University of Hafr Al-Batin

SET 212: Fire Prevention and Protection Methods

LECTURER

FIRE EXTINGUISHERS

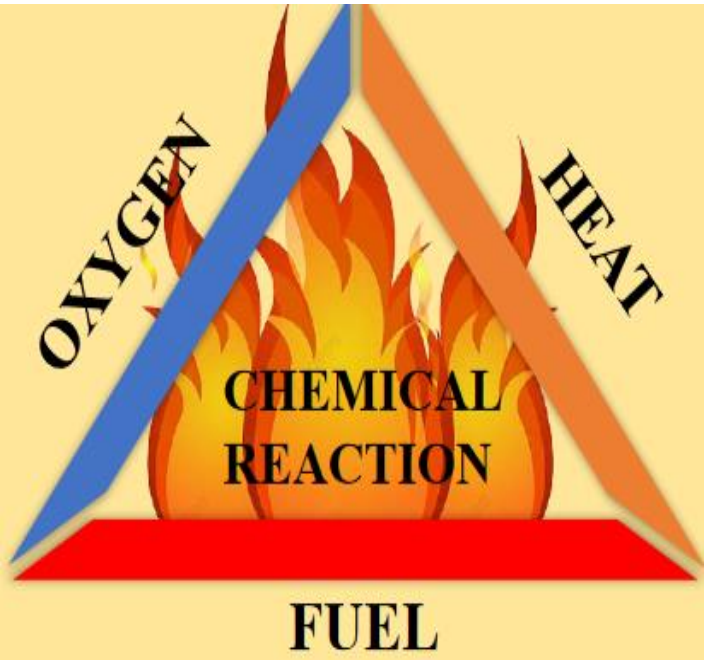
Introduction

- Almost all fires are small in their incipient stage and can be put out quickly in the hands of a trained person **portable fire extinguishers** are great tools to protect people and property from fire during the early stages if the proper firefighting equipment is available.

- When using an extinguisher or selecting an extinguisher to install, it's important to know the **characteristics of different fire extinguishers**.

Combustion

- **The fire triangle** is a simple model for understanding the necessary ingredients for most fires. A fire can be prevented or extinguished by removing any one of the fire **triangle elements**.
- Actually, it's a tetrahedron, because there are **four elements** that must be present for a fire to exist.



- **I. Oxygen to sustain combustion.**
- **II. Heat to raise the material to its ignition temperature.**
- **III. Fuel to support the combustion.**
- **IV. The chemical reaction between the other three elements.**

- **Remove any one of the four elements to extinguish the fire.**

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- The concept of Fire Protection is based upon keeping these four elements separate. Fire extinction is achieved by the removal of either fuel, oxygen, heat, or by the interruption of the chain reaction.

The Parts of a Fire Extinguisher.

- While there are many different types of fire extinguishers – **water, dry chemical, foam, clean agent,** etc. – for the most part, they have the same or very similar parts with which to operate them.

- In general, regardless of the class of extinguisher and the type of extinguishing agent they may contain, you can expect a fire extinguisher to have:

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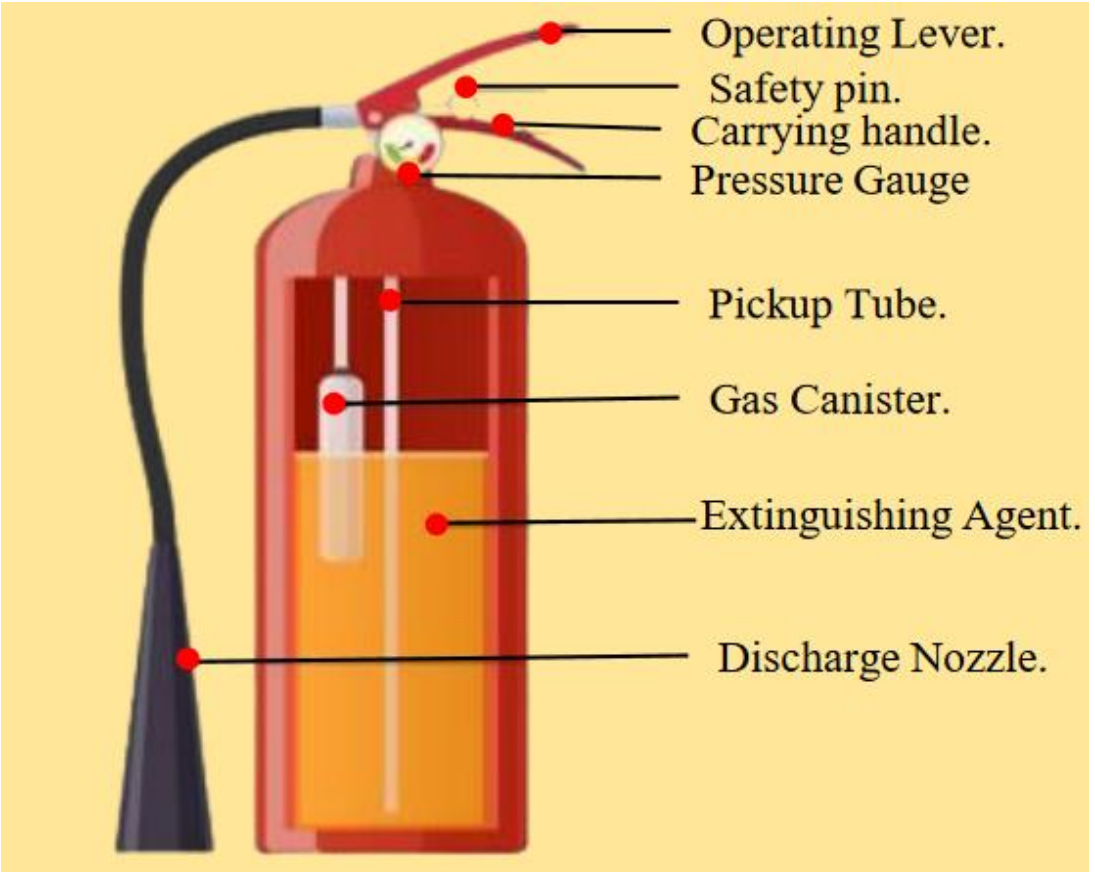
1. **Cylindrical Tank.**
2. **Valve.**
3. **Carry Handle.**
4. **Operating Lever.**
5. **Pull Pin.**
6. **Tamper Seal.**
7. **Pressure Gauge.**
8. **Discharge Hose.**
9. **Discharge Nozzle.**
10. **Extinguishing Agent and Propellant.**



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The function of each part of a fire extinguisher

Cylindrical Tank:

The fire extinguisher serves to store extinguishing materials and propellants. These tanks are generally made of strong steel and, although small, they are very heavy.

The tube is the main part of storing the extinguishing formula. In addition, there is also a part of the fire extinguisher that has the function of removing the extinguishing agent known as the valve assembly.

Valve:

Serves to control (close and open) the flow of contents in the tube. Valve functions in Fire extinguishers are so important, they must use high-quality valves.

Carry Handle:

Helps us carry fire extinguishers with ease.

Operation lever:

Depressible part to operate the extinguishing device. This part cannot be operated if the pin has not been pulled.

Pull pins:

We can call them locks, metal pins function to prevent accidental release.

- **Damage seal:**

A plastic seal affixed to keep the pulling pin from being damaged when the fire extinguisher is dropped or hit.

- **Pressure gauge:**

An instrument for measuring pressure whether the fire extinguisher has enough pressure to put out a fire. If the arrow is green, it means that the ingredients have been filled correctly. If the gauge is on the left, the load is under load, if the gauge on the right is green then overload and risk of explosion.

Drain hose:

Hose that serves to drain the contents and sources of ignition.

Drain nozzle:

The tip of the hose is conical to allow the expelled substance to spread.

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- In addition to the core parts above, there are also additional parts of the fire extinguisher that have an equally important function. Here are among them:

1. **Instruction label: Instruction label and instructions for use.**
2. **Monthly inspection sheet: Allows assigned individuals to check APAR eligibility.**
3. **Annual inspection tag: Just like the monthly inspection sheet, it is annual.**

- Each part of a fire extinguisher has a function that is interconnected to work effectively.

- Extinguishing materials that are in the tube, must be controlled and can be used optimally to extinguish the fire efficiently and quickly.

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Fire extinguisher types: How to choose the right class

- Choosing fire extinguisher types for the relevant class of fire could literally be the difference between life and death.

- No single extinguisher can be used to tackle every fire, and because each type of fire extinguisher has different classes of fire on which it is effective, selection can be a minefield.

