



DUST COLLECTOR FREQUENTLY ASKED QUESTIONS

VOLUME 1

Dust collection systems can range from being fairly simple to extremely complex. It's important to know that you have the proper system for your application. Some questions always come up when looking at dust collection systems. To make life easier, we have put together some common questions we get asked along with answers and explanations. Have a look.

Q1 What type of dust collector do I need for my application?

Most dust collectors out there are baghouses and cartridge collectors. However, they are not the best solution for every application.

- a) Baghouses – ideal for dry dust collection application. High removal efficiency down to submicron sizes. Don't like wet, sticky applications. High dust concentrations can cause operational issues. Cyclone pre-filters can help baghouse operations
- b) Cartridge collectors – less expensive than baghouses, the cartridge collectors are less forgiving than baghouses in wet, sticky applications. The pleated filters allow higher airflows in smaller areas but also plug faster. Cartridge collectors have lower dust concentration thresholds than baghouses. Cyclone pre-filters can help cartridge collector operations.
- c) Cyclones – are low maintenance dust collectors. They can have high removal efficiencies of dusts 10+ microns and larger. Often times they will be a pre-filter for a baghouse, cartridge collector or wet scrubber. They operate more efficiently the higher the dust concentrations are in the airstreams.
- d) Wet scrubber – are used for water soluble dusts. They also remove fumes (acids, bases, amines, etc.) from the airstream. They are very efficient but require treatment of the dust contaminated water.
- e) Electrostatic precipitators – have very high dust removal efficiency, particle size not as important. They are expensive to manufacturer and operate. Very effective with submicron particulate, but can become expensive without pre-filters.
- f) Filters – the most basic dust collectors. Disposable filters are effective with very low concentrations of dust particulate. Filters are replaced, once they are plugged up. Cyclone pre-filters can be used to increase filter life.



Dust Collection FAQ

Q1)

What type of dust collector do I need for my application?

Q2)

What information do I need to size my dust collector?

Q3)

Is my dust explosive?

Q4)

Can I increase the airflow through my dust collector?

Q5)

I replaced my baghouse with a cartridge collector and it doesn't work as well, why?

Q2 What information do I need to size my dust collector?

The attached Questionnaire will provide most of the questions that would be asked for a dust collector. The information that absolutely must be provided for a dust collector to be sized and quoted are:

- a) What is the airflow through the dust collector?
- b) What is the temperature and pressure the dust collector will experience?
- c) What is the dust being collected?
- d) Is it explosive?
- e) What removal efficiency do you require?

The five above will allow a supplier to provide a quote. However, with only the above information, the dust collector performance cannot be guaranteed.

[See dust collector questionnaire](#)

Q3 Is my dust explosive?

To help answer this question, NFPA has released NFPA-652 and 654. A combustible dust is defined as a finely divided combustible particulate solid that presents a flash fire or explosion hazard when suspended in air or the process-specific oxidizing medium over a range of concentrations. Basically, what this means is when the dust is in the air and its concentration is enough to cause a flash fire or propagate a deflagration or explosion if exposed to a spark or heat source, then it's considered combustible.

Unless you know for sure that your dust isn't combustible, you should send the dust sample to a lab for testing. The lab will provide one of three responses – no reaction, combustible but not propagating, or propagating.



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Usually the lab will initially do a Go/ No-Go test. If the dust doesn't exhibit combustion, the testing will stop. If it does exhibit combustion, they will then do further tests and provide explosion properties (K_{st} and P_{max}) of the dust. The K_{st} tells you how quickly the explosion will propagate, while P_{max} tells you the power behind the event.

A few things to remember:

- 1) A combustible dust mixed with non-combustible dust may or may not pass the go / no-go test; therefore, if you have both in a mixture, get a test.
- 2) Material that may not burn can still be combustible as a dust, unless you know for sure, getting a test is the safe bet.
- 3) If you have made a process change that changes the composition, relative concentrations, etc. of the dust, then the combustibility of the dust may have changed and a new test should be done.
- 4) If you have combustible dust in your facility, then a hazard analysis of the area must be done every five years

Q4 Can I increase the airflow through my dust collector?

Before you can answer this, you must review your dust collector system. When properly designed, they provide the performance you require. If one of the system parts fails or is undersized the whole system will fail. The following are brief descriptions on each part of the system and how changing the airflow affects them.

Hoods / pickup points

Hoods are used to provide the point of dust collection. They are designed for providing a specific airflow at a minimum velocity. The hood type, location, and quantity are usually specific for your application. The Industrial Ventilation Handbook provides guidelines for velocity ranges to provide the proper ventilation.



