



**PDHonline Course M137 (3 PDH)**

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# **Overview of Portable Fire Extinguishers**

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# OVERVIEW OF PORTABLE FIRE EXTINGUISHERS

## Course Content

### Introduction

Portable fire extinguishers are designed to put out small fires. A small fire, if not checked immediately, will soon spread out of control. In fact, most big fires start out as small ones. The portable fire extinguisher is one of the most common fire-protection appliances in use today.

For a fire extinguisher to be effective, the following conditions must be met:

- The extinguisher must be right for the type of fire
- It must be located where it can be easily reached
- It must be in good working order
- The fire must be discovered while it is still small
- The person using the extinguisher must be trained to use it properly

The provisions of fire protection extinguishers requirement's are subject to certain statutory requirements of Occupational Health and Safety Act (OSHA) and in accordance with the recommendations of National Fire Protection Association (NFPA). There are additional local guidelines and requirements of insurance agencies, local to place and environment, which must be carefully applied.

#### **Occupational Health and Safety Act**

Section 123 of the Regulation for Industrial Establishments (R.R.O. 851/90) specifies that the requirements of the Fire Code respecting fire extinguishers apply at industrial establishments.

#### **National Fire Protection Association (NFPA)**

NFPA 10 provides the minimum requirements on the selection, installation, inspection, maintenance, and testing of portable extinguishing equipment.

This course is derived from the extract information of NFPA 10 and is meant to help you with proper selection, proper use, and proper identification of fire extinguishers. It is not intended to abrogate the specific requirements of NFPA 10 and other standards.

## Fire Extinguishing Methods

Fires need four elements to occur: fuel, oxygen (16% or more), heat, and chemical reaction. Remove any of these factors and the fire cannot occur or will extinguish itself if it is already burning.

Fires can be extinguished in one of four ways:

1. **By cooling:** Water is used to cool the burning material below the temperature at which it starts to burn
2. **By smothering:** Carbon dioxide (CO<sub>2</sub>) or foaming agents are used to smother the burning material so that air is excluded
3. **By removing the fuel:** Fuel can be any combustible material—solid, liquid or gas. In place of usage you require these elements but definitely in event of fire a means to cut the fuel must be considered for instance “turning off a fuel line.”
4. **By disrupting:** Interrupting the chemical chain reaction can extinguish the fire.

Portable fire extinguishers are intended as a first line of defense to cope with fires of limited size. The fire extinguishers work by either removing one of the three elements needed to sustain combustion or by interrupting the reaction between the elements. The minimum percentage of oxygen in the atmosphere required to sustain a fire is 16%.

To select the proper fire extinguisher, you must first become familiar with the different classes of fires.

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## Classifications OF Fires

NFPA classify fires into four basic categories - designated Class A, B, C, and D as described below.

<b>TYPES OF FIRES</b>	
<b>CLASS A</b>	Ordinary Combustibles such as wood, paper, cloth, rubber, trash, many plastics including FRP and other ordinary materials.
<b>CLASS B</b>	Flammable Liquids & Gases such as petroleum greases, tars, oils, paints, gasoline, solvents, lacquers, alcohols and flammable gases.
<b>CLASS C</b>	Fires involving energized electrical equipment such as appliances, wiring, switches, panel boxes, outlets, lamps and power supplies.
<b>CLASS D</b>	Combustible metals such as magnesium, titanium, zirconium, sodium, lithium and potassium. (Normally not for household use)
<b>CLASS K</b>	Fires in cooking appliances that involve combustible cooking media such as vegetable or animal oils and fats.

Note that Class A, B, and C categories are not subdivided any further, so it may be easier to think of them as (A) solids, (B) liquids, and (C) electrical fires; there's no need, for example, to waste time distinguishing between alcohol or kerosene when your stove's on fire.

## Fire Extinguisher Types

Not all fires should be treated alike. It is essential that the type of extinguisher you use is appropriate for the type of fire you are fighting. If, for example, you spray water on a grease fire, the water will cause the grease to splatter and the fire may spread; similarly, if you douse live electrical equipment with water, you are putting yourself in danger of electrical shock. Turning off the electricity will change the status of a Class C fire to a Class A and/or B fire.

The effectiveness of a fire extinguisher on a particular fire depends on the amount and type of agent in the extinguisher. Matching the agent to the fire begins with an understanding of how fires are classified.

There are **six** different types of fire extinguishers and are classified by the type of fire on which they can be used. Each extinguisher and extinguishing agent has certain advantages and disadvantages associated with its use and limitations on what it can accomplish.

### **Type of Extinguisher: Stored-pressure water Extinguishers**

**Suitability:** 'Class A' fires

**Features:** Stored pressure water type extinguishers contain water under pressure and are usually quite large and heavy. *Use this type is recommended when burning combustibles require a cooling and wetting action.*

A brief outline of uses and technical information are provided here.

