

Dust collection systems are highly beneficial in any shop, but are also often problematic. Some fill up too quickly, others are awkward to empty, exposing the user to large amounts of dust in the process, and many suffer from both problems. Furthermore, the expense of even the smallest dedicated dust collector can be prohibitive for a small shop.

The cyclone lid can be used to turn a common shop vacuum into a dust collection system, or it can be used to expand the capacity of an existing dust collection system. Working on the principle of cyclonic dust separation, this product will remove 90% to 99% of suspended particles flowing in the air, and is for use with standard dust collection hose and fittings.

Large Cyclone Lid, 2 1/2" openings: Will fit on any round container with a top diameter between 19" and 23 1/2". The registration ledges on the inside of the lid fit on standard trashcans from 19" to 20 1/2" in diameter. The 2 3/2" dia. outer ledge fits on a 55-gallon steel drum. For use with a shop vacuum (preferably with a motor rating of 6 amps or better).

Large Cyclone Lid, 4" openings: Will fit on any round container with a top diameter between 19" and 23 1/2". The registration ledges on the inside of the lid fit on standard trashcans from 19" to 20 1/2" in diameter. The 2 3/2" dia. outer ledge fits on a 55-gallon steel drum. For use with a medium- or large-capacity dedicated dust collector with 4" ductwork.

Small Cyclone Lid, 2 1/2" openings: Will fit trashcans with top diameters between 16 1/2" and 19 1/2". For use with a shop vacuum (preferably with a motor rating of 6 amps or better).

⚠ Caution: Lids are not recommended for machines with built-in chip impellers and should be used only with sturdy-walled containers. (Thin-walled containers may collapse under static suction conditions, such as when the leading hose end is clogged or blocked.)

General Guidelines

For 2 1/2" and 4" Ductwork

To use the cyclone lid in any system, arrange the inlet and outlet hoses as shown in **Figure 1**. Set the airflow up as illustrated to get the most effective dust separation.

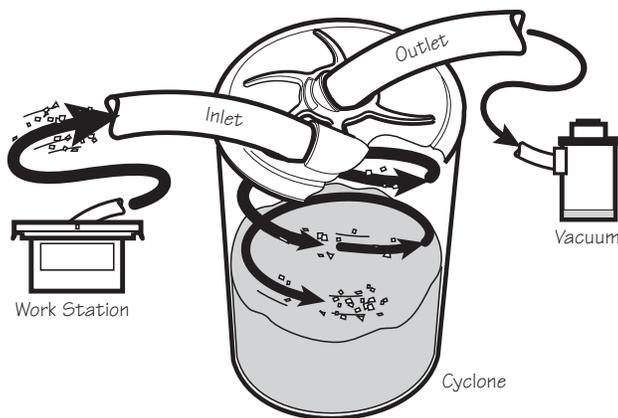


Figure 1: Cyclone lid set-up.

- In order to empty the can with ease, the lid must be connected to the system with flexible hose. The holes are sized to be a good fit with both coil hose and rigid connector fittings. A rigid fitting on the end of a flexible hose will fit snugly if inserted directly into the lid, or the hose can be directly inserted.
- If a rigid fitting seems too large for a good fit, **DO NOT FORCE IT** – you may crack the lid. Use a cabinet scraper to shave the edge of the hole until you get a good fit.
- To install coil hose, work it in gradually around the edge of the hole until at least 1 1/2 turns of the spiral ribbing are through. Do not try to screw it into the opening; it will not advance even though it resembles a screw thread.
- Use the shortest practical length of hose or pipe and avoid all unnecessary bends or corners. The flow of air should be as straight and as close to horizontal as possible. If bends are needed, make the radius of the curve as large as possible without increasing the overall distance the air has to travel.
- If the lid is used on a rigid container such as a steel can, and the source of suction is a shop vacuum, you **MUST** bore a 3/4" relief hole in the lid. (See *Relief Hole*.)
- The lid and all other plastic parts (including the trashcan) must be grounded. (See *Ensuring Proper Grounding of Fittings and Tubing for a Dust Collection System*.)
- The level to which the can or drum under the lid is filled has significant effect on the apparent efficiency of the lid. Since cyclonic dust separation depends on a certain amount of space to work, as the space decreases, so does the effectiveness of dust separation. We have found that efficiency drops below 90% when the amount of space under the lid (measured from its lowest point) is less than 6 to 7 inches. Since the shavings and dust tend to form into a swirl or drift, this measurement is taken after levelling the dust and shavings. However, results will differ depending on two main variables: particle size/type and volume/velocity of the air. There are too many different scenarios to provide guidelines for all, but the level of the dust and shavings under the lid and in the vacuum should be checked often and compared until a good compromise between efficiency and volume is figured out for your system. There is one factor that is very consistent: almost all of the efficiency loss occurs in the top 50% of the can.
- When the vacuum source – whether central dust collector with 4" ductwork or shop vacuum with 2 1/2" hose – is left running with no incoming particulate, there is a very small but steady loss of material. We have conducted tests with a clear lid that shows the air movement inside the can. Even without incoming material, the can is full of dust moving with the air as it comes in and swirls around. Inevitably, a few particles are regularly pulled out of the container. To keep these losses to a minimum, avoid running your dust collector when there is no dust to collect.

