

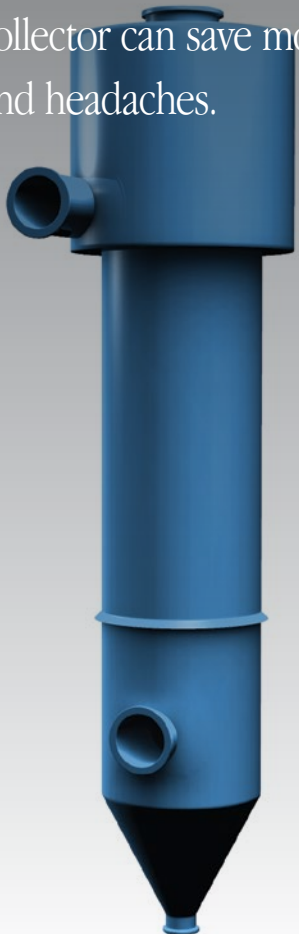
Dust Collector Facts

FOR the past several decades, industrial facilities in a wide variety of industries have deployed dust collection systems as part of its manufacturing process. As technology and filtration techniques have improved, these systems have changed and evolved to become more sophisticated, and at times complex. This Dust Collection Facts booklet is a guide to help you select the right type of dust collection technology to use in your facility.



Dust Collector Facts

Baghouses and **cartridge collectors** are the most common dust collectors out there. However, depending on your application, a **cyclone**, **wet scrubber**, or **ESP** may be better suited for your application. A cyclone requires less maintenance and utilities than most other collectors, so picking the correct dust collector can save money and headaches.



What is a dust collector?

A dust collector is a mechanical device used to remove dust from an air stream. The dust collection system consists of a hood (or air collection device), the dust collector, the motive fan and any inter-connecting ductwork, stack, dampers, controls, etc. Aerodyne Environmental manufactures cyclone dust collectors and the dust handling valves (airlocks) mounted on the dust collectors.

To properly specify a dust collector, certain information is required:

1. **Dust collector type** – Cyclone, baghouse, etc.
2. **Airflow (CFM)** – The amount of air going through the collector. The airflow is critical to sizing a dust collector and without airflow no collector can be sized.
3. **Temperature, pressure, humidity of airflow** – Higher temperature, pressure, and humidity will affect collector materials of construction, size and may require special valves and controls
4. **Dust description*** – The better you describe your dust the better your dust collector will operate. Example a sticky dust will bind a cartridge collector which will require frequent cleaning and/or replacing of the cartridges. While cyclones are well suited for sticky particulate.
 - a. SG or density of the dust/particulate – the greater the density, the easier it is to remove.
 - b. Dust/particulate loading (lbs/hr) – amount of dust.
 - c. Particulate size distribution (microns) – how big is the dust (smaller dust is removed in baghouse but larger dusts can be effectively removed in a cyclone).
 - d. Fibrous, abrasive, hydroscopic, granular, tendency to bridge, sticky, etc. (dust with these properties can wreck havoc on baghouses and cartridge collectors.
5. **Removal efficiency required** – The greater the removal efficiency, the more expensive the design will be.
6. **Materials of construction required** – from carbon steel to stainless and high alloy steel, the materials of construction affects price. Process conditions (temperature, gas/air composition, dust composition and humidity) can require specific materials of construction. (Example: salt in a humid environment requires stainless steel to prevent corrosion.)

* If unknown, a pilot unit can often be rented from the manufacturer to test on your existing system.