1. Water extinguishers are completely red
2. A very efficient and cost effective method to combat certain types of fires, the normal capacity of this type of fire extinguisher is 9 liters.
3. Water acts to reduce the temperature of the burning fuel so it is below its ignition point.

4. Water extinguishers are effective against fires involving:
  - Paper,
  - Textiles,
  - Wood,
  - Plastics and
  - Rubber
5. Water extinguishers are designed for use on Class A fires only. Using a water extinguisher on Class B or C fire will only serve to spread the fire and intensify the damage caused by the fire.
6. These particular fire extinguishers are not suitable for use on any other types of fire and should never be used on fires involving live electrical equipment as you may be electrocuted.

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**Type of Extinguisher:** *Carbon-di-Oxide (CO<sub>2</sub>) Extinguishers*

**Suitability:** 'Class B and E' fires

**Features:** Carbon-di-Oxide agent displaces the oxygen from the fire reaction. These extinguishers contain carbon dioxide and are highly recommended for potential chemical fires since the CO<sub>2</sub> is an inert gas. A brief outline of uses and technical information are provided here.

1. CO<sub>2</sub> is a non-conductive and non-corrosive agent, which reduces the oxygen available to support the fire. As carbon dioxide replaces oxygen, the discharge by personnel within extremely confined spaces is discouraged.
2. CO<sub>2</sub> is discharged as a white cloud of "snow" which smothers a fire by eliminating its oxygen. It is effective for small flammable and combustible liquid (Class B) fires and being non-conductive is suitable on electrical fires.
3. CO<sub>2</sub> is a clean, non-contaminating, odorless gas, safe for use on clothing, equipment, valuable documents or food.

4. CO<sub>2</sub> dissipates easily into the atmosphere. Application of this type of extinguishing agent is affected by air movement around the fire and must be applied as close to the base of the fire as possible.
5. CO<sub>2</sub> fire extinguishers are effective against fires involving electronic environments and on electrically energized equipment and do not leave any residue. This extinguishing agent does not damage computer/electronic equipment like a dry chemical extinguishing agent.
6. The normal capacity of this type of fire extinguisher ranges from 2kg to 5kg. Also available in 50 and 100 lb. wheeled extinguishers.
7. CO<sub>2</sub> fire extinguishers are red with a black band or label

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**Type of Extinguisher:** *Halon 1211 and halogenated agent-type stored*

**Suitability:** 'Class B' fires

**Features:** Halon\* extinguishers\* chemically interrupt the flaming process by displacing the oxygen from the fire. These extinguishers, like CO<sub>2</sub>, are very popular for use around computer/electronic equipment, because they leave no residue. Unfortunately, halogenated extinguishing agents are chlorofluorocarbons, and are contributing to the depletion of atmospheric ozone. Because of international concerns of ozone depletion and their damaging effect on the environment, Halon fire extinguishers are banned and rarely used anymore.

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**Type of Extinguisher:** *Dry chemical Extinguishers*

**Suitability:** 'Class A, B and C' fires

**Features:** Dry chemical discharge against a fire has the ability to absorb fuel molecules into the surface thus diminishing the ability of the fire to continue. *Multipurpose or regular dry chemical extinguishers chemically interrupt the flaming process and coat the burning*

material, eliminating oxygen. This is one of the most common types of extinguishers. A brief description, an outline of uses and technical information are provided here.

1. These extinguishers contain an ammonium phosphate base and are the most versatile type of portable extinguishers, suitable for use on many types of fires.
2. This multi-purpose, dry chemical extinguishing agent is effective in Class A, B and C fires. Use of a dry chemical extinguisher is not affected by wind like CO<sub>2</sub> or Halon extinguishing agents.
3. The compact nature of these fire extinguishers, ranging from the 0.9kg domestic model up to the 9kg industrial model, enables them to be utilized in numerous applications.
4. Dry Powder extinguishers are effective against fires involving:
  - Paper, Textiles, Wood, Plastics and Rubber
  - Petrol, Oil and Paints
  - LPG, CNG and Acetylene
  - Electrically Energized Equipment
5. Special powder is available for flammable metal (Class D) fires, however this has a limited impact upon the other types of fires.
6. Specific concerns include the restriction of vision for a short period and also is a respiratory irritant. The agent is slightly corrosive and may damage sensitive computer/electronic equipment.
7. Dry Powder extinguishers are red with a white band or label

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**Type of Extinguisher:** *Multipurpose Extinguishers*

**Suitability:** 'Class A, B & C ' fires

**Features:** Multipurpose ABC fire extinguishers utilize a Monoammonium Phosphate dry chemical. It chemically insulates Class A fires by melting and clinging to the heated surface, smothers and breaks the chain reaction on Class B fires and is a non-conductor



of electricity. Units are available in a range of sizes from 2 1/2 to 20lbs. capacity. A brief description, an outline of uses and technical information are provided here.

