Fire extinguishers are the most common manual fire suppression devices and are required in all commercial buildings and vehicles by most city, county, state, and various fire and building codes. A fire extinguisher is an active fire protection device which can be used with little to no training. It is not intended for use on an out-of-control fire, such as one which has reached the ceiling, endangers the user (i.e., no escape route, smoke, explosion hazard, etc.), or otherwise requires the expertise of a fire department.

Typically, a fire extinguisher consists of a handheld cylindrical pressure vessel containing an agent that can be discharged to extinguish a fire. Fire extinguishers manufactured with non-cylindrical pressure vessels also exist but are less common.

There is no official standard in the United States for the color of fire extinguishers, though they are usually red, except for class D extinguishers which are usually yellow. Water and Class K wet chemical extinguishers are usually silver, and water mist extinguishers which are usually white. Extinguishers are marked with pictograms depicting the types of fires that the extinguisher is approved to fight. In the past, extinguishers were marked with colored geometric symbols, and some extinguishers still use both symbols. The types of fires and additional standards are described in National Fire Protection (NFPA 10: Standard for Portable Fire Extinguishers, 2013 edition).

This document is written to give the user an overview of the common extinguisher types, extinguisher rating systems, selecting an extinguisher, and using and inspecting an extinguisher. If you have questions on the use, number and placement of extinguishers in a building check with your local fire department.

COMMON EXTINGUISHER TYPES

Water extinguishers come in many different types and styles including:

Pump-Tank Extinguisher

- For small Class A fires only
- Equipped with a double-action pump

Stored-Pressure Water Extinguishers (Air Pressure Water: APW)

- Use on small Class A fires only
- Water is stored under pressure
- Useful for confined hot spots, clean up and chimney fires
- Can add Class A foam to increase the water's effectiveness

Aqueous Film-Forming Foam (AFFF) Extinguisher

- For Class A or Class B fires (stagnant pool only)
- Creates a vapor seal over the surface of the fuel
- Has a specified amount of foam solution
- Has special aerating nozzle

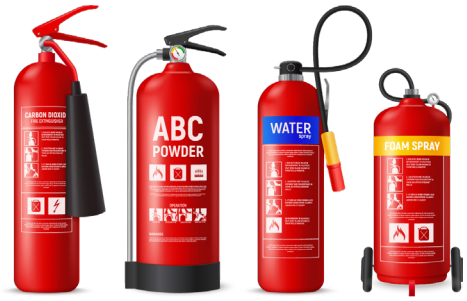
Carbon Dioxide (CO_2) Extinguishers

- CO_2 displaces available oxygen to smother the fire
- Stored under its own pressure as liquefied compressed gas
- Agent is discharged through plastic or rubber horn
- Gaseous discharge is usually accompanied by dry ice crystals or carbon dioxide "snow". This snow changes into gaseous form shortly after discharge.
- Use on Class C or Class D fires
- Does not produce a vapor-suppressing film on the surface of fuel and reigniting is possible
- Discharge is gas so it has limited reach
- Does not require freeze protection

Dry Chemical Extinguishers

- It has a stored/hold pressure of 200 psi
- It is cartridge-operated and employs pressure cartridge connected to the tank
- Use on Class A,B and C fires (multipurpose) and Class B and C fires (regular)
- Generally nontoxic, but airborne particulates can cause visibility hazards and respiratory problems
- Are corrosive to metals
- For Class A fires, discharge should be directed at whatever is burning to cover it with chemical and then applied intermittently on hot spots.

The following are some examples of the different types of fire extinguishers that are discussed above:



EXTINGUISHER RATING SYSTEMS

Extinguishers suitable for more than one class of fire are identified by combinations of the letters A, B, and/or C or the symbols for each class. Any extinguisher not properly marked is not a listed unit and should not be used.

CLASS A

Rated from **1-A through 40-A**. Rating is based on the amount of extinguishing agent used and the duration and range of the discharge used to extinguish a Class A test fire.

1-A rating: 1.25 gallons are required. **2-A rating:** 2.5 gallons are required. For example, a 2-A extinguisher will extinguish a Class A fire that is two times the size of a fire that can be extinguished by a 1-A extinguisher.

