

## **UNIT 7: FIRE PREVENTION**

### **What is Fire?**

The rapid oxidation of a fuel evolving heat, particulates, gases and radiation.

### **FIRE TRIANGLE**



There are four elements that must be present for a fire to exist.

There must be oxygen to sustain combustion, heat to raise the material to its ignition temperature, fuel to support the combustion and a chemical reaction between the other three elements.

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

The concept of Fire Protection is based upon keeping these four elements separate.

## Sources of Ignition

Smoking

Electrical equipment

Heaters

Process machinery

Contractors tools and equipment

Arson

## Fuels

Paper and boxes etc Packaging (polystyrene beads etc)

Plastics Solvents Soft furnishings (Mattresses, cushions)

Furniture Waste materials (rubbish, old pallets)

## Classes of Fire

**Class A** – Fire in ordinary combustible materials such as wood, paper, clothing, plastics, trash etc. Here quenching and cooling effects of water or of solutions containing large percentage of water are of prime importance.

**Class B** – Fire in flammable liquids, like petrol, gasoline, paints etc. This category also includes liquids, such as propane and butane, but does not include fires involving cooking oil and grease.

**Class C** – Fires in flammable gases, methane, hydrogen, LPG etc.

**Class D** – Fires in combustible metals such as potassium, sodium, magnesium etc. Special extinguishing agents and techniques are needed for fires of this type.

**Class E** – Fires involving electrical equipment's – fires in or near live electrical equipments.

**Class F** – Fires involving cooking oils and fats. High efficiency deep fat fryers have necessitated the introduction of this class of fire separately. Class F fires differ from conventional liquid fires due to high temperatures involved. Carbon di oxide and multipurpose powder extinguishers are effective in extinguishing such fires.

### Do Not Fight a Fire if

- It is bigger than a waste paper bin
- One extinguisher is not enough
- Smoke is affecting your breathing
- You cannot see the way out
- Gas cylinders or chemicals are involved
- Your efforts are not reducing the size of the fire
- There is any risk to yourself

### Basic Fire Prevention

- Be mindful of Fire Safety
- Don't block fire exits, call points or extinguishers, know your exits
- No smoking policy
- Take care with any hot process, follow manufacturer's instructions
- Maintain any machinery
- Observe good security
- Don't wedge Fire Doors
- On Hearing the Alarm
- This may include providing assistance to other persons and

- evacuating area by area

## Extinguishing Fire

- To extinguish a fire, one or more of the following steps should be taken.
- Removing / limiting the supply of oxygen by-
- Preventing air from entering the fire zone
- Putting foam to prevent entry of fresh air.
- Diluting air with a non-oxidizing gas such as carbon dioxide, nitrogen, etc.
- Stopping the supply of fuel.
- Removing heat.
- Interrupting the chemical chain reaction of the fire by using dry chemical agents

### Types of Extinguisher-Water

- Red body
- Suitable for use on Class A Fires, wood and paper etc
- Not suitable for combustible liquids, cooking fats etc
- Not safe to use on fires involving electricity
- Extinguishes by cooling

### Types of Extinguisher-Foam

- Red Body with Cream label
- Suitable for Class A and B Fires (paper, wood and non-cooking fat flammable liquids)
- Not suitable for use on fires involving electricity
- Extinguishes by cooling and sealing the surface of a burning liquid

### Types of Extinguisher-Powder

- Red body with blue label
- Best on Class B (non-cooking fat flammable liquids) fires but safe to use on any type of fire
- Works by chemically interfering with the combustion reaction.

### Types of Extinguisher-Carbon Dioxide

- Red body with black label
- Best on Class B (non-cooking fat flammable liquids) and Class C (flammable gases) fires but safe to use on any type of fire including those involving electricity
- Extinguishes by reducing oxygen levels and cooling
- Beware handle can become very cold (avoid touching in use)

