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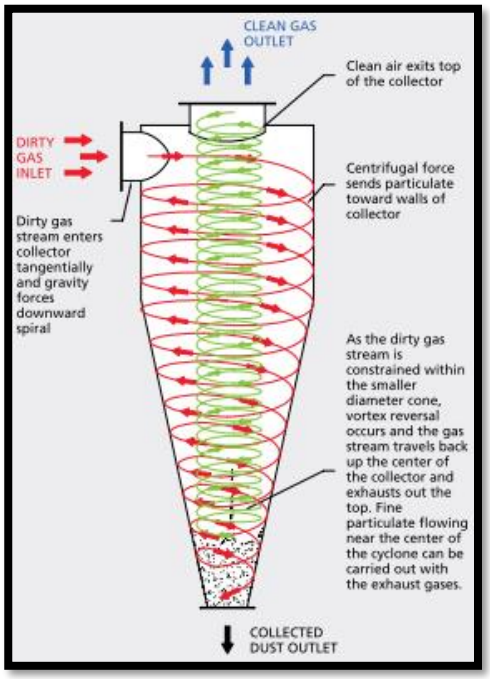
WHITE PAPER

Aerodyne Cyclones:

Not Your Grandfather's Cyclone!

Aerodyne manufactures two different types of cyclones - the GPC (Ground Plate Cyclone) and the SplitStream Collector. These Aerodyne cyclones are not the traditional cyclones with which you are probably familiar. Both cyclones can be designed for vertical or horizontal installation; traditional cyclones can only be vertical. The Aerodyne GPC and SplitStream cyclones also provide high particulate removal efficiency. The following describes the different cyclones that are available along with their advantages and disadvantages.



Traditional Cyclone

Traditional Cyclone

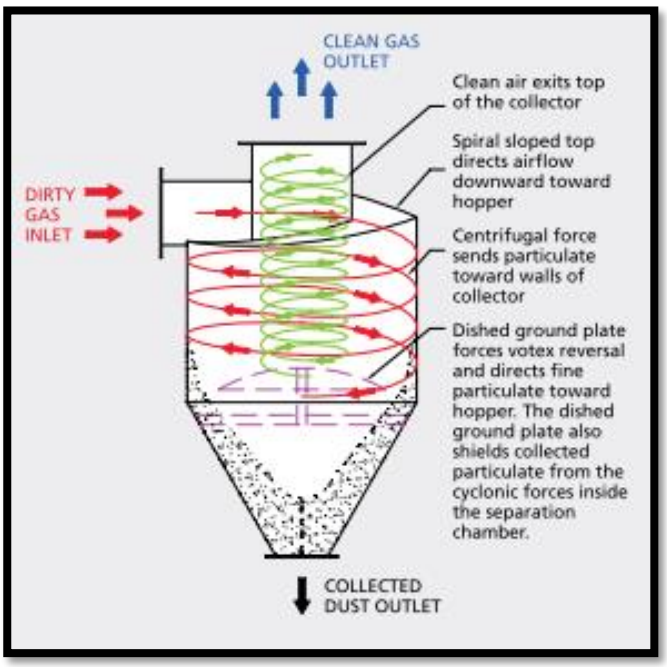
To understand why the Aerodyne cyclones are unique, let us first look at how a traditional cyclone operates. The typical cyclone design consists of a tangential inlet and a long-tapered body. Centrifugal forces force particulate out toward the walls, and gravitational forces direct the dirty gas stream downward through the narrowing body. As the gas stream becomes constrained in the narrow end of the cyclone body, a phenomenon known as "vortex-reversal'' occurs in which a secondary inner-vortex is generated and moves upward through the center of the primary vortex where it is exhausted from the collector. Dust near the walls fall into the cyclone hopper and out of the airstream. The traditional cyclone must be vertical in design to operate effectively.

Vortex-reversal is one of the primary causes for inefficiencies in cyclonic dust collectors. As the inner vortex travels up through the cyclone, it takes with it any fine dust particulates that did not have the inertia to be forced tight to the collector walls. Another issue that can develop with traditional cyclones is that an integral hopper could have dust re-entrainment into the clean airstream. Oftentimes, traditional cyclones will install a dust trap to prevent re-entrainment. The dust trap is located below the cyclone hopper and is designed to minimize particulate re-entrainment. If you've seen a cyclone with what looks like a pocket underneath it, it has a dust trap.

