UMassAmherst | Environmental Health & Safety

Storage cabinets and ventilation FAQ

Flammable cabinets and acid/corrosive cabinets underneath fume hoods are typically ventilated through the lab's hazardous exhaust system (Figure 1). Flammable cabinets that are free standing in the lab are generally not ventilated and, by fire code, are not required to be. There are some exceptions to these guidelines, but it is generally discouraged to ventilate flammable/corrosive cabinets that are not already connected as it is not necessary for safety, and, in fact, can hinder the flammable resistance of the cabinet. This guide will talk about the specifications for these cabinets and the ventilation they do have.

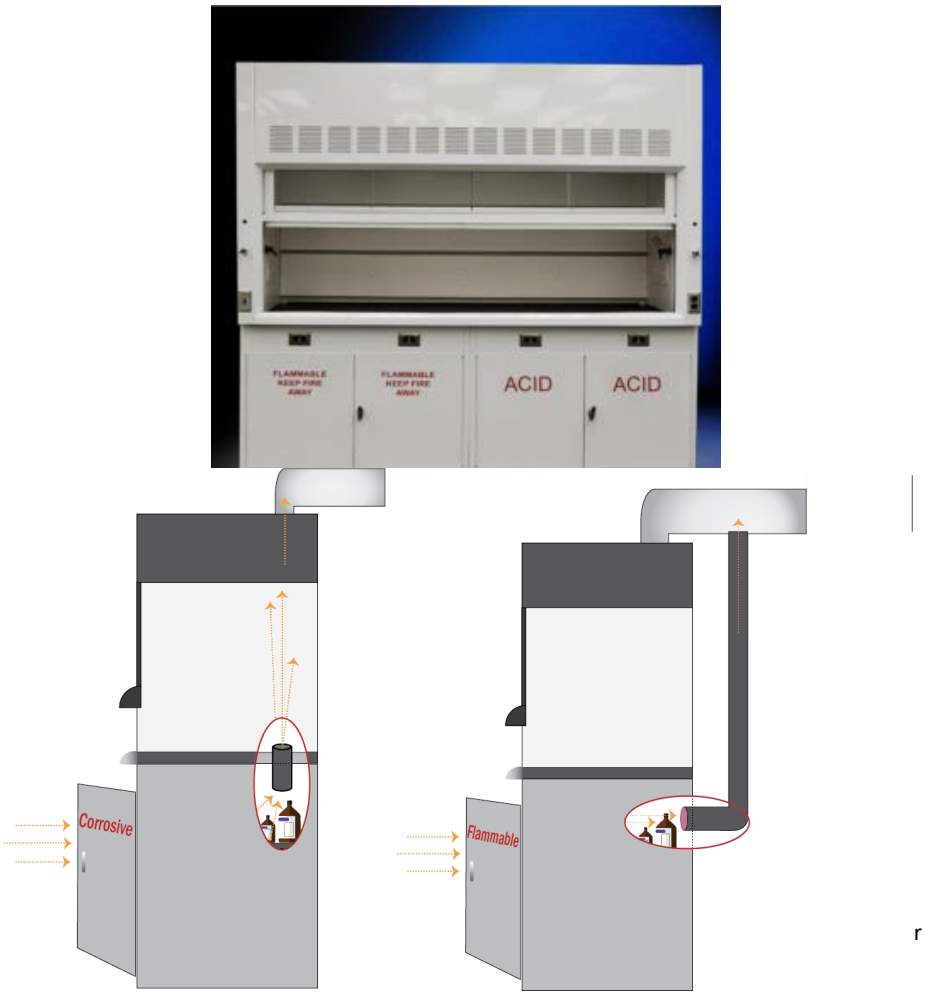

Figure 1: Flammable and acid cabinets vented below a fume hood (top). Schematic of venting a corrosive cabinet (bottom left) and a flammable cabinet (bottom right).

Where should I store flammable chemicals?

Flammable chemicals should be stored in a rated flammable storage cabinet. These will always have a "FLAMMABLE" label on them. Most commonly, labs have storage under hoods and separate yellow cabinets. Large quantities of flammables should not be stored outside of rated storage per code.

The formal specifications for these cabinets, per OSHA and NFPA, are as follows:

- Bottom, top, and sides are at least No. 18 ga. sheet steel
- Cabinet is double walled with 1.5 inch airspace
- Joints are riveted, welded, or made tight by some equally effective means
- Door shall have a three point latch
- The door is raised at least 2 inches above the cabinet bottom
- The cabinet should be labelled as flammable storage

These cabinets are designed to keep the inner contents protected in the event of a fire. Seen in figure 2 below, the cabinet contained the items inside while the fire burned in the room. In order to achieve this protection, these cabinets should be fully closed when chemicals are not actively being removed or added. Please also be aware that cabinets have defined limits for the quantity of flammable materials they can safely store. For this reason, never overcrowd cabinets and follow the manufacturer's instructions for quantity storage limits.

Figure 2: Flammable chemical unaffected by the fire outside of a flammable storage cabinet.

What if a flammable storage cabinet smells?

Sometimes, flammable chemicals can have odors that are apparent when opening the cabinet, which can lead one to believe the cabinet should be vented. Connecting cabinets to exhaust is very expensive and sometimes not feasible outside of new construction due to exhaust capacity

and existing duct work limitations. However, there are passive carbon filters that can be added to these cabinets, if desired, which are relatively cheap and easy to install, that can stop these odors. An example can be found here. Sometimes odors are a result of poor chemical handling practices, such as having compromised caps on containers or outgassing from drips on the sides of containers. Please check all items in cabinets for container integrity and talk with your colleagues about appropriate dispensing techniques. EH&S is always happy to consult on storage and handling practices as well.

