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Venting Your Studio For Encaustic Painting

R&F Technical Data Sheet

Many questions regarding ventilating one's studio come our way. Definitive methods fitting everyone's studios are difficult to describe because studios differ in shape, size, layout, air source, and location of windows.

The two main things to avoid are: 1) expenses that are not necessary and 2) clumsy ventilation setups that interfere with your workspace.

If your studio has windows, you can create a fairly inexpensive and simple ventilation system but you will have to do some experimenting using trial and error to meet your specific needs. If your studio does not have windows or you need special equipment for your ventilation, you can get professional help from a heating, ventilation, and air conditioning (HVAC) expert.

This is a technical sheet to give some guidance for creating an effective exhaust with cost and simplicity in mind. Your comments are more than welcome and will help us to expand the scope of our guidelines to include circumstances that we haven't already covered.

WHY VENTILATE YOUR STUDIO?

All waxes, when they are melted– whether as candles, batik, or encaustic—release a mixture of invisible fume (in the form of tiny particles) and gases, such as acrolien and aldehydes. At the proper working temperature of encaustic [*approximately 220°F],* the concentration of these fumes and gases is well below any toxic level, but the emissions can be irritants if they are not vented. The hotter wax is, the more concentrated these emissions become and the greater the degree to which they will affect you adversely.

Un-vented wax emissions from heated encaustic can cause headaches and nausea. These effects can occur while working with the wax or can occur a day later. Chronic exposure to even small amounts of wax emissions can make one more susceptible to respiratory infections. Inhaling wax fume particles can cause labored breathing because it is difficult for the body to remove those particles from the lungs.

The emissions from wax do not affect people equally. Some are far more sensitive to them than others. However, that does not mean that if you are not sensitive to them now you will not develop sensitivity to them later, either due to frequent exposure to melted wax or to changes in your body chemistry. So it is important to work in a well-ventilated area at all times, regardless of how long you spend in the studio or how sensitive you are to the emissions initially. Respirators are not a good substitute for ventilation because they are not approved for acrolein and there is no single cartridge that would filter out all of the gases and particles.

DILUTION VENTILATION

The principle of this type of ventilation is to dilute the concentration of fumes. The mix is pulled out by an exhaust fan and an equal amount of fresh air is brought in through open windows or forced in by intake fans. The benefit of a dilution system is that ventilating your entire studio allows you to work large and in different areas of your studio. The drawbacks of a dilution system are that it is not as effective as a local exhaust, it can stir up dusts and other contaminants in the room, and it requires a large amount of air to move through your studio; this, of course, means that you lose heat in the winter and cool air in the summer.

Localized dilution system. Setting up a window fan in a defined work area can provide adequate exhaust.

Baffles can be used to focus the exhaust on the contaminated air. This "localized dilution" is inexpensive and simple to install. It is also an easy way to experiment with your ventilation without wasting a lot of time or money.

Setting up a localized dilution system.

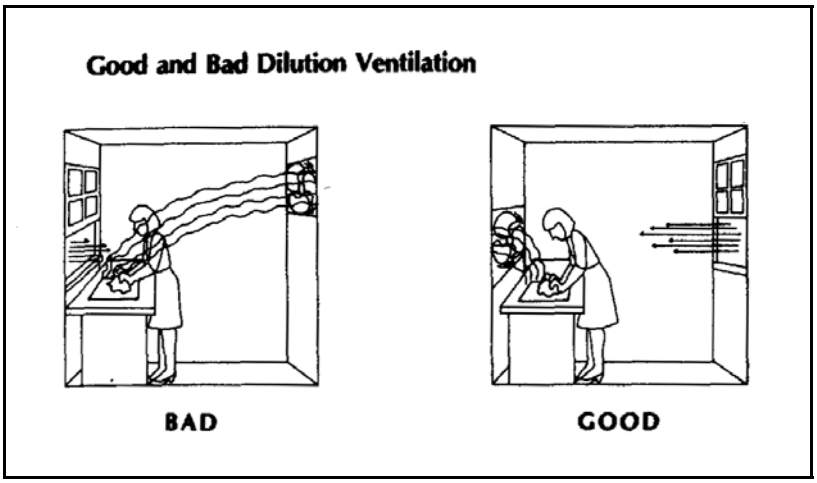
To set up this system, you will need to have a window a little higher than the height of your work table.