The long-tapered body of a "high-efficiency" cyclone is intended to give the fine particulate more time to make it to the walls of the collector. While this added length may boost collection efficiencies, it creates problems with installation, space requirements and high transportation costs. Often traditional cyclones are used where low cost is more important than performance, and size is not an issue.

Aerodyne GPC Cyclone

The GPC cyclone uses a combination of a sloped spiral inlet and fixed ground plate to provide several distinct advantages over the traditional cyclone dust collector described above. First, a spiral inlet directs the dirty gas stream toward the ground plate and hopper of the collector. This efficiently begins the centrifugal motion of the air without any dead spots. The fixed ground plate, utilized by the GPC removes the requirement of a long tapered hopper. The ground plate provides the vortex-reversal, rather than the geometry of the tapered hopper in traditional cyclones. As the dirty gas stream strikes the convex ground plate; fine particulate, which has not completely made it to the collector walls, is deflected into the hopper. The ground plate also shields collected particulate from the clean air, acting as a barrier between the separation chamber and collection hopper; Therefore, no separate dust trap is required.



Aerodyne GPC Cyclone

The GPC design allows it to be much smaller than traditional cyclones and includes 6 sizes under 8ft^3 per NFPA 654. A GPC cyclone is usually less than half the height of a traditional cyclone. The ground plate also removes the requirement of gravity, so it can be designed for a horizontal installation, with virtually no effect on collection efficiency. The horizontal GPC is around 1/3 of the height of a traditional. The removal efficiency is high (99% of 20 micron particulate*).

* spherical dust, specific gravity of 1

Applications and Particulates (partial listing)

- Pharmaceutical clean room
- Coffee roasters
- Mines and quarries
- Pre-filters
- Plastics
- Food processing

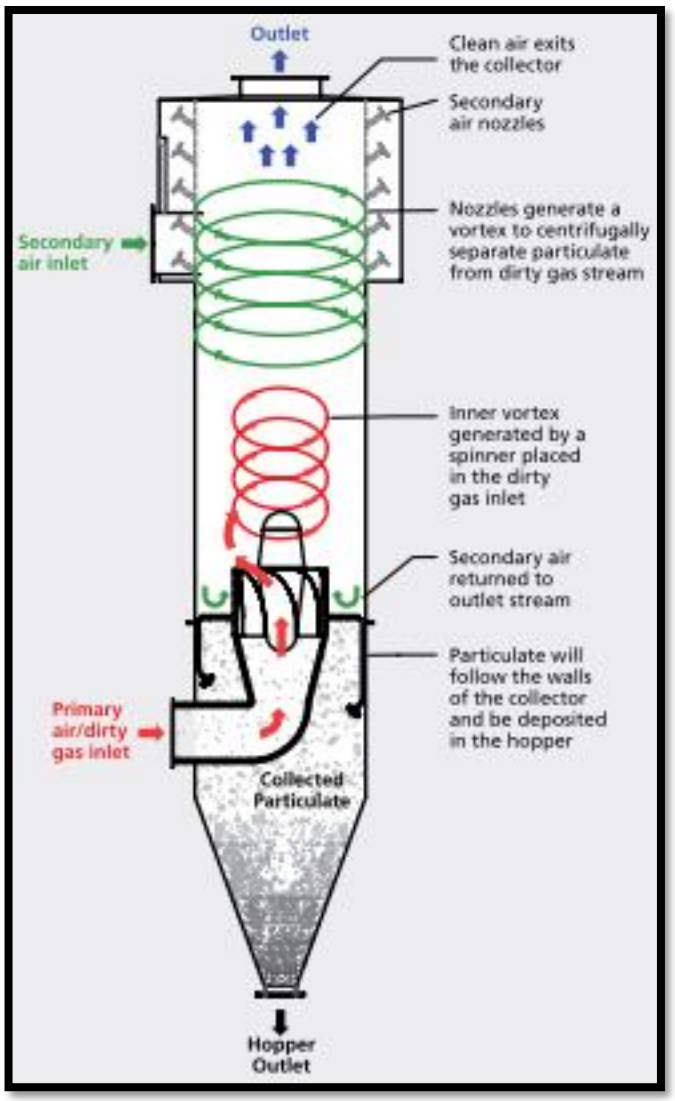
For additional information contact Aerodyne and request our GPC spec sheet or our pre-filter white paper.

