantage to the industrial dust collection industry. It can be used in a variety of applications where standard cyclones would fail. The SplitStream cyclone is great as a pre-filter for baghouses and cartridge collectors, and can often times even replace them.



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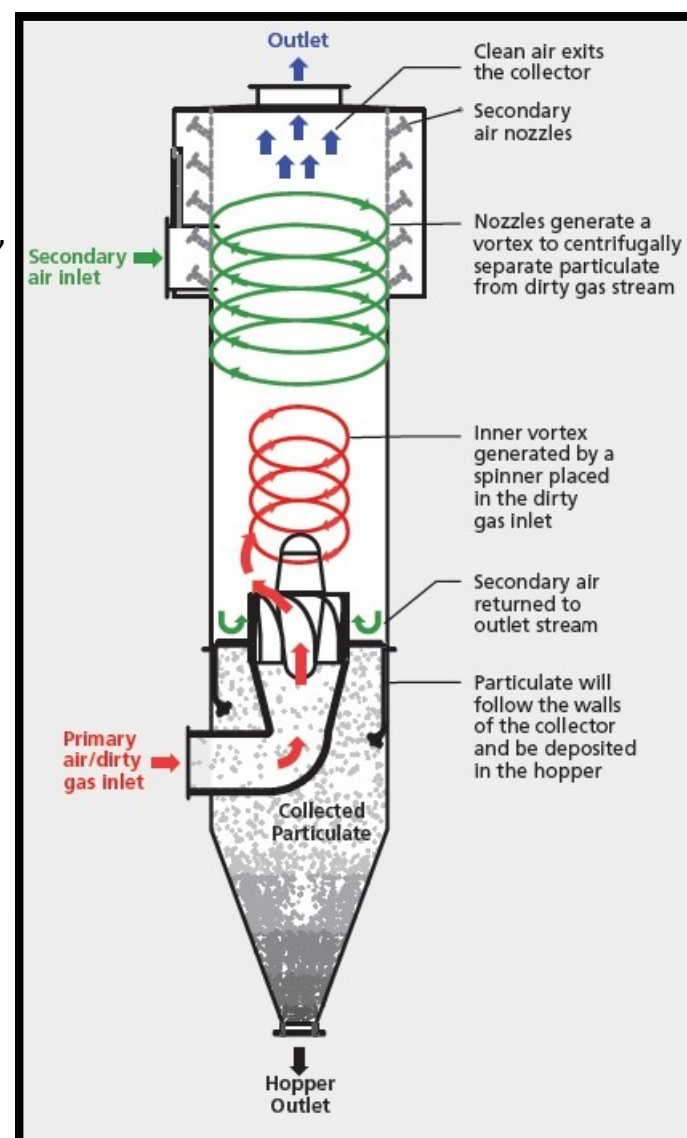
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## The Solution—A Unique Design to Tackle Tough Dust

The Aerodyne SplitStream cyclone offers a unique advantage to the industrial dust collection industry. It can be used in a variety of applications where standard cyclones would fail. The SplitStream cyclone is great as a pre-filter for baghouses and cartridge collectors, and can often times even replace them.

What makes the SplitStream unique and versatile is the secondary airstream. This airstream requires between 14" to 18" W.C. of static pressure to properly enter and disperse in the cyclone. In addition, it allows high removal efficiency, abrasion resistance, and additional process benefits. While the secondary airstream needs its own fan, it can also offer unique benefits that a standard cyclone or dust collector does not offer.

The SplitStream cyclone is a high efficiency cyclone that will remove 99% of 7-10 micron dust. It is available in both vertical and horizontal designs, so it can fit into areas where standard cyclones cannot and better accommodate the intended plant's layout. The unique design of the SplitStream allows it to capture small dust particulates that cause operational issues with other dust collectors. The secondary air can use a dirty airstream (dust laden), recycled airstream, or outside air.



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## Temperature Adjustment of an Airstream

The SplitStream cyclone uses a secondary airstream to convey the dust from the walls of the cyclone down into the hopper for dust collection. The secondary airstream can be used to heat or cool the primary airstream before it is vented outside or fed to other process equipment. The two airstreams will combine in the cyclone and they will leave together at a uniform temperature.

The secondary airstream does not have to be from the same process. It can be from a different process, different part of the facility, nearby equipment or even outside ambient air. The secondary airstream can be clean air or include dust particulates that you want collected. The cyclone will clean both airstreams of dust particulate. Please note: do not combine two airstreams that have components that react, as they can form submicron dust that will not be collected in the cyclone.

Some examples of where the SplitStream would adjust temperature include:

- Baghouse pre-filter of high temperature process – by cooling the airstream before the baghouse, less expensive bags can be used.
- Wet scrubber pre-filter of high temperature process – by cooling the airstream before the wet scrubber, less water would be lost in the quench. Thereby minimizing water usage.
- Baghouse pre-filter in low temperature process – by warming up the air, maintenance and condensation can be minimized.
- Wet scrubber pre-filter in low temperature process – by warming up the air, a wet scrubber can be used for fume removal.
- Feed stream filtering and pre-heating or cooling – process air can be recycled to clean the process make up air while retaining heat or refrigerant.