CLASS B

Classified with numerical ratings ranging from **1-B through 640-B**. Rating is based on the approximate square foot area of a flammable liquid fire that a non-expert operator can extinguish.

1-B rating: 1 square foot of flammable liquid fire that a non-expert can extinguish For example: A 20-B extinguisher will extinguish a flammable liquid fire that is 20 times the size of a fire that can be extinguished by a 1-B extinguisher.

CLASS C

Class C extinguishing agents are tested for non-conductivity only. Extinguishers used on Class C fires receive only the letter rating because Class C fires are essentially Class A or Class B fires involving energized electrical equipment.

CLASS D

When an extinguishing agent is determined to be safe and effective for use on a combustible metal*, the details are included on the extinguisher. Special agents are required for the specific fuels. No numerical rating will be given. Class D extinguishing agents will not be give a multipurpose rating for use on other classes of fire.

**A combustible metal is defined as any metal composed of distinct particles or pieces, regardless of shape, size or chemical composition that will burn. A combustible metal dust is a combustible particulate metal that presents a fire or explosion hazard when suspended in air or the process-specific oxidizing medium over a range of concentrations, regardless of particle size or shape.*

The following list is a sample of metals known to be combustible:

- *Alkali metals: Cesium, Francium, Lithium, Potassium, Rubidium, Sodium and alloys of these metals including: Aluminum, Magnesium, Niobium, Tantalum, Titanium, Zirconium*

EXTINGUISHER LABELING

Extinguishers will have geometric shapes of specific colors with the class designation inside the shape. They will also have pictographs to illustrate what type of fire to use the extinguisher on. The follow chart is an example of what will be on the extinguisher for the specific fire it is to be used on. Example: A Class A fire extinguisher will have the following on it:

Ordinary solid combusibles

Symbol	Pictogram	Intended Use
		Ordinary solid combusibles
		Flammable liquids and gases
		Energized electrical equipment
		Combustible metals
		Oils and fats

SELECTING A PORTABLE EXTINGUISHER

Select an extinguisher that minimizes the risk to life and property (e.g., don't use dry chemical in areas where highly sensitive computer equipment is located due to the risk of corrosion). Considerations for extinguisher selection are:

- Classification of burning fuel
- Rating of the extinguisher
- Hazards to be protected
- Severity of the fire

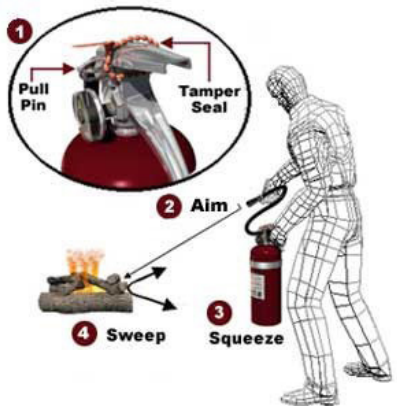
- Atmospheric conditions
- Availability of trained personnel
- Ease of handling extinguisher
- Any life hazard of operational concern

USING A FIRE EXTINGUISHER

Use the following steps when responding to incipient state fires.

- Select the proper extinguisher
- Check the extinguisher for the following:
- External condition
- Hose/nozzle in place
- Weight
- Pressure gauge (if available)
- Pull the safety pin (see diagram 1 below)
- Point the nozzle (or horn) in a safe direction and discharge a short test burst
- Approach the fire from the windward side
- Apply agent from a point where it reaches, but does not disturb the fuel
- Sweep the nozzle as you walk toward the fire
- After knockdown, move closer to achieve final extinguishment

The image below shows the P.A.S.S. technique:



INSPECTING A PORTABLE EXTINGUISHER

Fire extinguishers are a single use devise and must be inspected regularly to ensure that they:

- Are accessible and operable
- Are in their designated location
- Have not been activated or tampered with
- Do not have obvious physical damage or any other condition present that could prevent their operation

Remember servicing is the responsibility of the extinguisher owner.

REFERENCES

- National Fire Protection (NFPA 10)
- Factory Mutual
- Occupational Health and Safety (OSHA)
- Kiddy Fire Extinguishers
- USFA