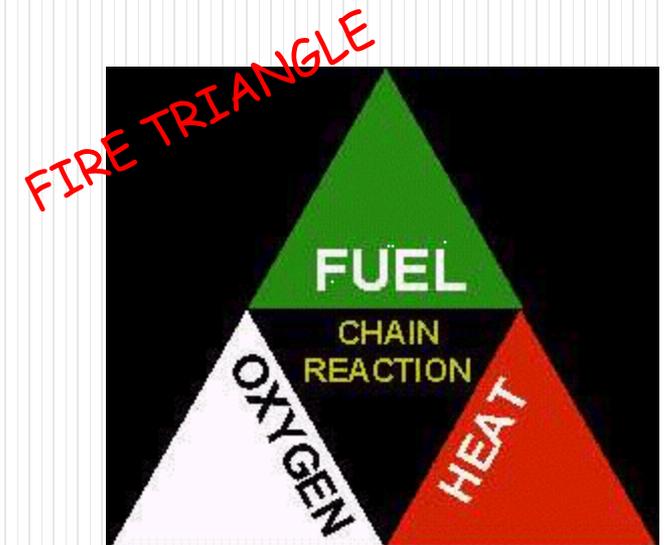


Fire Extinguisher Training



The University of Tennessee

Office of Environmental Health & Safety

In order to understand how fire extinguishers work, you first need to know a little bit about fire. Four things must be present at the same time in order to produce fire:

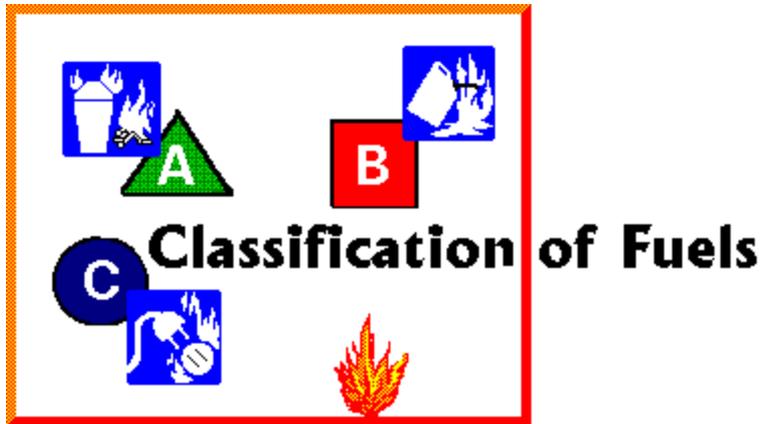
1. Enough **oxygen** to sustain combustion,
2. Enough **heat** to raise the material to its ignition temperature,
3. Some sort of **fuel** or combustible material, and
4. The **chemical, exothermic reaction** that is fire.

Oxygen, heat, and fuel are frequently referred to as the "**fire triangle**." Add in the fourth element, the **chemical reaction**, and you actually have a fire "tetrahedron." The important thing to remember is: **take any of these four things away, and you will not have a fire or the fire will be extinguished.**

Essentially, fire extinguishers put out fire by taking away one or more elements of the fire triangle/tetrahedron.

Fire safety, at its most basic, is based upon the principle of keeping fuel sources and ignition sources separate.

Not all fuels are the same, and if you use the wrong type of fire extinguisher on the wrong type of fuel, you can, in fact, make matters worse. It is therefore very important to understand the four different classifications of fuel.





Class A - Wood, paper, cloth, trash, plastics: Solid combustible materials that are not metals.



Class B - Flammable liquids: gasoline, oil, grease, acetone: Any non-metal in a liquid state, on fire.