1. ABC-rated extinguishers, commonly called multi-purpose or tri-class extinguishers, are capable of fighting all three classes of fire.
2. Numbers preceding the letters indicate an agent's relative effectiveness in extinguishing that particular class of fire. For instance, a 10 BC dry chemical extinguisher is twice as effective in putting out a fire as a 5 BC unit. Multi-purpose 1A-10 BC dry chemical extinguishers are becoming more popular as an alternative to the common 10 BC extinguishers because of the additional Class A rating, especially since the additional cost is minimal (less than \$5).
3. The ABC units have the drawback of often ruining equipment because it leaves behind the residues. But since the priority is on safety the ABC multi-purpose extinguishers are widely used mainly because it not only reduces any confusion about what to use and where (saving time), but also covers the possibility that, for example, any Class B fire that spreads from the stove to the curtains (Class A) can be fought with the same extinguisher.

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**Type of Extinguisher:** *Aqueous film forming foam (AFFF) Extinguishers*

**Suitability:** 'Class A, B ' fires

**Features:** Aqueous film-forming foam (AFFF) extinguishers discharge a foam concentrate solution through a special air-aspirating nozzle to produce foam. The AFFF blankets flammable or combustible liquids and prevents oxygen from fueling the fire.

A brief description, an outline of uses and technical information are provided here.

1. The normal capacity of this type of fire extinguisher is 9 liters, however a smaller sizes (4.5 liters) is also available.
2. Foam extinguishers are effective against fires involving:
  - Paper, Textiles, Wood, Plastics and Rubber

- Petrol, Oil and Paints
3. This fire extinguisher should **not** be used on electrical equipment fires.
  4. Foam extinguishers are red with a blue-band or label

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**Type of Extinguisher:** *Wet Chemical Extinguishers*

**Suitability:** 'Class A, E ' fires

**Features:** Wet chemical extinguishers utilize an aqueous solution discharged in a fine spray to the surface of the fire. The agent reacts with the burning oil or fat, forming a blanket, which extinguishes the flame. A brief description, an outline of uses and technical information are provided here.

1. The normal capacity of this type of fire extinguisher is 7 liters with a 1A: 4F rating, ideal where space is a restricting feature such as restaurant kitchens.
2. Wet Chemical extinguishers are effective against fires involving:
  - Cooking Oils and Fat
  - Paper, textiles, wood, plastics and rubber
3. This product should not be used on electrical equipment fires.
4. Once used, the solution is usually alkaline, it is recommended the surface be cleaned and all residues removed within a reasonable time period.
5. Wet Chemical extinguishers are red with an oatmeal band or label

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**Type of Extinguisher:** *Dry Powder Extinguishers*

**Suitability:** 'Class D ' fires

**Features:** Class D dry powder fire extinguishers are designed for use on combustible metal fires. Fitted with a "soft-flow" extension applicator, it provides a straight stream of chemical where greater range, a narrow discharge pattern or a lobbing effect is required. The extension applicator also keeps the operator's hands away from the extreme heat

and prevents inhalation of toxic fumes caused by burning material. The extinguisher comes with a special corrosion resistant yellow color-coded paint finish.

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### Mobile Extinguishers

Mobile fire extinguishers offer excellent protection in hazardous situations by enabling a single user to provide a large quantity directly to the base of the fire. A brief description and an outline of uses are provided here. Mobile wheeled fire extinguishers are ideal for high hazard situations such as the storage of flammable fuels. They can be easily taken to a fire and operated by one person to supply a large quantity of extinguish ant to the fire.

Wheeled fire extinguishers of various models are available with the following agents:

- Dry powder
- Foam or
- Carbon Dioxide

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To summarize, the table below will help you to match types of extinguishers to different classes of fire.

Some extinguishers are suitable for one class of fire only; others can fight two or even three classes of fire. However, no extinguisher is suitable to fight all four classes of fire.

<b>Fire Classification</b>	<b>Extinguisher Type</b>
Class A Extinguisher	<i>The following extinguishers are suited to Class A fires:</i> <ul style="list-style-type: none"><li>- Pressurized water</li><li>- Multipurpose or regular dry chemical</li><li>- Aqueous film-forming foam (AFFF)/ film-forming fluoroprotein (FFFP)</li></ul>

<b>Fire Classification</b>	<b>Extinguisher Type</b>
Class B Extinguisher	<i>The following extinguishers are suited to Class B fires:</i> <ul style="list-style-type: none"><li>- Regular and multipurpose dry chemical</li><li>- Carbon dioxide (CO<sub>2</sub>)</li><li>- Aqueous film-forming foam (AFFF)/ film-forming fluoroprotein (FFFP)</li></ul>
Class C Extinguisher	<i>The following extinguishers are suited to Class C fires:</i> <ul style="list-style-type: none"><li>- Dry chemical</li><li>- Carbon dioxide</li></ul>
Class D Extinguisher	<i>The Dry Powder extinguishers use specially designed chemical for the particular material.</i>