Window types. Double-hung windows that slide up and down or horizontal windows that slide back and forth on a track can be easily adapted for a fan. However, if your window is a single pane or it opens out rather than opening up and down or sideways on a track, it may be necessary to remove the window and replace it with a wooden or Plexiglas panel on which a fan can be mounted. You could also opt for an industrial fan that is designed to be mounted.

Sealing. All areas between the fan and the window frame should be blocked off and made airtight. Household window fans come with extensions to accomplish this, but they're not airtight. Weather stripping can help tighten the seal or caulk around any gaps between fan and window frame. The more completely you seal around the fan, the better you help to create the vacuum it needs to draw the air out, thus maximizing the strength of the fan. Fans with louvers facing the outside help to keep out the outside air when the fan is not operating.

Fan size and strength. Fan strength is measured in cubic feet per minute (CFM). This figure represents the volume of air that is moved by the fan. It is based on the size and shape of the blades and the speed at which they spin (RPM). Inexpensive fans sometimes do not list their CFM or RPM. Having a fan with several speed settings increases the number of variables to work with and so gives you greater flexibility in setting up your exhaust.

Typical Cost Effective Encaustic Studio Set-up: Window or box fan with palette set-up next to it. Cross ventilation should come directly from the opposite side of the room from a window or open door.



images from *Ventilation: A Practical Guide for Artists, Craftspeople, and Others in the Arts*.

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Location of fan. The stronger the fan is, the greater the velocity will be at which it moves air. The velocity is greatest at the fan and tapers off relative to the distance from it. Therefore, the closer to the fan your work area is the less powerful (lower CFM) the fan needs to be, the less replacement air you will need to bring in, and the more focused the exhaust will be so that the wax emissions are vented before they begin to spread out.

Ideally, your table should be lined up lengthwise against the window so that the wax emissions from both your palette and your painting area will be vented somewhat equally. If your table is perpendicular to the fan, keep your palette at the fan end of the table. To get the full effect of the fan, it should be installed so that the lowest blade point is 4-6 inches higher than your palette (depending on the height of any containers of encaustic on the palette.) Remember, heat makes the encaustic emissions rise. The fan should capture them just after they begin to rise.

Testing for airflow. The simplest way to test airflow is to simply light a stick of incense. The action of the smoke will tell you if air is being drawn steadily through the fan and at what distance from the fan the velocity and focus of the airflow begin to significantly drop. This helps you to determine how far your work should be from the fan and the most effective design for baffling. You may also get a ventilation smoke kit from a safety equipment supplier for about $40.

Odor test. The airflow velocity should be strong enough that, with your head over your palette, you cannot detect the odor of the melted wax. Since the emissions from heated wax are odorant, it is easy to detect if you are breathing them in. **However, olfactory fatigue sets in after even short periods of exposure, so that you become less aware of the odor.** Therefore, the best time to use the odor test to determine if you are breathing wax emissions is after a period of about a day of not being exposed to them. If you have been working with encaustic for a long period, have someone else double check for odor.

LOCAL EXHAUST WITH DUCT

This is a controlled system in which a duct is connected to an exhaust fan at one end and a hood at the other. The hood is placed immediately adjacent to the work area and the contaminated air is sucked out sideways through the hood. The advantages of local exhaust are that it is the most effective way to exhaust toxic contaminants in an open studio, you have much greater control of the emissions, and they are exhausted out immediately, and a much lower amount of air needs to be exhausted than in a dilution system.

When a Local Exhaust System is Necessary

If your studio has no windows or your windows are too small or too high up, or if you are working in the middle of the room, you may need to install a local exhaust duct system. If you have no windows, you will also have to create a vent to bring air in. A local exhaust system is also recommended when heating large pots of wax, such as when you make encaustic medium. You may need to design this system with an HVAC expert. You can help with the design by making sure the following requirements are met:

- The fan should be a centrifugal fan. It is more effective than an axial flow (propeller) fan for a duct system.
- If possible, ducts should be round, not square. Square ducts trap air and are less efficient.
- Try to avoid right angles in ductwork. Right angles impede the airflow. If you need to have a turn in your duct, or if you have branches entering into a trunk duct, the angle should be close to 45°.
- You will increase the airflow velocity if the duct diameter is reduced when going from the fan to the hood or register.