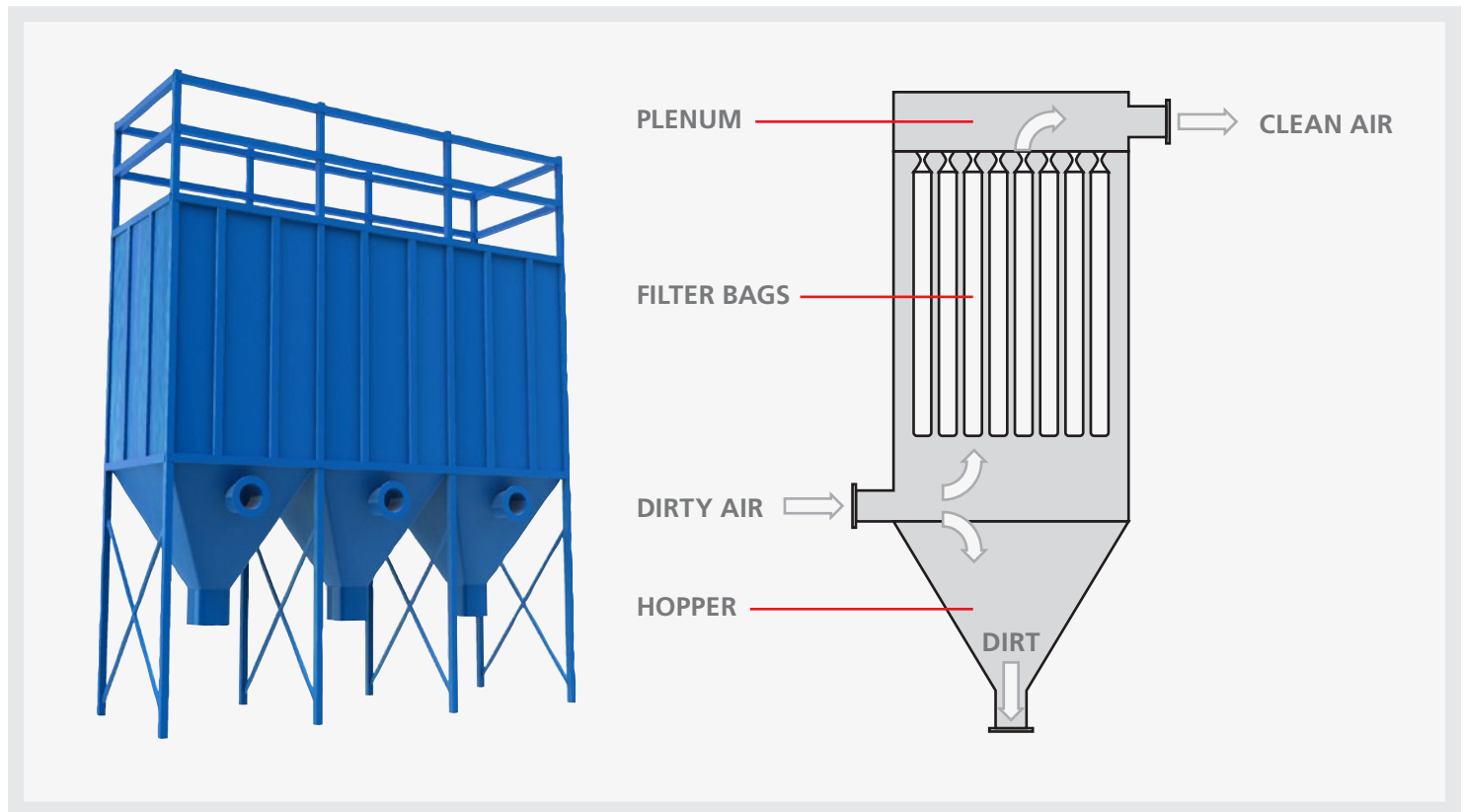
What kind of dust collectors are there?

Baghouses

A baghouse consists of a vessel with many filters (bags) inside. The bags are located in rows and mounted on a tube sheet. The tube sheet separates the dirty air from the clean air. Dirty air enters the bag house near the bottom. The dirty air is forced through porous bags which have a built up filter cake. Clean air goes through the filter/bag and leaves through the top of the vessel.