In general, dry chemical extinguishers including multipurpose ABC type, which use a chemical powder to smother the source of the fire, are the favored choice today. Not only is a dry chemical extinguisher more effective, it is easier for an inexperienced user to direct the discharge plume to the base of the flame from a safe distance. Conversely, extinguishers with gaseous agents (CO<sub>2</sub>, Halon, and Halon replacements FE-241 and FM-200), which react with the surrounding oxygen, aren't as effective because the gases are often dissipated before the fire is extinguished.

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## Selection Process

As it has been said, using the wrong extinguisher to fight a fire can have serious results. Selection of the best extinguisher for a given situation is based on a variety of factors.

- Nature of the combustibles or flammables that might be ignited.
- Potential severity (size, intensity, and speed of travel) in any resulting fire.
- Effectiveness of the fire extinguisher on that hazard.
- Ease of use.
- Availability of personnel to operate the extinguisher.
- Ambient temperature conditions and other special atmospheric considerations (wind, draft, or presence of fumes).
- Suitability of the fire extinguisher to its environment.
- Any anticipated adverse chemical reaction between the extinguishing agent and burning materials.
- Any health and operational safety concerns.
- Upkeep and maintenance requirements for the fire extinguisher.

Follow these steps in selecting your extinguishers:

### Step # 1

Conduct an assessment to identify your fire hazards and determine the type of extinguishers needed. The extinguishers you select must match the classes of fire most likely to occur. Remember to check your material safety data sheets to identify materials that could catch fire. The section on fire fighting measures gives information on the type of extinguishing agent needed to put out a fire involving the material. The fire hazards could be classified into 3 broad categories:

- **Light (Low) Hazard:** Light hazard occupancies are locations where the total amount of Class A combustible materials, including furnishings, decorations, and contents, is of minor quantity. This can include some buildings or rooms occupied as offices, classrooms, churches, assembly halls, guest room areas of hotels/motels, and so forth.
- **Ordinary (Moderate) Hazard:** Ordinary hazard occupancies are locations where the total amount of Class A combustibles and Class B flammables are present in greater amounts than expected under light (low) hazard occupancies. These occupancies could consist of dining areas, mercantile shops and allied storage, light manufacturing, research operations, auto showrooms, parking garages, workshop or support service areas of light (low) hazard occupancies, and warehouses containing Class I or Class II commodities as defined by NFPA 13, *Standard for the Installation of Sprinkler Systems*.

- **Extra (High) Hazard:** Extra hazard occupancies are locations where the total amount of Class A combustibles and Class B flammables present, in storage, production, use, finished product, or combination thereof, is over and above those expected in occupancies classed as ordinary (moderate) hazard. These occupancies could consist of woodworking; vehicle repair; aircraft and boat servicing; cooking areas; individual product display showrooms; product convention center displays; and storage and manufacturing processes such as painting, dipping, and coating, including flammable liquid handling.

## Step # 2

Determine the size of potential fires in each area and how fast they could spread.

All fire extinguishers are rated according to the extinguishing agent's effectiveness in controlling one or more classes of fire.

- **Extinguishers for Class A and Class B** fires are rated for the size of fire they can handle. This rating appears on the label and is expressed as a number from 1 to 40 for Class A fires and 1 to 640 for Class B fires.

The higher the number, the larger the fire the extinguisher can put out. However, higher the rating, the heavier shall be the extinguisher. Extinguishers rated 2A: 10B:C are suitable for home or office fires.

(\*: Refer the following Section 'Placement and Location of Fire Extinguishers' for further information.)

- **Extinguishers for Class C** fires depend upon such factors as the size of the electrical equipment, how it is constructed, whether it is enclosed, and the nature of other combustible materials in the area.
- **Extinguishers for Class D** fires should be carefully selected based on information in the material safety data sheet and the manufacturer's recommendations. The amount of agent needed depends on the surface area of the metal, and its shape and form.

Consult the local fire authority or NFPA 10 to determine the number of fire extinguishers you need for your workplace.

### **Step # 3**

Consider other factors that affect selection:

- Possible health and safety hazards from chemical reactions between the extinguishing agent and the burning materials, or when using certain types of extinguishers in unventilated areas. Extinguishers with long-range nozzles, for example, are available for use in confined spaces or other hazardous areas.
- Atmospheric conditions in areas where extinguishers are located. Extreme cold, for example, could make water-based extinguishers ineffective. Where there may be corrosive fumes, select fire extinguishers that can resist corrosion, or provide protection against corrosion.
- Physical abilities of the user. The size and weight of extinguishers should match the physical abilities of those who have to use them. Extinguishers shouldn't be too heavy for employees to handle.