### Types of Extinguisher-Wet Chemical

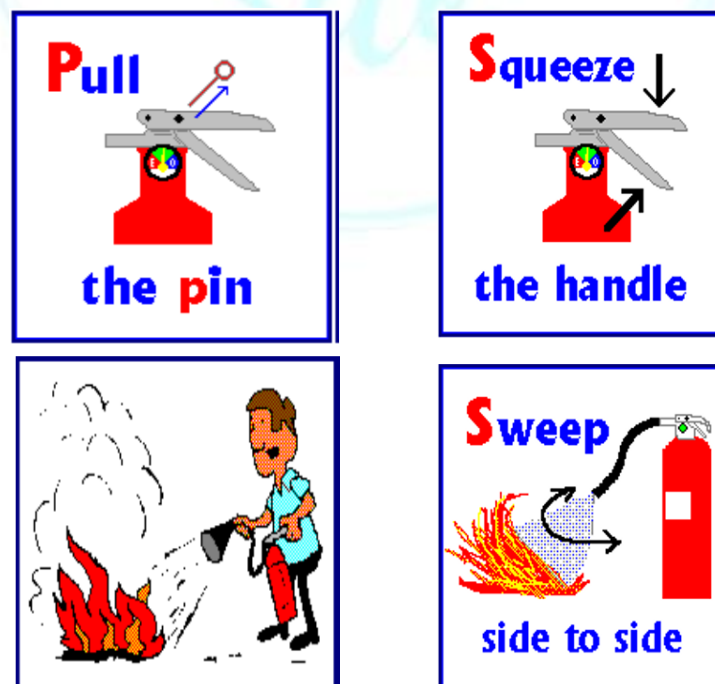
- Red body with Yellow Label
- Suitable for class F cooking oil fires
- Not suitable for class B fires
- Sprays foam as a fine mist to form a layer over the oil
- Extinguishes by cooling and converting the oil into a soap
- Misting action prevents splashing of the oil
- Requires specialist training to use



### Types of Extinguisher-Fire Blanket

Any colour body or label but they are usually red or white for use on any type of fire but best on small contained class B (flammable liquids, may include small cooking pans) fires and people on fire Can be used on microwaves Extinguishes by asphyxiating

### How to Use an Extinguisher



## Care and Maintenance of Fire Control Equipments

Lack of maintenance can lead to extinguishers not discharging when required, or rupturing when pressurised.

They should also be available and fully functional in case of emergency. Proper testing and maintenance schedule must be followed to have all these effective at all time. Comprehensive Maintenance programme includes

1. Inspection 2. Testing 3. Maintenance.

INSPECTION: A visual inspection of a water-based fire system is carried out to verify that it appears to be in operating condition and is free of physical damage. The frequency of inspection varies based on specific needs.

TESTING: It is a procedure to determine the status of a system by conducting physical checks on water-based fire protection systems such as water flow test, fire pump tests, alarm test etc. Care and Maintenance of Fire Control Equipments

MAINTENANCE: It is the work performed to keep equipment in operable condition by making repairs or replacing, if required. Fire extinguishers should be maintained at regular intervals, at least once a year.

## Fire control equipments

### Fire extinguisher

- Is an active fire protection device used to extinguish or control small fires, often in emergency situation



## Hydrant and fire hose reel

- A Fire Hydrant System is an effective and efficient means of extinguishing large fires, which can otherwise cause devastation.
- Hydrant System enables the fire fighter to attack the seat of the fire from a distance.

## Smoke detector and heat detector

- Is a device that senses smoke, and heat typically as an indicator of fire.
- Be signal to a fire alarm control panel

## Fire alarm

- Is a set of equipment working together to detect and alert people through visual and audio appliances when smoke or fire is present.
- Active from smoke, heat detector, water flow sensors which are automatic or from manual fire alarm pull station

## Water sprinkler

- Is the component of a fire sprinkler system that discharges water when the effects of a fire have been detected.

## Fire blanket

- Fire blankets can be used to extinguish small fires in the home, caravan, boat or garage.
- Also be used to wrap around a person whose clothes have caught alight.



## **STEPS TO MAKE HOTEL FIRE SAFE**

1. To install appropriate fire-fighting system in hotel.
2. To provide fire extinguishers in kitchens.
3. To provide sprinkler systems in required areas.
4. To provide smoke detectors and fire signals.
5. To have flame proof motors in pumps and other such motor operated equipment located in the basement adjacent to control room.
6. To provide very good electric system.
7. Regular maintenance of water boilers, geysers, AC plants etc.
8. Staff should be trained to handle fire hazards.
9. Ensure that the valves of the gas bank are shut off after the kitchen closes.
10. Regular scheduled maintenance of all fire-fighting equipments.

## **LEGAL REQUIREMENTS**

- Every hotel has to obtain fire safety certificate from local fire services authorities.
- The restaurants and hotels with seating capacity of 50 or more persons are required to ensure fire safety measures in place irrespective of the height of the building.
- The restaurants are required to have a minimum fire safety device as specified by the local fire services department as follows:
  - An underground water tank of 50,000 liters capacity.
  - A terrace water tank of 5000 liters capacity for hose reel and 10,000 liters capacity if sprinklers are not provided.
  - If the covered area is more than 1500 sq. m or seating capacity is more than 1000 persons there should be a sprinkler system.



- The fire water pump and fire water line have to be painted red.
- The telephone numbers of the nearby Fire Stations are to be displayed in the reception area.