Baghouse facts:

- a. The filter cake does the majority of the dust removal. As the filter cake builds up, the pressure drop across the bags increases.
- b. A baghouse will usually have a controller that measures the pressure drop and tells the solenoids when to pulse.
- c. The pressure drop across a bag house is usually 5–6" W.C. (Water Column) but will increase as bags get older.
- d. The filters are available in standard bag and pleated filters. The pleated filters have greater surface area than a standard bag, but they can bridge easier.
- e. Bag material – Bags and filters are available in many materials including cotton, wool, polypropylene, Teflon, and glass/fiberglass. Bags are not good with fibrous and sticky particulate.
- f. Moisture can cause binding with the bags and maintenance problems.
- g. Maintenance – Baghouses require a lot of maintenance. The filters must be replaced regularly. Most of the time replacing the filters requires confined space entry and is a very dirty job.
- h. Most baghouses require compressed air (high expense) and have solenoid valves to control the compressed air.
- i. Common problems in a bag house include broken bags, broken solenoids and over use of compressed air.
- j. The more a bag is pulsed/ cleaned the more wear and tear on it and the quicker it will fail.



Dust Collector Facts

What kind of dust collectors are there?

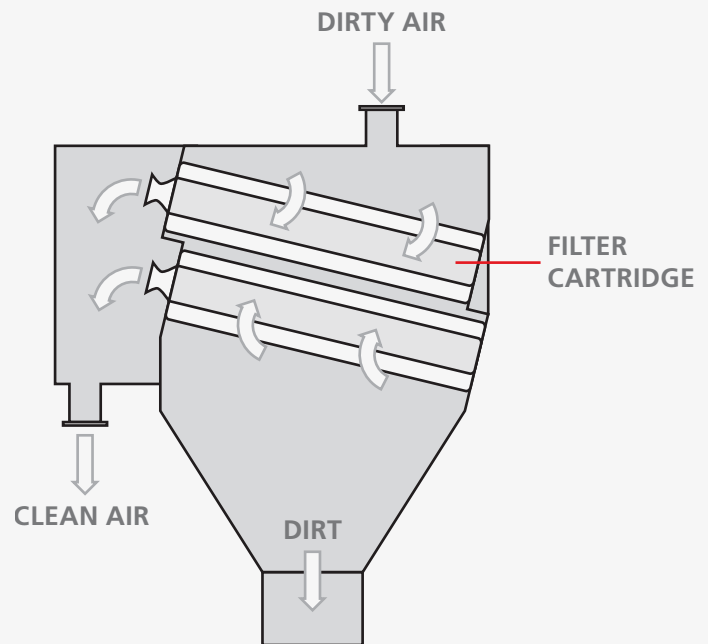
Cartridge Collectors

Cartridge collectors are used in the following applications: grinding, sandblasting, welding fumes, laser and plasma cutting fumes, graphite, pharmaceutical powders, acid fine chemical powders.

When dusts are difficult to handle, hygroscopic, or high temperature, a baghouse is a better alternative for trouble free dust collection and longer filter life.

Cartridge collector facts:

- Cartridge collectors are similar to baghouse except a cartridge is utilized.
- The cartridges are pleated and have greater surface area available than bags.
- The cartridges are easier to change than bags.
- A cartridge collector is less expensive than a bag house but has more limitations.
- They are used for easier applications and are unsuitable for some applications.
- Since the filters are pleated they lose efficiency quickly when binding (a build up of solids across the pleats) occurs.
- The cartridge collector requires the same accessories as a bag house.





What kind of dust collectors are there?

Cyclone

The cyclone is the simplest design of all dust collectors. It is a mechanical way to remove dust from an air stream. The cyclone uses centrifugal and gravitational forces to force the dust to the vessel walls and then let gravity collect it. The cyclone requires only a discharge valve and fan for operation. Cyclones require very little maintenance.