### **Step # 4**

Make sure that your extinguishers:

- Are approved by a recognized laboratory (replaced or new extinguishers must be approved by the Underwriters' Laboratories of Canada or ULC, and labelled as such);
- Do not contain carbon tetrachloride, methyl bromide, or other toxic vaporizing liquids.

### **Step # 5**

Do a reassessment whenever you make changes in your workplace, e.g., when you change a work process or the materials you are using.

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## Size, Placement, and Location of Extinguishers

No matter how carefully they are selected, fire extinguishers won't be of any use if they can't be reached in an emergency. Once the extinguisher choice is made based on the classes of fires likely to occur in the immediate work area, the next important step is the placement of fire extinguishers. The placement should be such that they are readily accessible to workers without subjecting them to possible injury. Placement is best accomplished through a physical survey of the area to be protected. In general, selected locations should be visible, accessible, and uniformly distributed.

NFPA 10 (E3) requires that the minimum number of extinguishers be installed in a manner that fulfill both the distribution and travel distance requirements for a particular occupancy classification.

### 1. Class A Fire Extinguisher Distribution

Table below is a guideline for determining the minimum number and rating of fire extinguishers for Class A fire protection needs.

Criteria	Light Hazard	Ordinary Hazard	High Hazard
Minimum rated single extinguisher	2-A*	2-A*	4-A†
Maximum floor area per unit of A	3000 ft <sup>2</sup>	1500 ft <sup>2</sup>	1000 ft <sup>2</sup>
Maximum floor area for extinguisher	11,250 ft <sup>2</sup> ‡	11,250 ft <sup>2</sup> ‡	11,250 ft <sup>2</sup> ‡
Maximum travel distance to extinguisher	75 ft	75 ft	75 ft

\*Up to two water-type extinguishers, each with 1-A rating can be used to fulfill the requirements of one 2-A rated extinguisher.

†Two 2½ gal (9.46 L) water-type extinguishers can be used to fulfill the requirements of one 4-A rated extinguisher.

‡See E.3.3, NFPA 10 for details.

Courtesy Source: Table 5.2.1 Fire Extinguisher Size and Placement for Class A Hazards

### 2. Class B Fire Extinguisher Distribution

For Class B fires, the basic minimum distance is indicated in the table below:



Type of Hazard	Basic Minimum Extinguisher Rating	Maximum Travel Distance to Extinguishers	
		Ft	M
Light Hazard	5-B	30	9.15
	10-B	50	15.25
Ordinary Hazard	10-B	30	9.15
	20-B	50	15.25
High Hazard	40-B	30	9.15
	80-B	50	15.25

Courtesy Source: Table 5.3.1, Fire Extinguisher Size and Placement for Class B Hazards

### 3. Class C Fire Extinguisher Distribution

According to NFPA, extinguishers with Class C ratings are required where fire either directly involves or surrounds electrical equipment. Since the fire itself is a Class A or Class B hazard, the fire extinguishers shall be sized and located on the basis of anticipated Class A or Class B hazard. The capacity of the fire extinguishers supplied for each major Class C hazard situation should be individually judged according to the following factors:

- (1) Size of the electrical equipment
- (2) Configuration of the electrical equipment (particularly the enclosures of units) that influences agent distribution
- (3) Effective range of the fire extinguisher stream
- (4) Amount of Class A and B material involved

Each of these factors influences the amount and type of agent needed. (Refer clause 5.5 and annexure E 5)

### 4. Class D Fire Extinguisher Distribution

According to NFPA, Class D fire extinguishers or extinguishing agents (media) shall be located not more than 75 ft (23 m) of travel distance from the hazard. The extinguishers shall be located in those work areas where combustible metal powders, flakes, shavings, chips, or similarly sized products are generated. Size determination shall be on the basis of the specific combustible metal, its physical

particle size, area to be covered, and recommendations by the fire extinguisher manufacturer (Refer clause 5.6)

For Class E fires, NFPA 10 recommends: Maximum travel distance shall not exceed 30 ft (9.15 m) from the hazard to the extinguishers (Refer clause 5.7.2)

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## Location Guidelines

Locate extinguishers where they can be readily reached for use while a fire is still small. However, don't locate them where they could be a hazard to employees, or where they could get damaged.

If not equipped with wheels, ensure that portable extinguishers weighing more than 18 kilograms (kg) or 39 pounds (lbs.) are installed so that the top is not more than 1.1 meters (m) or 3.6 feet (ft.) above the floor. Those weighing 18 kg or less must not be more than 1.5m (5 ft.) above the floor.