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A velocity lower than suggested could cause dust to escape the hood. Adding additional hoods to an existing system could cause the airflow (and pickup velocity) to drop below the minimum suggested, thereby making a notable reduction of performance.

Ductwork

The ductwork of a properly designed ventilation system should be sized so that it has the lowest possible pressure drop and has a minimum velocity. To keep the pressure drop down, you want to keep the ductwork as straight as possible, minimize turns, and keep the duct size larger. Since we are moving dust, you also need to make sure you keep a minimum velocity, or the dust will settle in straight sections. This will cause increased resistance and is a fire/explosion hazard. Usually, you want to keep the velocity of the air over 4,000 FPM to prevent dust from accumulating. Sticking with standard ductwork sizes will keep costs down.

Dust Collector

Some dust collectors are less sensitive to added airflow than others. A cyclone's pressure drop will increase as you increase the airflow through it. A baghouse or cartridge collector's removal efficiency will decrease if you increase the airflow too much. Many of these are very particulate specific. A cartridge collector with wood dust could handle higher airflows than silica dust. Contacting the dust collector manufacturer is the best way to figure it out.

Exhaust fan

The exhaust fan is the most important equipment in a dust collection system. It provides the motive force to collect the air-dust mixture. Many times people will add additional pickup points and not change the fan; therefore, less air will be pulled from each of the existing pickup point. When you look to increase the airflow in a dust collection system, make sure you calculate the total airflow and static pressure required. Then check to see if the existing fan can handle it (open dampers, speed up) and if not, then a new fan will be required.



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Q5 I replaced my baghouse with a cartridge collector and it doesn't work as well, why?

These days, cartridge collectors are being used instead of baghouses on many dust collection applications. The cartridge collector's smaller size, lower cost, and easier maintenance all make it more attractive than a baghouse. However, not every application is suited for a cartridge collector.

Differences between baghouse and cartridge collector:

The main difference between the baghouse and cartridge collector is the filters. A cartridge collector uses a pleated filter. The pleated filter allows greater surface area in a given diameter. This allows greater airflow through the filter than a simple bag type. However, this is usually the main cause of cartridge collectors failing when a baghouse wouldn't. The pleated filters are easier to plug up than a bag. If you begin filling up your pleats, the available surface area of the filter quickly falls off. This increases your pressure drop, thereby decreasing the airflow of your system. High concentrations of dust, wet and sticky dusts, and hygroscopic dusts all can cause pleats to plug up. This will cause high maintenance on the cartridge collector.

Bags, on the other hand, usually don't use pleats. Therefore, their surface area is strictly the surface area of the cylindrical bag (supported by the cage). When a dust begins to build up on the bag, it doesn't restrict the surface area as much as a pleat so the pressure drop doesn't rise as fast. Also, with sticky dusts, the dust only has one point of contact with a filter, unlike a pleated filter where it can have two. The single point will make it easier to dislodge during cleaning.

The other difference between baghouse and cartridge collector is the maintenance. A cartridge filter is a complete filter and support. When you need to replace, then the whole thing is replaced at one time. Cartridge collectors usually have the cartridges horizontally mounted and easily accessible from the side. This ease of access cuts down replacement times.



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A baghouse usually has the bags hanging from the tube sheet and requires venturis (for compressed air), cages, and the bags themselves. To replace a bag, you must pull the bag, cage and venturi out (sometimes requiring confined space entry). The cage and venturi must then be removed before the bag can be replaced. All of this takes much more time than a cartridge unit.

The problem is, since cartridge units have horizontal filters, often times the top parts of the filters do not clean as well as the rest of the filters. This can deprive the filter of surface area, thereby increasing the pressure drop across the filter. Since bags are usually vertical, all sides of the bags are cleaned equally, providing a uniform filter loading. Again, high dust loadings, wet and sticky dusts, and hygroscopic dusts all can contribute to this issue.

The final difference between the collectors is the filter material itself. Cartridge filters are made from a few different types of fabrics. They often use plastic, glue or light weight metal in their construction. This keeps the maximum temperature low. A bag, however, can be made from pretty much any fabric around. The separate venturi and cage also provide greater flexibility for higher temperatures.

If you have a cartridge collector that is having issues as described above, don't fret. You might not have to replace it with a baghouse. Often times a cyclone pre-filter will solve the above issues. The pre-filter will decrease the dust loading for the cartridge collector. This will increase the time it takes to plug the filters and make it easier for the cleaning. A cyclone pre-filter could also provide longer time for the airflow to cool off, thereby decreasing the temperature in the cartridge collector.

Think Differently

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



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