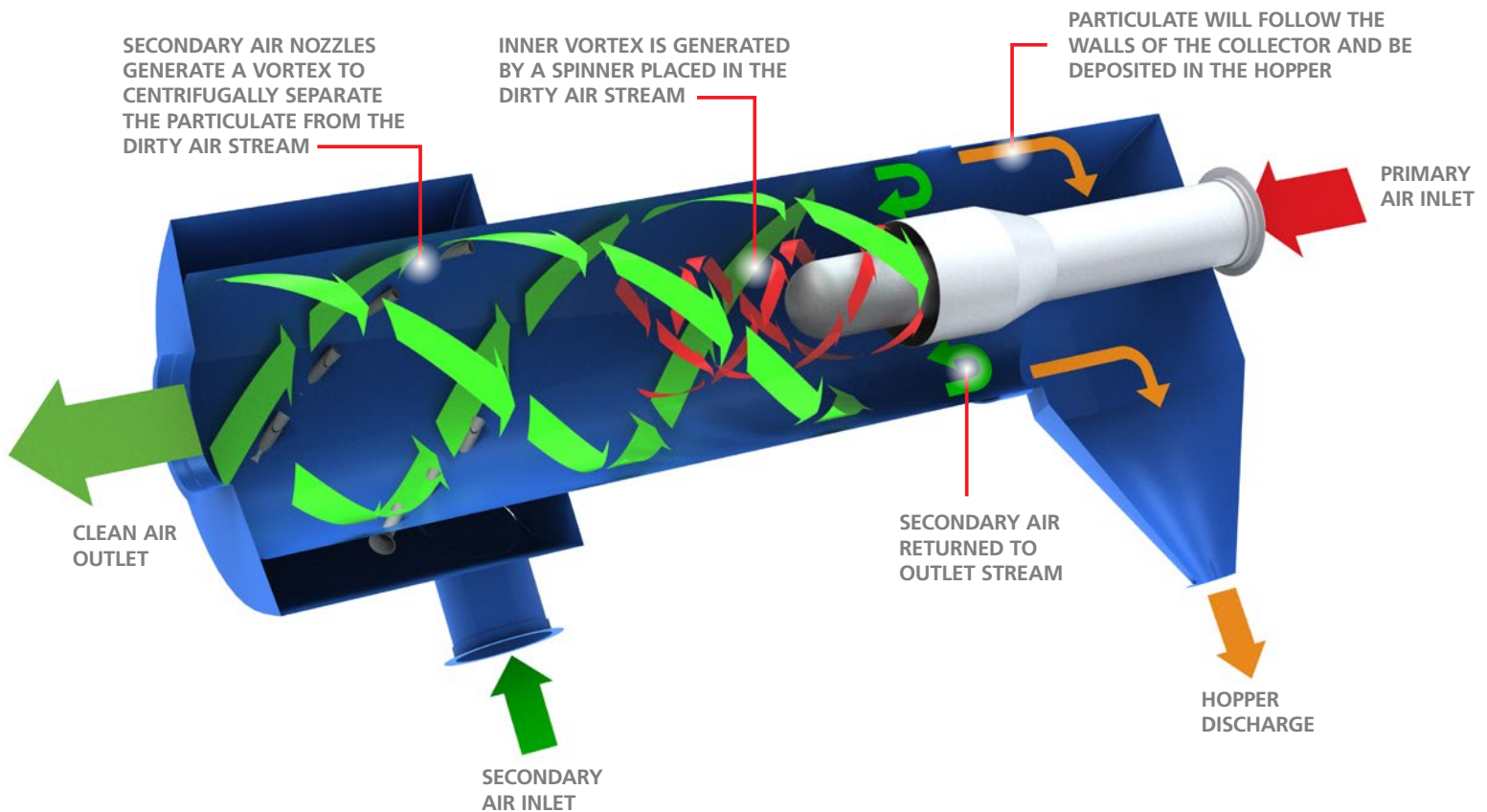
How a cyclone operates

Dust-laden air enters near top of vessel. The air stream will slowly rotate down the vessel walls to the vessel bottom. The air flows in a downward spiral against the cyclone body's wall. Centrifugal forces separate the particles from the airflow

and forces them to the cyclone wall. The clean air exits the outlet through the cyclone top. Captured particles are drawn by gravity into the hopper. The airlock discharge allows the particles to exit the hopper.