Classes of Fire

- Class A, combustible carbon-based solids e.g. paper, wood, or textiles
- Class B, flammable liquids e.g. paraffin, petrol, diesel, or oil (but not cooking oil)
- Class C, flammable gases, e.g. butane, propane, or methane
- Class D, burning metals, e.g. aluminum, lithium, or magnesium
- Class E, Fires caused by electrical equipment (indicated by an electric spark symbol)
- Class F, fats and cooking oils.

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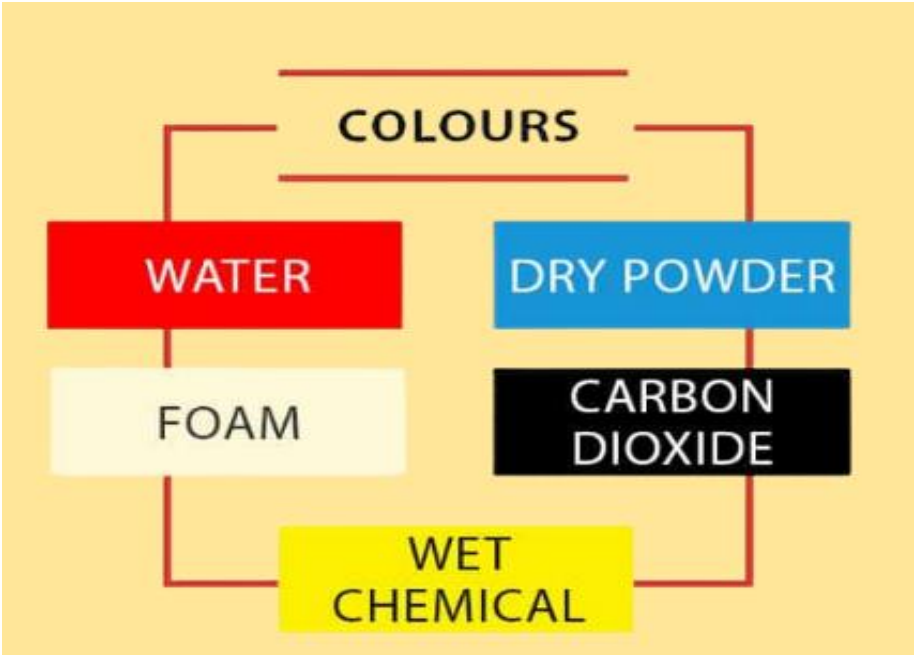
- In the UK, portable fire extinguishers must conform to BS EN3 Standard, which specifies that their body is colored red. A small colored band indicates the type of fire extinguisher – red for water, white and red for water mist, cream for foam, blue for dry powder, yellow for wet chemical, green for a clean agent, and black for CO2 extinguishers.

- **The five main fire extinguisher types with colors are:**

1. **Blue – Dry Powder – standard or specialist.**
2. **Black – Carbon Dioxide ('CO2').**
3. **Cream – Foam.**
4. **Red – Water (Spray and Mist)**
5. **Yellow – Wet Chemical**



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Each of the different types of fire extinguishers is suitable for different fire classes. It is important that you purchase the right fire extinguisher for your needs	
Class of Fire	**Description**
Class A Fires	Generally includes combustible materials like paper, wood, fabric, coal, etc. They are fires caused by flammable solids.
Class B Fires	Fires in flammable liquids, combustible liquids, petroleum greases, tars, oils, oil-based paints, solvents, lacquers, alcohols, and flammable gases.
Class C Fires	These are fires caused by farmable gases like methane, hydrogen, etc.
Class D Fires	These are fires caused by combustible metals and chemicals like potassium, magnesium, and others.
Electrical fire	These are fires caused by electrical equipment like heaters, batteries, etc. Once the electrical aspect is eliminated, a person can use any other fire extinguisher based on the fuel for the fire.
Class F Fires	Fires in cooking appliances that involve combustible cooking media (vegetable or animal oils and fats).

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WATER	FOAM	CARBON DIOXIDE (CO2)
Water fire extinguishers have a red label and a class A rating. They are suitable for fighting fires involving solid combustibles such as wood, paper, and textiles.	AFFF foam fire extinguishers have a cream label and are highly effective on class A and class B fires (the foaming agent helps to prevent re-ignition).	CO2 fire extinguishers have a black label, and they are primarily used for electrical fires. They are also used in computer server rooms. They can also be used in Class B fire types.