Here are some general pointers for where to locate extinguishers in your workplace.

### ***Locate them:***

- So that they are visible, along with their operating instructions and identification marks;
- Where they can be easily reached (i.e., they must not be blocked by machines or materials);
- In or near corridors or aisles leading to exits however, they must not block aisles;
- Close to potential fire hazards, but not so close that they could be damaged or cut off by a fire;
- Where they will not expose people using them to undue risk, e.g., using a halon extinguisher in an unventilated area;
- Where they will not be damaged by moving trucks, cranes or other work activities, or corroded by chemical processes;
- So that they are protected against the elements (if stored outdoors).

### In special areas

Where highly combustible material is stored in small rooms or enclosed spaces:

- Locate the extinguisher outside of the room (this will force the potential user to exit the room and then decide whether to re-enter it to fight the fire).

For service rooms that contain electrical equipment:

- Locate extinguishers in or near the room.

On vehicles or in areas where extinguishers are subject to jarring or vibration:

- Mount extinguishers on brackets designed to withstand vibration.
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## Recommended Signage

Post signs to show the locations of fire extinguishers, particularly in large floor areas where they could be easily blocked from view. The signs should be large enough to be seen clearly from a distance. Figure below gives an example of a fire extinguisher sign.



Identify walls or columns on which extinguishers are mounted with a red band. The band should be about 2.4 to 3 m (8 to 10 ft.) above the extinguisher. The background on which the extinguisher is mounted should also be painted red, as shown below:



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## Identification Of Extinguishers

Manufacturers place markings on extinguishers to indicate the class or classes of fire for which they are suitable. There are two sets of standard symbols used to label an extinguisher for the class or classes of fires on which it can be used. One or both of these symbol sets will appear on the label of all listed portable fire extinguishers.

The first system uses geometric shapes and colors with a class letter shown inside the shape. *(On class A and B extinguishers a number is used in conjunction with the letter. This number represents the performance capability; a general rule of thumb is, the higher the number, the better the extinguisher will perform.)* The other system uses pictographs to make selection easier.



Fire extinguishers have color-coded symbols on their faceplate to show their classification (A-**green** triangle, B-**red** square, C-**blue** circle, D-**yellow** star). Some extinguishers are marked with multiple ratings such as AB, BC or ABC. These extinguishers are capable of putting out more than one class of fire.

**Figure: Symbol and Color Markings on Extinguishers**

Extinguisher Type	Symbol#1	And/or Symbol #2
Class A Extinguisher (Rated from 1A - 40A)	 Ordinary Combustibles	
Class B Extinguisher (Rated from 1B - 640B)	 Flammable Liquids	
Class C Extinguisher	 Electrical Equipment	
Class D Extinguisher	 Combustible Metals	
Class E Extinguisher		

Extinguishers are labeled to indicate with which type of fire they are to be used. It is also very important that an extinguisher not be used on a fire that it is not rated for. Using the wrong extinguisher, or using it improperly, can cause spread of the fire, personal injury, or more serious consequences.

*The recommended marking system combines the uses and non-uses of an extinguisher on a single label. This system also shows the types of fires that an extinguisher should not be used on. An example would be:*

<p><b>Example:</b> The following extinguisher would be rated for Class A and B fires but not Class C.</p>	
<p><b>Example:</b> The following extinguisher would be rated for Class A only and not for Class B and Class C.</p>	

Regardless of which labeling system is used, it is important that the extinguisher be mounted with the label facing out, and the markings clearly visible.

Note the color coding is optional but if used:

- A blue background indicates uses
- A black background with a bright red slash indicates non-uses

To make identification easier in an emergency, it is good idea to consider applying class ratings to wall panels near extinguishers. These markings should be easy to see from a distance of 4.5m (15 ft.).

## Operation

All personnel expected to use a fire extinguisher should be trained in its proper use.

1. Recognize the unit as the appropriate extinguisher for the type of fire. This step requires permanent marking on the unit to indicate purpose, content, and usage.
2. Test that the extinguisher works before you approach the fire.
3. Transport the extinguisher to the fire. The extinguisher should be located so that it can be easily removed in a fire emergency and brought to the site of a fire as quickly as possible. Take care. Speed is essential but it is more important to be cautious.
4. Basic operation involves four standard steps:

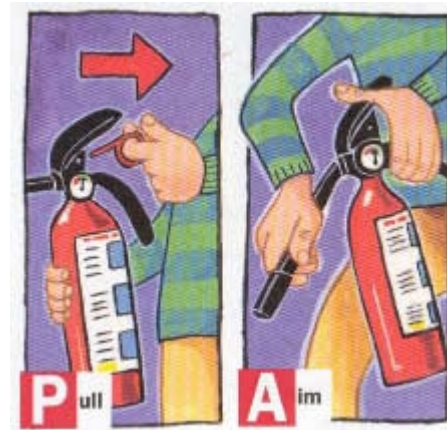
Most extinguishers have printed or visual how-to instructions for use. Make sure to understand them before a fire breaks out. There is no time to read directions during an emergency.

