Evacuation Plans and Procedures eTool

Fire Extinguisher Basics

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Hydrostatic Testing | OSHA Requirements | Test Your Knowledge

This section contains basic information on fire and fire extinguishers. It is broken into the following modules:

- Fire and extinguisher operation
- Types of fire extinguishers:

  - Air-pressurized water extinguishers
  - Carbon dioxide extinguishers
  - Dry chemical extinguishers

Fire and extinguisher operation

Fire triangle

To understand how fire extinguishers work, you need to understand a little about fire. Fire is a very rapid chemical reaction between oxygen and a combustible material, which results in the release of heat, light, flames, and smoke.

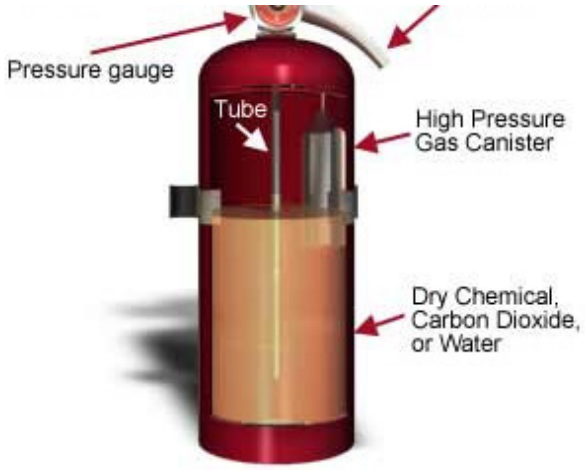
For fire to exist, the following four elements must be present at the same time:

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

How a fire extinguisher works

Portable fire extinguishers apply an

extinguishing agent that will either cool burning fuel, displace or remove oxygen, or stop the chemical reaction so a fire cannot continue to burn. When the handle of an extinguisher is compressed, it opens an inner canister of high-pressure gas that forces the extinguishing agent from the main cylinder through a siphon tube and out the nozzle. A fire extinguisher works much like a can of hair spray.



Types of fire extinguishers

Different types of fire extinguishers are designed to fight different types of fire. The three most common types of fire extinguishers are:

- Air pressurized water extinguishers
- CO2 (carbon dioxide) extinguishers
- Dry chemical extinguishers

All portable fire extinguishers must be approved by a nationally recognized testing laboratory such as Underwriters Laboratories, Inc. (UL) or Factory Mutual Research (FM) to verify compliance with applicable standards 1910.157(c)(2). Equipment that passes the laboratory's tests are labeled and given an alpha-numeric classification based on the type and size of fire it will extinguish.

Let's take a look at the label pictured. The classification is:

1-A:10-BC

The letters (A, B, and C) represent the type(s) of fire for which the extinguisher has been approved.

The number in front of the A rating indicates how much water the extinguisher is equal to and represents 1.25 gallons of water for every unit of one. For example, a 4-A rated extinguisher would be equal to five (4 x 1.25) gallons of water.

The number in front of the B rating represents the area in square feet of a class B fire that a non-expert user should be able to extinguish. Using the above example, a non-expert user should be able to put out a flammable liquid fire that is as large as 10 square feet.

Extinguisher Type	Type of Fire
	Ordinary Combustibles

Water

Fires in paper, cloth, wood, rubber, and many plastics require a water type extinguisher labeled A.

CO_2

OR

Flammable Liquids

Fires in oils, gasoline, some paints, lacquers, grease, solvents, and other flammable liquids require an extinguisher labeled B.

Dry Chemical

Electrical Equipment

Fires in wiring, fuse boxes, energized electrical equipment, computers, and other electrical sources require an extinguisher labeled C.

Multi-Purpose

Ordinary Combustibles, Flammable Liquids, or Electrical Equipment

Multi-purpose dry chemical is suitable for use on class A, B, and C.

D

Metals

Combustible metals such as magnesium and sodium require special extinguishers labeled D.

Air-pressurized water extinguishers (APW)
 Water is one of the most commonly used extinguishing agents for

type A fires. You can recognize an APW by its large silver container. They are filled about two-thirds of the way with ordinary water, then pressurized with air. In some cases, detergents are added to the water to produce a foam. They stand about two to three feet tall and weigh approximately 25 pounds when full.

APWs extinguish fire by cooling the surface of the fuel to remove the "heat" element of the fire triangle.

APWs are designed for Class A (wood, paper, cloth, rubber, and certain plastics) fires only.

Important:

Never use water to extinguish flammable liquid fires. Water is extremely ineffective at extinguishing this type of fire and may make matters worse by the spreading the fire.

Never use water to extinguish an electrical fire. Water is a good conductor and may lead to electrocution if used to extinguish an electrical fire. Electrical equipment must be unplugged and/or de-energized before using a water extinguisher on an electrical fire.

Carbon dioxide extinguishers

This type of extinguisher is filled with Carbon Dioxide (CO_2), a non-flammable gas under extreme pressure. These extinguishers put out fires by displacing oxygen, or taking away the oxygen element of the fire triangle. Because of its high pressure, when you use this extinguisher pieces of dry ice shoot from the horn, which also has a cooling effect on the fire.

You can recognize this type of extinguisher by its hard horn and absent pressure gauge.

CO_2 cylinders are red and range in size from five to 100 pounds or larger.

CO_2 extinguishers are designed for Class B and C (flammable liquid and electrical) fires only.

Important:

CO_2 is not recommended for Class A fires because they may continue to smolder and re-ignite after the CO_2 dissipates.

Never use CO_2 extinguishers in a confined space while people are present without proper respiratory protection.

Locations:
Carbon dioxide extinguishers will frequently be found in industrial vehicles, mechanical rooms, offices, computer labs, and flammable liquid storage areas.

Dry chemical extinguishers

Dry chemical extinguishers put out fires by coating the fuel with a thin layer of fire retardant powder, separating the fuel from the oxygen. The powder also works to interrupt the chemical reaction, which makes these extinguishers extremely effective.

Dry chemical extinguishers are usually rated for class B and C fires and may be marked multiple purpose for use in A, B, and C fires. They contain an extinguishing agent and use a compressed, non-flammable gas as a propellant.

ABC fire extinguishers are red in color, and range in size from five pounds to 20 pounds.

Dry Chemical extinguishers will have a label indicating they may be used on class A, B, and/or C fires.

Locations:
These extinguishers will be found in a variety of locations including: public hallways, laboratories, mechanical rooms, break rooms, chemical storage areas, offices, commercial vehicles, and other areas with flammable liquids.

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