## Abrasive Dust

Abrasive dust will shorten process equipment's life span by eroding away the walls of the equipment. Due to the design of a standard cyclone, the lifespan is shortened quicker. A standard cyclone is designed so that the dust is conveyed to the outside of the cyclone, where it hits the walls and fall into the hopper. Abrasive dust will also wear out filter bags, the inlet distributor, tube sheets, and the baghouse walls.

However, the SplitStream cyclone uses a secondary air flow to capture the dust and convey it into the hopper. This secondary airstream keeps the dust from contacting the cyclone walls, thereby increasing the service life of the cyclone. Aerodyne has SplitStream cyclones that have been operating for over 25 years in applications where a standard cyclone would not last more than a few years.

Some examples of where the SplitStream can be beneficial in abrasive applications include:

- Standard cyclones developing holes in its walls, causing a shutdown of the system and repair or replacement of the cyclone.
- Baghouses developing holes in the walls and in the tube sheets. Holes in the tube sheet will cause dirty air to leak into the clean air plenum, thereby short circuiting the bags. Abrasive dust can also cause premature failure of the bag filters and inlet distributor. If the inlet distributor wears away the baghouse will not perform as designed.
- Abrasive dust in wet scrubbers could cause premature failure of the recycle pump, nozzles and recycle piping.
- Sand, glass beads and concrete are some examples of the abrasive applications.

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## **Sticky and Hygroscopic Dust**

Sticky and hygroscopic dust can also cause issues with standard dust collectors and cyclones. Sticky dust will accumulate in any dead zones in standard cyclone. This causes a gradual reduction in the internal volume of the cyclone, and changes the geometry of the cyclone, which could cause a change in the removal efficiency of the unit.

Sticky and hygroscopic dust will also cause fabric filters to plug up. Sticky dust will not release when the cleaning air is pulsed through the filter, as the dust will stick to the filter as well as other dust. Hygroscopic dust will also plug up bags and cartridges as the dust will collect in the filter, and then grow as it encounters water and water vapor. Often times the cleaning air used is not dehumidified and have water vapor and/or droplets. This introduces water vapor into the system where none was before. For example, a customer of ours had this issue and a cement-like dust coated the baghouse causing major maintenance issues.

The SplitStream cyclone uses a spinner in the primary inlet of the cyclone. This spinner imparts centrifugal motion in the primary airstream. This forces the particulate (both solid and liquid) outwards towards the walls. The secondary airstream will then capture the particulate and direct it down into the hopper. Since the dust never gets to the walls of the cyclone, and the velocity in the spinner is high enough to prevent dust accumulation, the SplitStream cyclone does not have operational issues with sticky and hygroscopic dusts.

### **Some examples where the SplitStream can help handle sticky and hygroscopic dust include:**

- Exhaust from spray dryers – gathers product uncontaminated by filters.
- Exhaust from coolers and process dryers in the food industry.
- Collection and reuse of particulate that is hygroscopic such as sugar, caramel, honey, fertilizers, and salts before final removal with wet scrubber.

## **Fibrous Dust**

Fibrous dust causes many issues for standard dust collectors. The fibrous dust floats in the airstream and often will be re-entrained back in to the air exiting the cyclone. In baghouses and cartridge collectors, fibrous dust when cleaned off the filters, will float in the dirty air plenum. This increases the concentration of the dust in the unit. The dust will not settle into the hopper to be removed from the system. Overtime this will cause the dirty air plenum to plug up, thereby plugging up the dust collector.

The SplitStream cyclone however uses a secondary airstream to convey the fibrous dust down into the hopper. The secondary airstream enters near the top (vertical unit) through nozzles or vanes. It then rotates down along the outer wall, collecting the fibrous dust into its airflow, while keeping the dust off the walls. The secondary airflow then delivers the dust into the hopper before joining the cleaned primary airstream and leaving from the cyclone outlet.

### **Some examples of fibrous dust that the SplitStream cyclone can capture include:**

- Fiberglass
- Egg shells and poultry bed
- Peanut shells, corn shells, and other plant fibers
- Textiles dust



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## Oxygen Reduction

Many dusts are explosive and with growing scrutiny of new and existing operations by inspectors and insurance companies, existing processes are being found that require explosion protection. One way of protecting from explosions is to prevent an explosion from ever occurring by lowering the oxygen level of the system below the Lower Explosive Level (LEL). This is done by adding an inert gas such as nitrogen to decrease the concentration of oxygen.

The secondary airstream can be used to add nitrogen (or other inert gas) into the system. This lowers the available oxygen allowing the cyclone to operate without additional explosive prevention devices.

### **Some examples of this include:**

- Dust collection with nitrogen purge (reactors, storage vessels, etc.)
- Re-using combustion gas before venting to atmosphere

Aerodyne's SplitStream cyclone offers a strong advantage over standard dust collectors. Coupled with its unique design and its ability to be configured multiple ways, it is the ideal dust collection solution. Whether it is using it as a pre-filter for an existing system or replacing a faulty dust collector in a plant, the SplitStream will reduce maintenance, increase efficiencies, and improve the overall process.

**For more information about your dust collection needs, contact Aerodyne Environmental at (440)543-740, Toll Free (800)358-7546, or email [dc@dustcollectorhq.com](mailto:dc@dustcollectorhq.com).**