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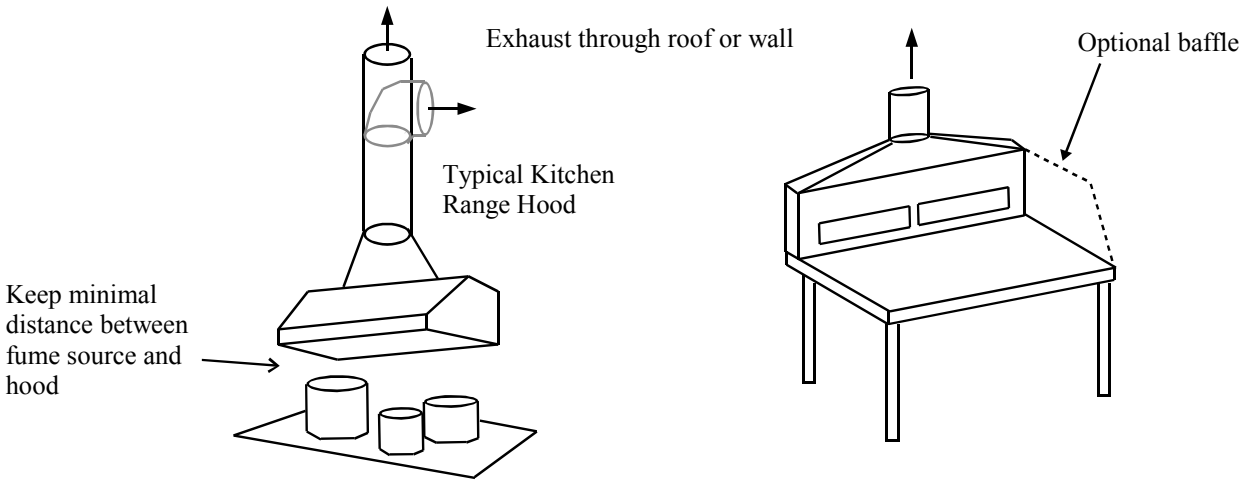

Examples of local exhaust with ductwork.

REPLACEMENT AIR-Any time you remove air from an enclosed space, it will need to be replaced.

Windows. The most obvious source of replacement air is from a window. In most cases, the window should not be on the same wall as the fan, since the air that the fan pulls from the window will create airflow along the wall that bypasses the area you are trying to exhaust. Therefore, a window on either the opposite or adjacent wall is good.

Other parts of the building. If your studio is in a larger building, you can draw air from other parts of the building through your door or air vents cut into the wall. *If you are in a studio building, make sure that you are not drawing in contaminated air from other studios!*

Air leaks. Another source of air is through the walls of the building itself. Older buildings, particularly, are often not tightly sealed and leak air in and out. While such buildings may be more expensive to heat and cool, they are of great advantage for bringing in replacement air.

Testing for inadequate replacement air. Aside from the smoke test (mentioned above) one easy method, if you have an outward-opening door, is to check it for ease of opening. If it opens with more difficulty than usual, you may have negative air pressure in the room and therefore require more incoming air.

SUMMARY

Ventilating a studio can be approached using common sense. Remember the whole purpose of ventilation is to remove contaminated air from your workspace. Determining whether the air is safe to breathe is the best way to test your system and using your senses is the can be a simple way to do that. Step back from your work area and ask these questions:

1. Is the wax smell overly strong or heavy?
2. Do you feel irritation in your eyes, nose, or throat? Do you notice any other symptoms of overexposure?
3. Have there been any changes in the way the system functions?

If you answer yes to any of these questions, you will need to reassess your system. If you answer no, then your system is probably doing the job it is supposed to be doing. You, and in turn, your ventilation system will need to be constantly monitored to ensure it is working properly.