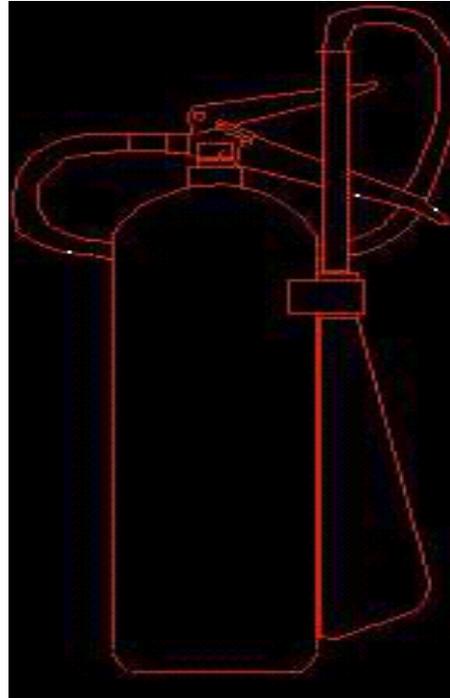


Class C - Electrical: energized electrical equipment : As long as it's "plugged in," it would be considered a class C fire.



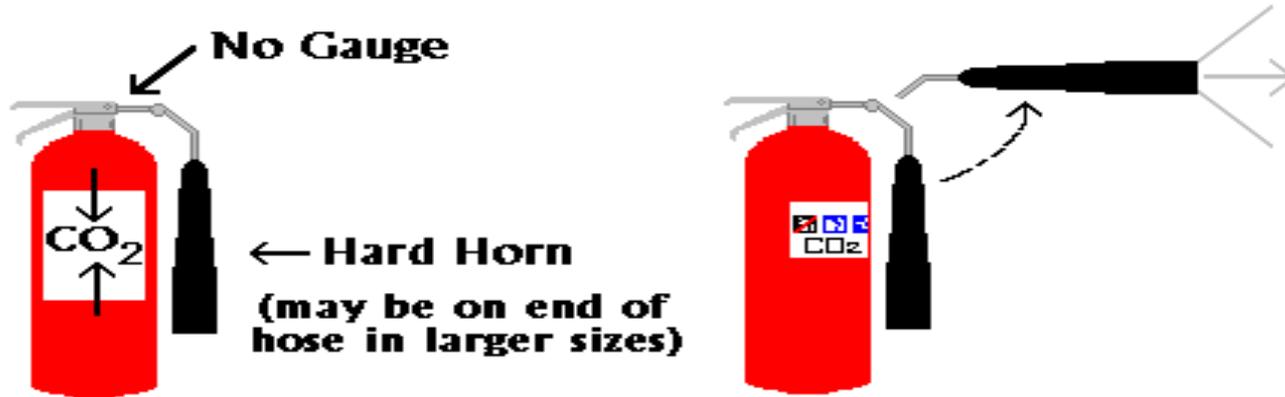
Class D - Metals: potassium, sodium, aluminum, magnesium: Unless you work in a laboratory or in an industry that uses these materials, it is unlikely you'll have to deal with a Class D fire. It takes special extinguishing agents (Metal-X, foam) to fight such a fire. Most fire extinguishers will have a pictograph label telling you which fuels the extinguisher is designed to fight. For example, a simple water extinguisher might have a label like the one shown in the left hand column, indicating that it should only be used on Class A fuels.

TYPES OF FIRE EXTINGUISHERS



Different types of fire extinguishers are designed to extinguish different classes of fire. The two most common types of fire extinguishers are:

Carbon Dioxide Extinguisher



Carbon Dioxide extinguishers are filled with non-flammable carbon dioxide gas under extreme pressure. You can recognize a CO₂ extinguisher by its hard horn and lack of pressure gauge. The pressure in the cylinder is so great that when you use one of these extinguishers, bits of dry ice may shoot out the horn.

CO₂ cylinders are red and range in size from 5 lbs to 100 lbs or larger. In the larger sizes, the hard horn will be located on the end of a long, flexible hose.