Are flammable cabinets required to be vented?

According to NFPA 30, flammable storage cabinets are not required to be ventilated for fire protection purposes. A vented cabinet could actually hinder the ability to protect the components of the storage unit from a fire because the exhaust could potentially pull heat and flames into the cabinet. If vented, something should be in place to ensure the cabinet is still secure from fire, such as adding a heat activated damper to the system that would shut down the exhaust to the cabinet in the event of a fire. Ventilated flammable storage cabinets are also required to have flame arrestors (figure 3) in place on all points of connection to the cabinet to prevent flames from spreading and to dissipate heat.

What is a flame arrestor?

A flame arrestor is an integral part of the ventilated flammable cabinet, as that is what actually prevents the fire from reaching inside through the ventilation connections. These allow gases to pass through, but stop a flame in order to prevent an explosion or fire propagation in the event of an emergency. According to codes in the USA, this fire protection should work for at least 10 minutes, but in many instances will last longer. This duration allows for the building to be evacuated in case of emergency.

Figure 3. Picture of different size flame arrestors

What if the handle breaks on my flammable storage cabinet?

If the handle breaks on the flammable cabinet, the flame resistance could be compromised if the cabinet does not close properly. For cabinets attached under the hood, please submit a work request here to get this fixed. If it is a standalone cabinet, you may still submit a work request, however, Facilities personnel are not responsible for repairing equipment that is not part of the building. Some departments have staff that might be able to assist with performing manufacturer recommended repairs with approved parts. If the cabinet cannot be repaired, it should be replaced.

My chemical cabinet is rusty, should I stop using it?

No, you can still use your cabinet even if it gets rusty. Rust should be wiped up, and shelves can be lined with bench paper and replaced when necessary. If there is concern about the integrity of the shelf because of the rust, a new cabinet should be used.

How do you know if cabinet ventilation is necessary?

There are many under hood flammable storage cabinets that have built in ventilation. However, most commonly in labs, there are standalone yellow flammable storage cabinets that are not ventilated. Consulting with EH&S is necessary before venting a flammable cabinet.

What is a corrosive cabinet?

Corrosive cabinets are designed to safely store acids and other corrosive materials, rather than simply storing them on a shelf. Some are made of metal, and some are made of plastic, but, plastic is more ideal because the metal could corrode over time. It is a good idea to check the state of any metal pieces of a corrosive cabinet periodically. These cabinets can help contain spills and leaks, as well as provide ventilation from harmful fumes. If underneath the fume hood, these are vented directly into the base of the fume hood, and exhausted just as other fumes are in the hood.

Figure 4: Blue corrosive standalone cabinet

Should a corrosive cabinet be ventilated?

There are no requirements to ventilate these cabinets, but it is generally a good idea to store liquid corrosive materials in a ventilated cabinet if the lab space is equipped with ventilated corrosive storage cabinets already. Many labs also have standalone blue corrosive storage cabinets (seen in figure 4 above) which are also entirely appropriate. Consulting with EH&S is necessary before venting a corrosive cabinet. If cabinet odors are a problem, please ensure that lab personnel are storing and dispensing items appropriately as poor practice and compromised containers can often be the culprit.

Can I store flammable materials in a corrosive storage cabinet?

Generally, no. Flammable materials must be stored in rated flammable storage cabinets to meet building and fire code requirements as discussed above. Corrosive storage cabinets are not designed to meet the same criteria. For this reason, if you have items that are both

flammable and corrosive (e.g., glacial acetic acid), these should be stored in rated flammable storage rather than general corrosive storage.

What is a live outlet cabinet?

In many building on campus, there are cabinets labeled with "Caution – live outlet, do not store flammable chemicals". These cabinets are designed to hold vacuum pumps (figure 5). These cabinets do not provide fire rated storage to flammable materials, and additionally, the live outlet inside can serve as a source of ignition. Do not store flammable materials in these cabinets. If the cabinet is not needed for a pump, you may store chemicals that are not flammable or combustible in these cabinets. Do not store any chemicals in the cabinet if it is being used to house a vacuum pump.

Figure 5: Live outlet cabinet for a vacuum pump outside (left) and on the inside (right).

If I run out of flammable storage, what should I do?

In some cases, labs run out of flammable storage. In these cases, the lab should examine current materials and storage. Sometimes items that are not actually flammable get stored in flammable storage cabinets taking up space that is needed for flammable items. Additionally, older items that are no longer in use can be removed to make space. You can submit a hazardous waste pick-up request for any unwanted materials. If you have more than 10 items with a barcode that you would like to have removed, please contact EH&S at askehs@umass.edu to schedule a time for our CEMS team to visit to scan the items and submit the waste request on your behalf. You may also be able to coordinate with a colleague to use temporary space for storage. Ultimately, if more storage is needed, the lab can purchase another standalone yellow cabinet for excess storage. Occasionally EH&S is able to connect departments and labs who have extra flammable storage cabinets for repurposing with those in

need. If you have extra cabinets, or if you need a cabinet, please let us know, and we can try to connect you to appropriate resources.

Sources

https://flowsciences.com/venting-fume-hood-base-cabinets/

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https://www.grainger.com/know-how/safety/emergency-response/fire-protection/kh-safety-flammables-combustibles-179-qt

https://iq-laboratory.com/acid-corrosive-cabinets-101/