✓	A	
✗	B	
✗	C	
✗	D	
✗	E	
✗	F	

✓	A	
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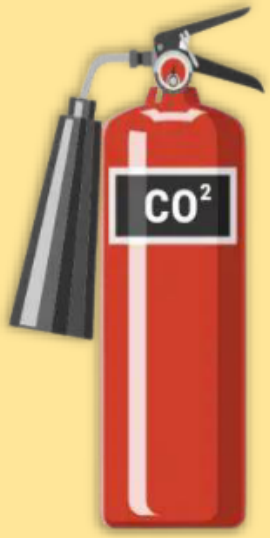

✗	A	
✓	B	
✗	C	
✗	D	
✓	E	
✗	F	

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ABC POWDER	WET CHEMICAL	DE-IONISED WATER MIST
Blue label fire extinguishers are sometimes known as 'ABC' extinguishers because they can be used on Class A, B, and C fire types. However, powder fire extinguishers are therefore not recommended for use within small rooms, homes, and offices. Limited to engine rooms and outdoor machinery. The standard dry powder can be used on some electrical fires, while the special dry powder extinguisher may be used on fires involving flammable metals.	Yellow labeled fire extinguishers are wet chemical-based extinguishers designed for Class F types of fires. It is important to note that Class F fires generally occur in professional kitchens and other spaces where oil is being heated to high temperatures. Although this type of fire extinguisher can be used for Class A type of fire, many businesses will mainly prefer water or foam extinguishers for this purpose.	De-ionised water mist fire extinguishers have a white label and are highly effective in classes A, B, and C and burning electrical equipment. The unique design of the water mist extinguishers' supersonic nozzle creates a microscopic mist curtain, reducing the oxygen content. Water mist extinguishers are safe and well suited for use on burning electrical equipment as the de-ionized water mist does not conduct electricity and the water mist does not form puddles which could lead to electrocution.

✓	A	
✓	B	
✓	C	
✗	D	
✓	E	
✗	F	

✓	A	
✗	B	
✗	C	
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✓	F	

✓	A	
✓	B	
✓	C	
✗	D	
✓	E	
✗	F	

Fire extinguisher use

- Portable Fire Extinguishers and Fire Blankets are designed as First Aid Fire Fighting Equipment.
- Fire extinguishers should ideally only be used by someone who has been trained to do so – and the following text does not count as training.
- Moreover, a fire extinguisher should only be activated once the fire alarm has been triggered and you have identified a safe evacuation route.
- Evacuate the building immediately if you still feel unsure about using a fire extinguisher or if doing so is clearly the safest option.
- You should not spend more than ten seconds taking control of a fire.

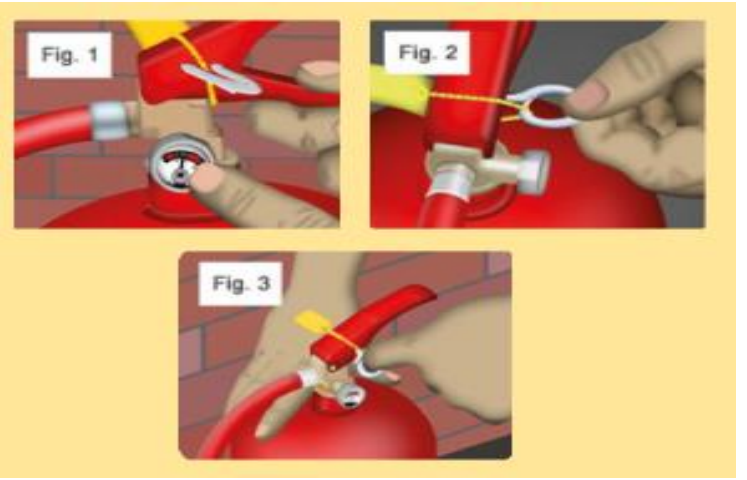
How to use a Water Fire Extinguisher

- **Before attempting to fight a fire with a fire extinguisher it is important to check:**

✓ That it is fully charged (Fig. 1).

✓ The safety pin is not bent (Fig. 2).

✓ Ensure you remain a safe distance from the fire and remove the safety pin (Fig 3). This will break the tamper sea.



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- The following four-step technique can be memorized more easily with the acronym PASS:

1. Pull: Pull the pin to break the tamper seal.
2. Aim: Aim low, pointing the nozzle or hose at the base of the fire. (Do not touch the horn on a CO2 extinguisher since it becomes very cold and can damage the skin.
3. Squeeze: Squeeze the handle to release the extinguishing agent.
4. Sweep: Sweep from side to side at the base of the fire – the fuel source – until the fire is extinguished.