Cyclone facts:

- Cyclones are often used as pre-filter for other dust collector.
- Cyclones are often used when products can't be contaminated or is valuable and customers don't want to throw it away in filters (example gold and silver).
- The cyclone is the lowest cost solution out there and requires very little maintenance.
- The normal cyclone will remove a wide range of particulate. A standard cyclone will get 99% removal efficiency in the 25–35 micron range. High efficiency models get as low as 5–10 micron, but much higher DP (Differential Pressure).
- Aerodyne Environmental Cyclones are unique. Our cyclones are available in horizontal along with vertical designs. Our GPC is a compact design that is ideal as a pre-filter for baghouse/ cartridge collector. Our S-Collector is designed for abrasive, hygroscopic, wet, sticky, fibrous applications.

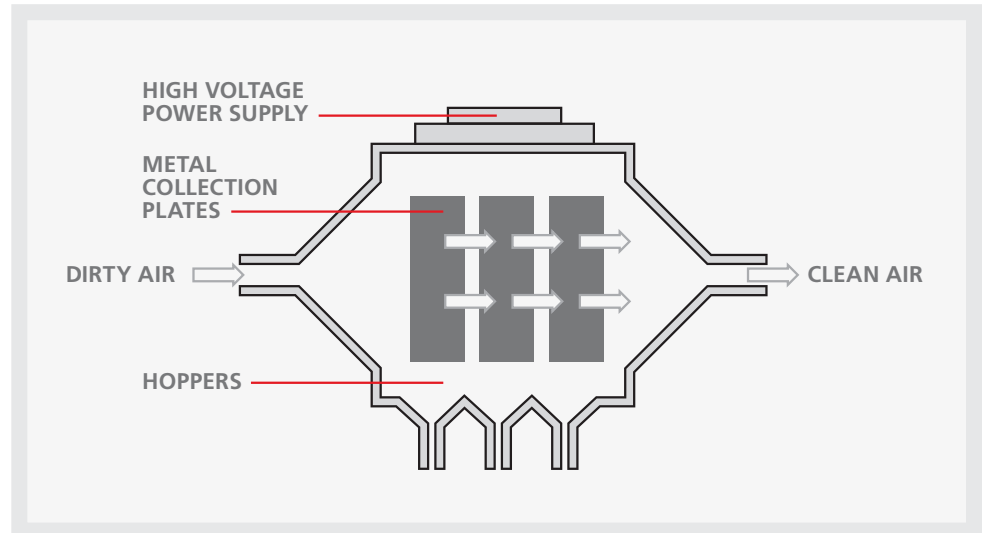


Dust Collector Facts

What kind of dust collectors are there?

ESP (Electro Static Precipitator)

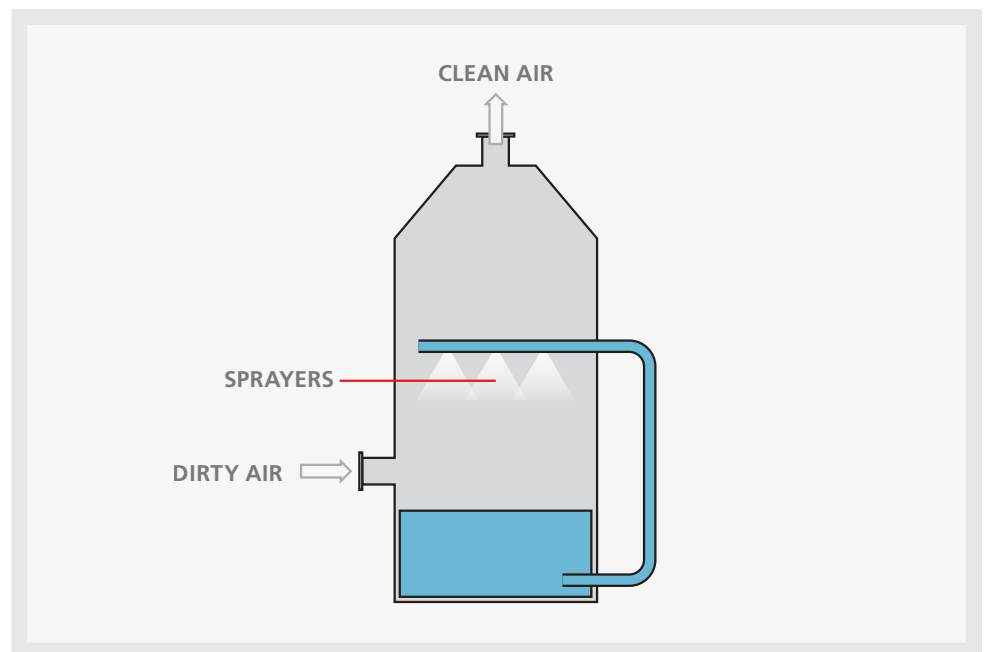
ESPs use high voltage to electrically charge particulate in the air. The charged particulate is collected on charged plates as air stream passes. ESPs use large amounts of electricity and can get collection efficiencies as high as 99% for many applications. ESPs provide good removal of sub-micron particulate. ESPs are expensive and require high operating and maintenance costs.