The extinguishers are powered by internal pressure, and most are relatively easy to operate. There are four basic steps to operating a portable fire extinguisher. An easy way to remember the procedure is to think of the word **P-A-S-S**.

*PASS stands for Pull, Aim, Squeeze, and Sweep*

Pull the pin to unlock the handle: Holding the extinguisher with the nozzle pointing away from you, release the locking mechanism. A twisting and pulling motion works the best.

In most cases, this means pulling out the pin located below the discharge lever.



Aim the nozzle, horn or hose low at the base of the fire: Extinguishers must be operated in an upright position. Always hold the extinguisher vertically. Never cradle it horizontally.



Squeeze the handle to release the extinguishing agent. Squeeze the discharge lever slowly and evenly. This will release the extinguishing agent and expel it through the nozzle.



Sweep the unit from side to side: As the extinguishing agent is expelled, sweep the nozzle from side to side until it appears to be out.

Keep your back to the exit at all times and stand 2 to 2.4m (6 to 8 ft.) away from the fire. After the fire appears to be extinguished, watch the fire area. Be aware that there is always a possibility that the material will reignite, so be very careful. If the fire breaks out again, repeat the process. Once an extinguisher has been discharged, it should be discarded and replaced with a new one. Keep in mind that the discharge time of a

portable extinguisher can be very short. If you cannot extinguish the fire completely, leave the area immediately and wait for the fire department to arrive.

Most portable extinguishers work according to these directions. Each unit carries specific directions for its use printed on the extinguisher case. It is important to be familiar with these instructions before an emergency.

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## Extinguisher Use

As soon as a fire is discovered:

- Sound the alarm and start to evacuate
- Call the fire department

These are important steps for everyone's safety, even if you feel the fire can be brought under control by using an extinguisher.

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## Should You Fight The Fire?

Before you begin to fight a fire, make sure:

- Everyone has left, or is leaving the building
- The fire department has been called
- The fire is confined to a small area and is not spreading
- There is an unobstructed escape route to which the fire will not spread
- The extinguisher is the right type for the fire
- The person using the fire extinguisher knows how to use it

Portable fire extinguishers can be a useful component of a home fire safety plan, but they aren't the only component. A comprehensive home fire safety plan should include smoke detectors and an evacuation plan. And it's smart to talk about fire safety with your family regularly to re-enforce the evacuation plan and to check whether your smoke detectors'



batteries are working. Reviewing where your fire extinguishers are kept, and how to use them.

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## When Not to Fight A Fire

Portable fire extinguishers have their limitations. They are not designed to fight a large or spreading fire. Even against small fires, they are useful only under certain conditions. The following is a list of situations that you should not attempt to fight a fire:

- The extinguisher is not rated for the class of fire
  - The extinguisher is not large enough to put out the fire or is not fully charged. Most portable extinguishers discharge completely in as few as eight seconds.
  - The fire is spreading beyond the spot where it started.
  - You can't fight the fire with your back to an escape exit
  - The fire can block your only escape
- 

## Testing

The NFPA 10 standard for portable fire extinguishers requires a monthly inspection, annual maintenance, and proper recharging procedures so that a portable fire extinguisher is ready for its intended use. NFPA 10 does not require an engineer or fire inspector for the monthly inspection -- a building owner, occupant, or a designated representative can do it.

Either a fire extinguisher service agency representative or a trained industrial safety or maintenance person should conduct annual maintenance.

These people should have access to the manufacturer's service manuals. General repairs or replacement of damaged components should be a part of this examination.

*Fire extinguishers must be inspected when initially placed in service and at 30-day intervals after that time. The inspection requires a check of the following items:*

- Location in designated place
- No obstruction to access or visibility

- Operating instructions on nameplate legible and facing outward
- Safety seals and tamper indicators not broken or missing
- Fullness determined by weight or "hefting"
- Examination for obvious physical damage, corrosion, leakage, or clogged nozzle
- Pressure gauge reading or indicator in the operable range or condition
- Condition of tires, wheels, carriage (for wheeled units), hose, and nozzle checked
- Hazardous materials identification systems (HMIS) label in place.
- Check your extinguishers pressure gauge every three months; to make sure that it is still in operable range. If not, have it serviced or replace it with a new one.

When an inspection reveals a deficiency in location, access or visibility, condition, or labeling, immediate corrective action must be taken.

Independent testing laboratories test and rate the portable fire extinguishers to determine the type and size of fire each model can put out. Do not buy a portable fire extinguisher if it does not carry the label of an independent testing lab.