Aerodyne SplitStream Collector

The Aerodyne SplitStream Collector uses two airstreams to remove particulate in the air. The primary air stream enters the cyclone and proceeds through a mechanical spinner. The spinner imparts centrifugal motion into the airstream, thereby forcing dust particulate toward the cyclone walls. A secondary airflow enters the cyclone near the clean air exit. The secondary air proceeds through nozzles or vanes as it enters the cyclone. The secondary air then rotates around the outer edge of the cyclone, collecting particulates and delivering them into the hopper. The secondary air then reverses direction and joins the primary air and leaves the cyclone.

Since the SplitStream Collector has no moving components, it is capable of handling a wide range of materials, while requiring minimal maintenance. Particulate that is abrasive, fibrous, friable, sticky, or hygroscopic can be separated and collected for air pollution control or reclamation. The secondary air ensures that the dust doesn't contact the walls. This minimizes wall abrasion for abrasive applications and areas. For particulate that is sticky, the secondary airflow keeps the dust from building up on the walls. The SplitStream Collector has a very high removal efficiency of light, fluffy particulate that floats in the air. The secondary airstream also gives the option to heat up or cool down the process air and material. Removal efficiencies as high as 99% of 7- 10 micron dust range are normal*.

* as measured in limestone testing



SplitStream Collector

Applications and Particulates

- Glass beads
- Sugar
- Grains, soybeans and cereals
- Cement

Picking The Best Cyclone

When looking for a cyclone for your application, there are many things to consider. A low priced traditional cyclone might provide adequate performance for your application at a lower capital cost, but is it the best solution for your application?

Traditional Cyclone

1. Require greater space for installation (Consider Alternative – Compact GPC Cyclone)
    a. Larger size could require outdoor installation.
    b. Outdoor installation will require roof or wall penetrations.
    c. Outdoor installation could require longer ductwork from pickup point to dust collection.
    d. Longer ductwork can increase maintenance and cleaning costs (especially if initial dust collection is a long distance away)
    e. Dust build up inside the ductwork could be an increased fire hazard.
2. Require robust support steel, greater installation cost (Consider Alternative –Horizontal GPC or SplitStream)
    a. Large vertical units are more noticeable to public.
    b. Larger volume can necessitate explosion protection, where a smaller unit may get by without.
    c. Large size could require expensive insulation of the cyclone.
3. Lower removal efficiency (Consider Alternative – GPC or SplitStream)

Aerodyne GPC Cyclone

1. Aerodyne GPC cyclones are more compact than traditional cyclone.
    a. A vertical GPC is around ½ the height of a traditional cyclone while a horizontal GPC is around 1/3 of the height.
    b. The smaller size may allow the GPC to be located indoors (six models less than 8ft^3, 2000 ACFM). Horizontal units can be suspended from the ceiling, or replace 90° turns in ductwork.
    c. The lower height (especially of the horizontal unit) allows it to be mounted on the roof, without being highly noticeable, and requiring much less expensive support steel.

Stainless Steel GPC Cyclone

2. Higher removal efficiency in a smaller package.
3. 99% removal of 20 micron dust (Spherical shape, S.G. = 1)

SplitStream Collector

1. High removal efficiency with benefits
2. 99% removal of 7-10 micron dust (limestone)
3. Abrasive dust – no special materials of construction required, service life of over 20 years on abrasive applications with standard carbon steel construction.
4. Sticky applications – Secondary air keeps dust off walls, and prevent buildup.
5. Heating or cooling airflow – Secondary air can be used to heat or cool the exhaust air. Secondary air can also be used to humidify or dehumidify exhaust air as required.
6. Secondary airflow allows for friable dust to be collected without damage.

Stainless Steel SplitStream Collector

To learn more about the different types of Dust Collection Methods, click here to download our free white paper. To request a brochure of the Aerodyne GPC Dust Collector, please visit www.DustCollectorHQ.com. For more information regarding the full line of Aerodyne industrial dust collection products and material airlock valves, call (440) 543-7400, toll-free at (800) 358-7546, or e-mail dc@dustcollectorhq.com.

About Aerodyne — Aerodyne (http://www.dustcollectorhq.com/) 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, material-handling valves. Aerodyne operates under the corporate motto "*Clean Our World*®", addressing material handling challenges through innovation, customer commitment, and environmental stewardship.