- Possibly the best way to deal with collected chips and dust is to have two cans for use with the lid. When one can fills up, replace it with the other. The full container can then be emptied (taken to the curb for collection, dumped in the compost, etc.) whenever convenient, leaving the system always ready for use. In certain circumstances, a garbage bag may be used to line the can. In our tests, this method worked best with a rigid can. When using a flexible, plastic trashcan the bag is invariably sucked up into the vacuum hose, causing a blockage. When first using a bag, try it for short periods at first, checking each time to see if the bag is getting sucked into the vacuum hose. To make it easier to withdraw a full bag, place a stick (slightly shorter than the can) upright between the bag and the can.

Dedicated Dust Collector with 4" Ductwork

For dust collectors with 4" hose, the cyclone lid will increase the capacity of the collector by an amount equivalent to the size of container under the lid. Since a dust collector becomes progressively less efficient as the filter bag fills with large particles, a cyclone lid allows the collector to work more effectively.

When the cyclone lid is used with bag collectors of this type, it can be situated in one of several different places within the system. Depending on the arrangement of your shop and the types of tools in it, you may choose to install the cyclone lid adjacent to the dust collector so that airflow from all the ductwork flows through it, or you may wish to capture just one type of particulate – jointer and planer shavings, for example. Since these two tools generate the largest volume of waste in most shops, they should be on the same branch line anyway, closest to the collector.

Shop Vacuum with 2 1/2" Hose

In a small home shop, all dust collection requirements can often be served by a shop vacuum. We tested the cyclone lid in conjunction with a shop vacuum and a 2 1/2" dust collection network on a wide variety of stationary woodworking machine tools. Even with a wide (8") and heavy (3/32") cut on a jointer or thickness planer, a good shop vacuum equipped with a cyclone lid can easily keep up with the chips created. For very large machines, such as a 20" thickness planer at the limit of capacity, the volume of particulate is probably greater than 2 1/2" ductwork can handle and a shop vacuum cannot move enough cubic feet of air per minute (cfm) to use 4" fittings. So if your tools (e.g., jointer, shaper, thickness planer) are mostly larger than the home-shop variety, a dedicated dust collector would be advisable.

Relief Hole

If the 2 1/2" cyclone lid is used with a shop vacuum on a rigid container such as a steel drum, the inflow of air must **never** be blocked – such as when all blast gates are shut on a dust collection network – unless a 3/4" diameter relief hole is bored in the lid. **Figure 2** shows the best location for the hole. If the hole is not drilled, the lid may pop into an inverted state (the way an umbrella pops the wrong way in a strong wind). This in itself is not a problem. The lid can be popped back the other way and it will work every bit as well as before. The problem is that the lid may crack in certain spots if repeatedly inverted. Testing has shown that a 3/4" relief hole will prevent the lid from popping. It will cause negligible loss of efficiency (equal to a hole less than

0.005" diameter in 2 1/2" hose) when air is flowing, but will provide enough relief to prevent the lid from inverting when the flow is blocked. When boring the hole, use a lipped brad-point drill bit, a lipped spade bit, an extra-large countersink, an auger bit, or cut it by hand. **Do not** use a twist drill or a forstner bit as these bits have the tendency to grab the thin material and create large cracks.

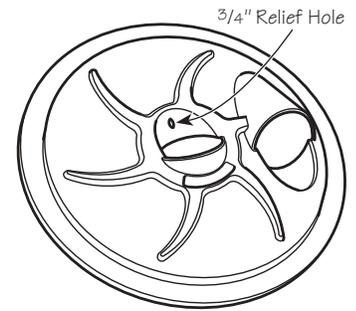


Figure 2: Relief hole location.

Ensuring Proper Grounding of Fittings and Tubing for a Dust Collection System

For dust collection systems for industrial use or in a production shop, galvanized metal pipe and fittings are best, but for most home shop applications, fittings and dust collection tubing made of plastic (ABS, PU or PVC) are sufficient, provided they are properly grounded to dissipate static electrical charges. Dust and air in the right proportions can be an explosive mixture, and a build-up of static electricity can provide the spark to ignite it.

To safely collect and bleed off the static charge, bare copper wire (not insulated) should be run along the inside of the ductwork and be attached to grounding screws or a bare metal surface on both the dust collector and the woodworking machine. The power cords of both machines must terminate in a grounded three-prong plug to complete the connection to the ground. Wires over the irregularities of fittings, especially at Ys or Ts could form traps for chips and sawdust, so bypass the fittings by running the wires to the outside through small holes. Seal the holes with silicone caulking compound and join the wires by twisting them together and securing them with a wire nut.

As charges can also collect on the outside surface, we recommend wrapping bare copper wire in a spiral around the outside of the ductwork, securing it with electrical tape and connecting it to the ground system by means of wire nuts.

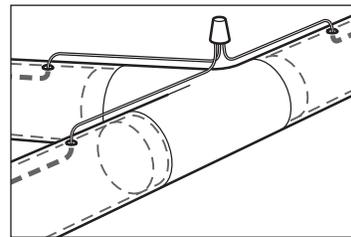


Figure 3: For internal ground, run bare copper wire along inside of ductwork. Bypass fittings as shown.

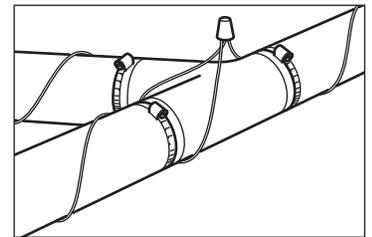


Figure 4: Wrap bare copper wire on outside of ductwork to prevent static build-up on surface.

If you have any difficulty securing the hose clamp to the hose and fittings, try wrapping the joints with duct tape first to provide a good gripping surface.

If you are still having difficulty in obtaining a safe electrical ground, we recommend the services of a good electrician.