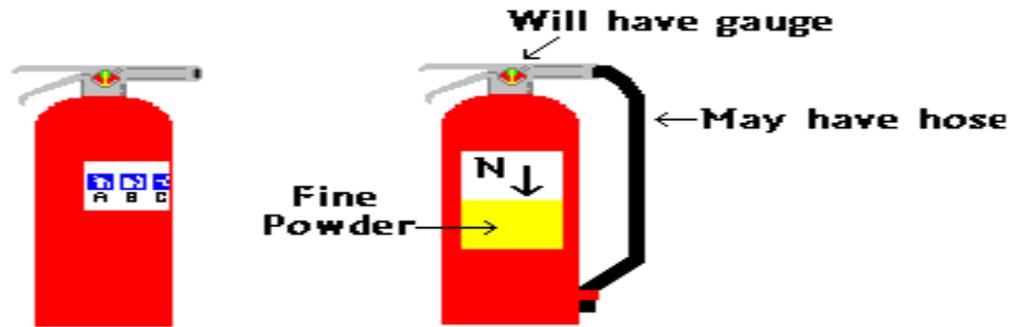


CO₂s are designed for Class B and C (flammable liquid and electrical) fires only.

Carbon Dioxide is a non-flammable gas that extinguishes fire by displacing oxygen, or taking away the oxygen element of the fire triangle. The carbon dioxide is also very cold as it comes out of the extinguisher, so it cools the fuel as well. **CO₂s may be ineffective at extinguishing Class A fires** because they may not be able to displace enough oxygen to successfully put the fire out. Class A materials may also smolder and re-ignite.

CO₂s will frequently be found in laboratories, mechanical rooms, kitchens, and flammable liquid storage areas.

Dry Chemical Extinguisher (ABC)



Dry Chemical Extinguishers come in a variety of types. You may see them labeled:
"DC" short for "dry chem"

"ABC" indicating that they are designed to extinguish class A,B,and C fires, or
"BC" indicating that they are designed to extinguish class B and C fires.

At the University of Tennessee - Knoxville, "ABC" fire extinguishers are filled with a fine yellow powder. The greatest portion of this powder is composed of monoammonium phosphate. Nitrogen is used to pressurize the extinguishers. ABC extinguishers are red or yellow and range in size from 5 lbs to 20 lbs on campus.

It is extremely important to identify which types of dry chemical extinguishers are located in your area.

Read the labels and know their locations! You don't want to mistakenly use a "BC" extinguisher on a Class A fire, thinking that it was an "ABC" extinguisher.



An "ABC" extinguisher will have a label like this, indicating that it may be used on class A,B, and C fires.

Dry chemical extinguishers put out fire by coating the fuel with a thin layer of dust, separating the fuel from the oxygen in the air. The powder also works to interrupt the chemical reaction of fire, so **these extinguishers are extremely effective at putting out fire.**

These extinguishers will be found in a variety of locations. New buildings will have them located in public hallways. They may also be found in laboratories, mechanical rooms, break rooms, chemical storage areas, offices, etc.

Dry chemical extinguishers with powder designed for Class B and C fires may be located in places such as commercial kitchens or areas with flammable liquids.

Rules for Extinguishing Fires

Fires can be very dangerous and you should always be certain that you will not endanger yourself or others when attempting to put out a fire.

For this reason, when a fire is discovered:

Assist any person in immediate danger to safety, if it can be accomplished without risk to yourself.

Activate the building fire alarm system or notify the fire department by dialing 911 (or designating someone else to notify them for you). When you activate the building fire alarm system, some, but not all, will automatically notify the fire department and get help on the way.

Only after having done these two things, if the fire is small, you may attempt to use an extinguisher to put it out.

However, before attempting to extinguish the fire, keep these rules in mind:

NEVER ATTEMPT TO EXTINGUISH A FIRE IF:

You don't know what is burning. If you don't know what is burning, you don't know what type of extinguisher to use. Even if you have an ABC extinguisher, there may be something in the fire which is going to explode or produce highly toxic smoke. Chances are, you *will* know what's burning, or at least have a pretty good idea, but if you don't, let the fire department handle it.

The fire is spreading rapidly beyond the spot where it started. The time to use an extinguisher is in the incipient, or beginning, stages of a fire. If the fire is already spreading quickly, it is best to simply evacuate the building, closing doors and windows behind you as you leave.

You don't have adequate or appropriate equipment. If you don't have the correct type or large enough extinguisher, it is best not to try to fight the fire.