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## Care and Maintenance

- Extinguishers must be properly maintained to ensure that they will work when needed, and that they are safe to use. A carbon dioxide extinguisher, for example, can build up a high static charge if it is used when there is a breakdown of the insulation around the discharge horn. This can cause electric shock.
- Adequate maintenance of extinguishers consists of regular inspections, recharging as needed, and a complete annual check up and servicing. Records must be kept of all maintenance work carried out, including inspections
- Disposable fire extinguishers can be used only once and must be replaced after one use or 12 years from the date of manufacture.
- Testing and servicing is usually carried out by a service agency. Certification records include the date of the test, the signature of the person who performed the test and the

serial number of the fire extinguisher that was tested. These records should be kept until the extinguisher is hydrostatically retested at the required time interval or until the extinguisher is taken out of service.

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## Inspections

Fire extinguishers must be inspected at least once a month, and more often where needed. Inspections are visual checks to determine that:

*Check if the extinguisher is well supported?*

- Hangers are fastened solidly.

*Check if the extinguisher is accessible?*

- Can be easily reached
- Location signs are clear
- Class markings are clear
- Operating instructions are clear

*Check if the extinguisher is in working condition?*

- Discharge opening is clear
  - Is fully charged
  - Has not been tampered with
  - Is not damaged
  - Hydrostatic testing has been done
  - The ring pin is in place
  - The seal is intact
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## Servicing

Completely examine each extinguisher at least once a year, and whenever your monthly inspections indicate that this may be needed.

Replace defective parts and extinguishers, recharge extinguishers as needed, and ensure that hydrostatic tests are carried out according to the manufacturer's instructions.

Set up a maintenance schedule for extinguishers so that they are not all out of service at the same time.

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## Record Keeping

Attach a durable tag to each extinguisher that shows:

- Dates of monthly inspections, recharging, and servicing
- Name of servicing agency
- Signature of person who performed the service

Maintain a permanent record for each fire extinguisher that shows:

- Serial number and type of extinguisher
  - Location of extinguisher
  - Inspection date
  - Description of maintenance work or hydrostatic tests carried out
  - Date of next inspection
  - Date of scheduled annual servicing
  - Inspector's comments
  - Inspector's signature
- 

## Training

Safety should be everybody's concern. If extinguishers are to be used by employees, then training needs to take place upon initial employment and at least annually thereafter.

If extinguishers are not intended for employee use and the employer has an emergency action plan and a fire prevention plan, then training is not required.

Training should cover:

- Extinguisher locations

- Classes of fire most likely to break out in your workplace and the proper extinguishers to use
- Markings on extinguishers
- When and how to use extinguishers
- Importance of sounding the alarm
- Health and safety hazards
- Personal protective equipment

Use lectures and demonstrations, and provide opportunity to practice using extinguishers. Consider having them practice on extinguishers that need recharging. With increased confidence, a person is more likely to respond effectively to fire emergencies.

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## Regular Stored Pressure Fire Extinguishers (general specs)

- o Quality designed - manufactured to exacting standards under ISO - 9002. U/L and U.S. Coast Guard approved
- o Rugged construction - easy and less costly maintenance and service
- o User friendly bar coded labels for inventory control and extinguisher locator programs
- o Complete range of sizes for all hazard requirements
- o Extinguishers may be used indoors where winds and drafts do not affect discharge or where a clean extinguisher agent is required.
- o Nonconductive, non-corrosive clean extinguishing agent. Low carbon steel shell with fluted base resists impact, vibration, and corrosion.
- o Simple operation and maintenance
- o Rechargeable
- o Manufactured of durable high quality materials
- o Large, easy-to-read pressure gauge
- o Rust free Aluminum Cylinders as an option- up to 30% lighter than steel for use in corrosive environments
- o Compliance: UL listed FM approved
- o Meets or exceeds requirements of ANSI/UL 1093 and 711

Regular extinguishers contain a siliconized sodium bicarbonate based dry chemical with free flowing and non-caking additives. Economical Class B & C protection with lower initial cost and recharging. This chemical smothers fires in a flammable liquid and pressurized gases and is electrically non-conductive.

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## Course Summary

A portable fire extinguisher can save lives and property by putting out a small fire or containing it until the fire department arrives.

Portable extinguishers have limitations. Because fire grows and spreads so rapidly, the number one priority for residents is to get out safely.

To help in choosing the proper extinguishers, fires are classed A, B, C, or D, according to the type of fuel (e.g., paper, grease, oil) that is involved in the fire. Extinguishers are available for use on one or more classes of fire, depending on the extinguishing agent they contain (e.g., water, dry chemicals, CO<sub>2</sub> or foam).

Location and accessibility of fire extinguishers are vital considerations. Extinguishers are more likely be used when they are readily available in sufficient number and type to persons familiar with their operation.

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