**Chapter 8: Portable Fire Extinguishers**

**Chief Concepts**

* Fire extinguishers are used successfully to put out hundreds of fires every day, preventing millions of dollars in property damage and saving uncounted lives.
* Fire fighters use fire extinguishers to control small fires that do not require the use of a hose line.
* Portable fire extinguishers have two primary uses: to extinguish incipient-stage fires and to control fires where traditional methods of fire suppression are not recommended.
* The primary disadvantage of fire extinguishers is that they are one-shot devices.
* The five classes of fires affect the choice of extinguishing equipment:
  + Class A fires involve ordinary combustibles such as wood, paper, cloth, rubber, household rubbish, and some plastics.
  + Class B fires involve flammable or combustible liquids, such as gasoline, oil, grease, tar, lacquer, oil-based paints, and some plastics.
  + Class C fires involve energized electrical equipment, which includes any device that uses, produces, or delivers electrical energy.
  + Class D fires involve combustible metals, such as magnesium, titanium, zirconium, sodium, lithium, and potassium. Special techniques and extinguishing agents are required to fight combustible-metal fires.
  + Class K fires involve combustible cooking oils and fats.
* Portable fire extinguishers are classified and rated based on their characteristics and capabilities.
* The classification system for fire extinguishers uses both letters and numbers. The letters indicate the classes of fire for which the extinguisher can be used, and the numbers indicate its effectiveness. Fire extinguishers that are safe and effective for more than one class will be rated with multiple letters. Numbers are used to rate an extinguisher’s effectiveness for only Class A and Class B fires.
* The traditional lettering system uses the following labels:
  + Extinguishers suitable for use on Class A fires are identified by the letter *A* on a solid green triangle. The triangle has a graphic relationship to the letter *A*.
  + Extinguishers suitable for use on Class B fires are identified by the letter *B* on a solid red square. The shape of the letter mirrors the graphic shape of the box.
  + Extinguishers suitable for use on Class C fires are identified by the letter *C* on a solid blue circle, which also incorporates a graphic relationship between the letter *C* and the circle.
  + Extinguishers suitable for use on Class D fires are identified by the letter *D* on a solid yellow, five-pointed star.
  + Extinguishers suitable for use on Class K (combustible cooking oil) fires are identified by a pictograph showing a fire in a frying pan.
* The pictograph system uses symbols rather than letters on the labels. Under this system, the presence of an icon indicates that the extinguisher has been rated for that class of fire.
* NFPA 10 lists the requirements for placing and mounting portable fire extinguishers as well as the appropriate mounting heights:
  + Fire extinguishers weighing up to 18.1 kg (40 lb.) should be mounted so that the top of the extinguisher is not more than 1.5 m (5 ft.) above the floor.
  + Fire extinguishers weighing more than 18.1 kg (40 lb.) should be mounted so that the top of the extinguisher is not more than 0.9 m (3 ft.) above the floor.
  + The bottom of an extinguisher should be at least 10 cm (4 in.) above the floor.
* Areas are divided into three risk classifications based on the fire risks associated with the materials in those areas:
  + In light (low) hazard locations, the majority of materials are noncombustible or arranged to limit fire spread, such as in offices.
  + Ordinary (moderate) hazard locations contain more Class A and Class B materials than do light hazard locations, such as auto showrooms and parking garages.
  + Extra (high) hazard locations contain more Class A combustibles and/or Class B flammables than do ordinary hazard locations, such as woodworking shops.
* Most extinguishers stop fires by cooling the fuel below its ignition point, by cutting off the supply of oxygen, or by combining the two techniques.
* Portable fire extinguishers use seven basic types of extinguishing agents:
  + Water—Used to extinguish Class A fires.
  + Dry chemicals—Used mainly to extinguish Class B and C fires. This type of extinguisher can be used to suppress Class A fires, but water is also needed to fully extinguish any embers.
  + Carbon dioxide—Used to extinguish Class B and C fires only.
  + Foam—Used to extinguish Class A or B fires. Be sure to double-check the type of foam in the extinguisher. Most Class B foams can be used on Class A fires, but Class A foams are not effective on Class B fires.
  + Halogenated agents—Include Halons and halocarbons. Halons are limited-use chemicals due to their propensity to damage the environment. These agents are used to extinguish Class B and C fires.
  + Dry powders—Chemical compounds used to extinguish Class D fires.
  + Wet chemicals—Used to extinguish Class K fires.
* Most hand-held portable fire extinguishers have six basic parts:

1. A cylinder or container that holds the extinguishing agent
2. A carrying handle
3. A nozzle or horn
4. A trigger and discharge valve assembly
5. A locking mechanism to prevent accidental discharge
6. A pressure indicator or gauge that shows whether a stored-pressure extinguisher has sufficient pressure to operate properly

* Portable fire extinguishers vary according to their extinguishing agent, capacity, and effective range, along with the time it takes to completely discharge the extinguishing agent. They also have different mechanical designs:
  + Stored-pressure water-type fire extinguishers—Expel water in a solid stream with a range of 10.7–12.2 m (35–40 ft.) through a nozzle at the end of a short hose.
  + Loaded-stream water extinguishers—Discharge a solution of water containing a chemical to prevent freezing.
  + Wetting-agent water-type fire extinguishers—Expel water that contains a solution to reduce its surface tension, which enables the water to penetrate more efficiently into Class A fuels.
  + Pump tank water-type fire extinguishers—Do not store water under pressure, but instead expel it through use of a hand-operated, double-acting, vertical piston pump.
  + Backpack water extinguishers—Nineteen-litre (five-gallon) water tanks used primarily outdoors for fighting brush and grass fires.
  + Ordinary dry chemical extinguishers—Available in hand-held models and larger, wheeled units to extinguish Class B and C fires.
  + Multipurpose dry chemical extinguishers—Available in hand-held models and larger, wheeled units to extinguish Class A, B, and C fires.
  + Carbon-dioxide extinguishers—Include a siphon tube and horn or cone-shaped applicator that is used to direct the flow of the agent. These extinguishers have a relatively short discharge range of 0.9–2.4 m (3–8 ft.).
  + Class B foam extinguishers—Very similar in appearance and operation to water extinguishers, except these extinguishers have an aspirating nozzle.
  + Wet chemical extinguishers—Available in two sizes, 6 L (1.5 gal.) and 9.5 L (2.5 gal.).
  + Halogenated agent extinguishers—Available in handheld extinguishers for Class B and C fires and larger-capacity models for use on Class A fires.
  + Dry powder fire extinguishers—Rely on sodium chloride–based agents. Models with 13.6-kg (30-lb.) capacity are available in either stored-pressure or cartridge/cylinder-operated versions. Wheeled models are available with 68- and 158.8- kg (150- and 350-lb.) capacities.
* There are six basic steps in extinguishing a fire with a portable fire extinguisher:
  + Locate the fire extinguisher.
  + Select the proper classification of extinguisher.
  + Transport the extinguisher to the location of the fire.
  + Activate the extinguisher to release the extinguishing agent.
  + Apply the extinguishing agent to the fire for maximum effect.
  + Ensure your personal safety by having an exit route.
* Activating a fire extinguisher to apply the extinguishing agent is a single operation that involves four steps. The PASS acronym is a helpful way to remember these steps:
  + Pull the safety pin.
  + Aim the nozzle at the base of the flames.
  + Squeeze the trigger to discharge the agent.
  + Sweep the nozzle across the base of the flames.
* When using a fire extinguisher, always approach the fire with an exit behind you. If you are outside, make sure the wind is at your back.
* Fire extinguishers must be regularly inspected and properly maintained to ensure that they will be available for use in an emergency.
* The fire fighter charged with inspecting the extinguishers should perform the following tasks:
  + Ensure that all tamper seals are intact.
  + Determine fullness by weighing or hefting the extinguisher.
  + Examine all parts for signs of physical damage, corrosion, or leakage.
  + Check the pressure gauge to confirm that it is in the operable range.
  + Ensure that the extinguisher is properly identified by type and rating.
  + Shake dry chemical extinguishers to mix or redistribute the agent.
  + Check the hose and nozzle for damage or obstruction by foreign objects.
  + Check the hydrostatic test date of extinguisher.
* Common indications that an extinguisher needs maintenance include the following findings:
  + The pressure gauge reading is outside the normal range.
  + The inspection tag is out of date.
  + The tamper seal is broken, especially in extinguishers with no pressure gauge.
  + The extinguisher does not appear to be full of extinguishing agent.
  + The hose or nozzle assembly is obstructed.
  + There are signs of physical damage, corrosion, or rust.
  + There are signs of leakage around the discharge valve or nozzle assembly.
* A fire extinguisher must be recharged after each and every use, even if it was not completely discharged. The only exceptions are nonrechargeable extinguishers, which should be replaced after any use.
* Most fire extinguishers are pressurized vessels, meaning that they are designed to hold a steady internal pressure. The ability of an extinguisher to withstand this internal pressure is measured by periodic hydrostatic testing. These tests, which are conducted in a special test facility, involve filling the extinguisher with water and applying above-normal pressure.