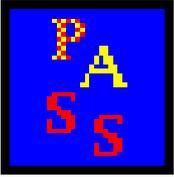
NEVER ATTEMPT TO EXTINGUISH A FIRE IF:

You might inhale toxic smoke. If the fire is producing large amounts of smoke that you would have to breathe in order to fight it, it is best not to try. Any sort of combustion will produce some amount of carbon monoxide, but when synthetic materials such as the nylon in carpeting or foam padding in a sofa burn, they can produce highly toxic gases such as hydrogen cyanide, acrolein, and ammonia in addition to carbon monoxide. These gases can be fatal in very small amounts.

Your instincts tell you not to. If you are uncomfortable with the situation for any reason, just let the fire department do their job.

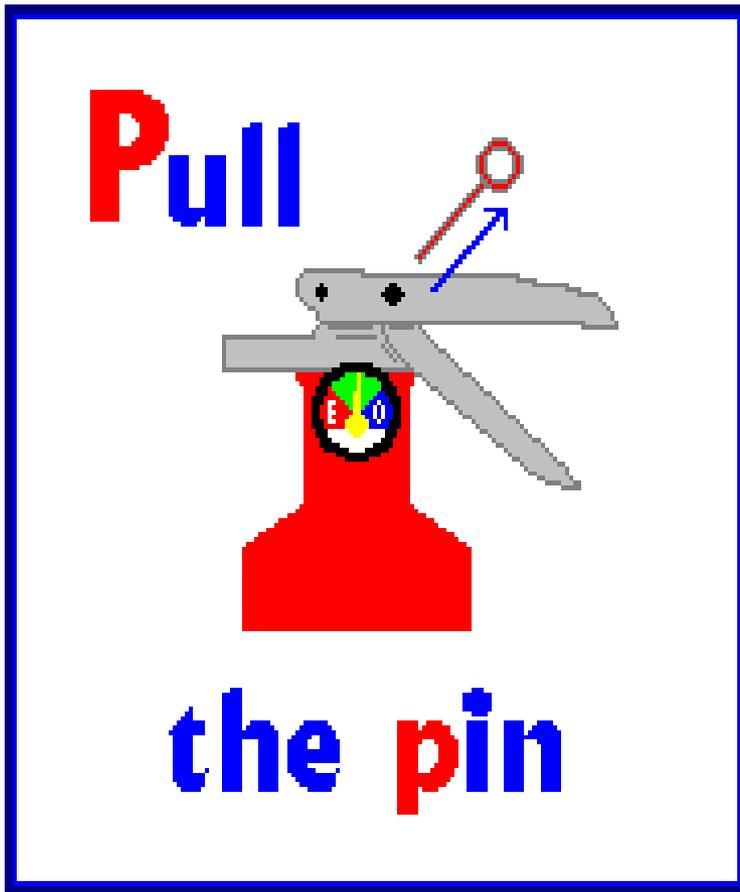


The final rule is to always position yourself with an exit or means of escape at your back before you attempt to use an extinguisher to put out a fire. In case the extinguisher malfunctions, or something unexpected happens, you need to be able to get out quickly, and you don't want to become trapped. Just remember, **always keep an exit at your back.**



It's easy to remember how to use a fire extinguisher if you can remember the acronym **PASS**, which stands for **P**ull, **A**im, **S**queeze, and **S**weep.





PULL THE PIN : This will allow you to discharge the extinguisher.

AIM AT THE BASE OF THE FIRE:

If you aim at the flames (which is frequently the temptation), the extinguishing agent will fly right through and do no good. You want to hit the fuel.





SQUEEZETHETOP HANDLE OR LEVER: This depresses a button that releases the pressurized extinguishing agent in the extinguisher.

SWEEP FROM SIDE TO SIDE:

Start using the extinguisher from a safe distance away, then move forward. Once the fire is out, keep an eye on the area in case it re-ignites.



Theory is great, but there is no substitute for hands-on experience. If you would like to set up a class for your department to practice using a fire extinguisher, please contact Environmental Health & Safety at 974-5084.

Quiz Time

To complete the Fire Extinguisher Training Module, please [click here](#) for the quiz