Wet Scrubbers

Wet Scrubbers are available in a variety of designs including cyclones, venturi, packed towers, cloud chambers and fluidized beds

- The wet cyclone is just like a regular cyclone except that they spray water in the cyclone. When a particle hits a water droplet the water drop surrounds the particle and the total size increased. This makes it easier to remove the particulate from the air stream
- A venturi forces the airflow through a small diameter with water droplets. This increases the chances of dust being captured by the water. Normally a cyclone or packed tower is then used after the venturi to collect the dirt mist. Pressure drop can be high, meaning high operational costs.



What kind of dust collectors are there?

- c. Packed towers use packing to intercept the particulate. The packed tower has the dirty air stream entering from the bottom while water is sprayed from the top. Packed towers can plug depending on the particulate.
- d. A cloud chamber uses very fine water particles to intercept the dust and remove it from the air stream. The mist is collected in a packed bed or mist eliminator.
- e. A fluidized bed is similar to a packed tower except the packing fluidizes upon operation. The fluidized bed uses larger amounts of recycle water than a packed tower. Fresh water/slurry is sprayed from the top.
- All wet scrubbers work with the same general principle and that is to spray dust with water and then collect the dust and water droplet in a slurry. The water droplets are usually collected in a mist eliminator and/or packed tower. Wet scrubbers can usually get better removal efficiencies and have a lower chance of plugging. They will also allow you to remove vapor (ex. H₂S) concurrently with the particulate. The main disadvantage of the wet scrubber is that you create a slurry that needs to be disposed of or treated.

Where are dust collectors used?

- Power plants
- Steel mills
- Chemical plants
- Foundries
- Woodworking shops
- Machine shops
- Mines and quarries
- Fiberglass plants
- Grain silos
- Food processing
- Pharmaceuticals
- Furnaces
- Labs

Type	Removal	Advantages	Disadvantages
Cyclone – Dry	5–10 micron	Low maintenance Low operating cost	Will not remove smaller particulate
Baghouse	2–3 micron	Industry standard Removes small particulate	High maintenance High operating costs Filters plug
Cartridge Collector	2–3 micron	Less expensive than baghouse	High maintenance High operating costs Filter plug
Wet scrubber	Sub-micron	High removal efficiency	Creates slurry High maintenance High operating costs
ESP	Sub-micron	High removal efficiency	High maintenance High operating costs

Double Dump



S Collector



Vacu-Valve



Knife Gate



Aerodyne Environmental's industrial dust collector products feature unique, low-maintenance designs that will enhance the performance of your processing operations. Our dust collectors, which work horizontally or vertically, can extend the life of your baghouse or cartridge filters. And, Aerodyne offers a variety of durable material handling valves for every application, including the Vacu-Valve Trickle Valve System, a cost-effective solution to rotary valves.

Aerodyne Environmental has been specializing in solving dry material handling problems for more than 60 years through such products as high-efficiency cyclone dust collectors and low-cost, low-maintenance dust collection valves. Our unique line of dust collectors and our wide variety of airlock valves can operate in a multitude of applications. Aerodyne operates under the corporate motto, "Clean Our World®," addressing material handling challenges through innovation, customer commitment and environmental stewardship.



17387 Munn Road
Chagrin Falls, OH 44023
(440) 543-7400
(440) 543-7404 Fax

1-800-358-7546

www.dustcollectorhq.com