

## **FIRE FIGHTING EQUIPMENTS**

Fire is a chemical reaction in which oxygen is combined with a gaseous or vaporous fuel. Note that, even if the fuel is a solid (e.g. wood) or a liquid (e.g. petrol) it is the vapours given off when the fuel is heated that burn. This rapid oxidation produces heat and light (flames). Fire can usually take place only when these three elements are present: • Oxygen • Fuel • Heat (energy) These 3 elements make up what is commonly called the 'Fire Triangle.

Essentially, fires are extinguished by taking away one or more of the elements in the fire tetrahedron. This can be achieved by

- Removal or separation of un burnt fuel (eg turn off the gas)
- Removal or dilution of the oxygen supply (eg smothering the fire with a fire blanket or an inert gas)
- Removal of the heat of the oxidation reaction (eg spraying the fuel with water)
- Inhibiting the chain reaction by modifying the combustion chemistry

A **fire extinguisher**, or **extinguisher**, is an active fire protection device used to extinguish or control small fires, often in emergency situations. 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 hand-held cylindrical pressure vessel containing an agent which can be discharged to extinguish a fire.

Different classes of fire extinguishers

Class A: Extinguishers are for ordinary combustible materials such as paper, wood, cardboard and most plastics

Class B: Fires involve flammable or combustible liquids such as gasoline, kerosene and oil.

Class C: Fires involve electrical equipment such as appliances, wiring, circuit breakers and outlets

Class D: Fires that involve combustible metals such as magnesium, potassium and sodium

The selection of a suitable extinguisher is primarily influenced by the following factors

- The size and rate of fire spread
- The Class of fire (i.e. type of materials involved)
- The training and capabilities of the person using the extinguisher

### **Use of fire extinguisher**

There are a number of different types of portable fire extinguishers, each can be identified by the colour coding and labelling. Check that the extinguisher you intend to use is suitable for the type of fire encountered eg a water extinguisher must never be used on any fire involving electrical equipment.

There are four (4) basic steps for using modern portable fire extinguishers.

The acronym **PASS** is used to describe these four basic steps

### **1. Pull (Pin)**

Pull pin at the top of the extinguisher, breaking the seal. When in place, the pin keeps the handle from being pressed and accidentally operating the extinguisher. Immediately test the extinguisher. (Aiming away from the operator) This is to ensure the extinguisher works and also shows the operator how far the stream travels

### **2. Aim**

Approach the fire standing at a safe distance. Aim the nozzle or outlet towards the base of the fire.

### **3. Squeeze**

Squeeze the handles together to discharge the extinguishing agent inside. To stop discharge, release the handles.

### **4. Sweep**

Sweep the nozzle from side to side as you approach the fire, directing the extinguishing agent at the base of the flames. After an A Class fire is extinguished, probe for smoldering hot spots that could reignite the fuel.

## **Water Extinguisher**

Water extinguishers are extinguishers that contain water and compressed gas. The water is ejected through the nozzle by a CO<sub>2</sub> gas cartridge or by stored pressure typically nitrogen gas.

These are used on Class A fires (wood, paper, fabric). They are typically 9 to 10 liters capacity and can project a jet of water about 6 meters. For the best effect the water stream should be directed at the burning material.

## **Foam extinguisher**

The contents are ejected about 4 to 5 meters by a gas cartridge or by stored pressure and they are about 9 liters in capacity. These are used on Class B fires (liquids such

as petrol, paints, oils etc). For the best effect the foam should be applied to fall as lightly as possible onto the burning material. This can be achieved by applying the foam to a rear wall in the case of an enclosed area, or if in an open space aiming the foam to strike the ground just short of the fire so that it flows gently over the burning fuel.

## **Dry Chemical Powder extinguisher**

The contents are ejected by a gas cartridge or by stored pressure. They are used on Class B fires, that is on flammable liquid fires to assist foam in the combined-agent suppression. They are safe to use on live electrical equipment, but are generally not preferred for this role because of the clean-up afterwards. They range in size from 1kg to 11kg, though 9 kg is the most common. The 'standard' powder is sodium bicarbonate, but a number of high performance powders are also in use. Dry chemical powder is most effectively applied to flammable liquid fires in a low sweeping motion so as to apply a cloud of powder over the fire area. There is a possibility of re-ignition once the powder has dispersed from concealed flames or hot spots. When applied to 'running fuel fires' the powder should be directed first at the lowest parts of the fire and gradually worked upwards. DCP extinguishes are rated as either 'ABE' or 'BE'. This will be indicated on the label.

## **Carbondioxideextinguisher**

They are used as a first attack on electrical fires. The portable units vary in size from 2.5 kg to 7 kg. CO<sub>2</sub> is a colorless, odorless gas, which does not support combustion. It is not poisonous but is suffocating in large quantities. The gas is discharged through a wide 'horn' discharge nozzle and the gas stream projects for 1 to 2 meters. This discharge is accompanied by a large roar and the gas is intensely cold, and can cause frostbite. It is applied in a low sweeping motion at the base of the fire, and the possibility exists for re-ignition after the gas disperses. However it leaves no mess or residue and is therefore preferred for electrical fires.