City of Hendersonville, NC
Fire Extinguisher Operation
In compliance with 29 CFR 1910.157

I. Purpose

The purpose of this policy is to familiarize employees, who may have the need to utilize a portable fire extinguisher, with the general principles of fire extinguisher use and the hazards involved with incipient stage of firefighting. It is not the employee's responsibility or a job requirement (except Fire Department personnel) to fight fires. The City's primary course of action in case of fire is to evacuate, call 911 and let the professionals fight the fire.

II. The Fire Tetrahedron

Before a fire can erupt there must be four elements that come together:

A. Oxygen Source - Approximately 16% oxygen is required for fire ignition. Normal air contains 21% oxygen. Some fuel materials contain sufficient oxygen within their make up to support burning.

B. Heat Source - There must be a heat source to bring the temperature up to the point of ignition. This could be an open flame, sun rays, lightning, hot surfaces, sparks and arcs, friction, chemical action, electrical energy, compression of gases.

C. Fuel - Fuel can come from three sources:

1. Gases — Gases such as natural gas, propane, butane, hydrogen, acetylene, carbon monoxide, and others.

2. Liquids — Liquids include gasoline, kerosene, turpentine, alcohol, paint, varnish, lacquer, olive oil, cod liver oil, and others.

3. Solids — Solids include coal, wood, paper, wax, grease, leather, plastic, sugar, grain, hay, cork, and others. Solids can be bulky items, finely divided items, or dust.

D. Chemical Chain Reaction

Combustion is a complex reaction that requires a fuel and oxidizer, and heat energy to come together in a very specific way. Once flaming combustion or fire occurs, it can only continue when enough heat energy is produced to cause the continued develop of fuel vapor or gases. Scientists call this type of reaction a chain reaction.

III. Types of Fires and Portable Fire Extinguishers

Using an extinguisher that's not rated for the fire you are fighting may make the fire worse. It is particularly dangerous to use water or a Type A extinguisher on a grease fire. Therefore, it is imperative that the employees know which type of fire he or she will be fighting and the appropriate type of fire extinguisher to utilize.

There are multipurpose fire extinguishers rated for more than one type of fire. An ABC rated extinguisher puts out most types of fires that could start in most work centers — wood, paper, cloth, flammable liquid, and electrical fires.

The five types of fires are:

A. Class A Fires - This includes fires involving ordinary combustibles such as wood, cloth, paper, rubber, many plastics, and other common materials that burn easily. You would use a portable fire extinguisher related as a Class A or Type A extinguisher to fight a Class A fire.

   Identifying marks on Class A or Type A portable fire extinguishers are: The letter "A" inside a Triangle Symbol, Color Green, and the words Ordinary Combustibles.

B. Class B Fires - This includes fires involving flammable liquids such as gasoline and other flammable liquids, oils, grease, tar, oil -based paint, lacquer, and flammable gas. You would use a portable fire extinguisher rated as a Class B or Type B extinguisher to fight a Class B fire.

   Identifying marks on Class B or Type B portable fire extinguishers are the letter `B" inside a Square Symbol, Color Red, and the words Flammable Liquids.

C. Class C Fires - This includes fires involving electrical equipment, energized electrical equipment, including wiring fuse boxes, circuit breakers, machinery and appliances. You would use a portable fire extinguisher rated as a Class C or Type C extinguisher to fight a Class C fire.

   Identifying marks on a Class C or Type C portable fire extinguisher are the letter "C" inside a Circular Symbol, Color Blue, and the words Electrical Equipment.

D. Class D Fires - This includes fire involving combustible metals including metal and metal dust often used in industry. If your work center has the possibility of a combustible metal fire then applying extinguisher agents from Class or Type A, B, and C portable fire extinguisher could result in a chemical reaction that could make the fire even more explosive. Class D fires are best left to professional fire fighters; however, Class D or Type D portable fire extinguishers are available. Fire involving the following list of combustible metals would be Class D fires:

Aluminum Phosphide	Aluminum (powder)	Beryllium	Calcium Carbide
Calcium	Cerium	Cesium	Gallium Arsenide
Gallium Phosphide	Lithium Aluminum Deuteride	Lithium Aluminum Hydride	Lithium Aluminum Hydride bis(Tetrahydrofuran
Lithium Amide	Lithium Borohydride	Lithium-6 Deuteride	Lithium Hydride
Lithium Tetraphenylborate tris (1,2-Dimethoxyethane	Lithium tri-tert-butoxy aluminohydride	Lithium	Lutetium
Magnesium Hydride	Magnesium & Magnesium alloys	Nickel Catalyst (Raney)	Neodymium
Phosphorus	Potassium Hydride	Potassium-Sodium Alloys	Red-Al
Rubidium	Sodium	Sodium Aluminum Hydride	Sodium Bis (2-Methoxyethorxy) Aluminum Hydride in toluene
Sodium borohydride	Sodium borohydride Cobalt-Doped	Sodium borohydride on Alumina	Sodium Phosphide
Strontium	Titanium (Powder)	Zink Phosphide	Zinc (Powder)

   You would use a portable fire extinguisher rated as a Class D or Type D extinguisher to fight a Class D fire. Identifying marks on a Class D or Type D portable fire extinguisher are: the Letter "D" inside a Star Symbol and the word Combustible Metals.

E. Class K Fires - This includes a cooking fire involving combustion from liquids used in food preparation. Cooking fires are fueled by a wide range of liquid cooking materials. Greases, cooking oils, vegetable fat, and animal fat are all fuel sources found in Class K fires.

IV. Types of Fire Fighting Agents

Fire extinguishers can contain different types of the firefighting agents:

A. Stored Pressure Water Extinguishers

These extinguishers are for Class A fires (Ordinary Combustibles). The extinguishing stream reach is approximately 30 to 40 feet. The normal discharge time is approximately 60 seconds.

B. Carbon Dioxide Extinguishers — CO2
These extinguishers are normally for Class B and C fires (Flammable Liquids and Electrical). The extinguishing stream is approximately 3 to 18 feet. The normal discharge time is approximately 8 to 30 seconds.

C. Dry Chemical Extinguishers
There are 2 types of dry chemical fire extinguishers. One is called a "multi-purpose dry chemical" and is effective on "A", "B", and "C" class fires; the other type is known as "regular dry chemical", these are capable of handling "B" and "C" class fires.. The extinguishing stream is approximately 5 to 20 feet. The normal discharge time is approximately 10 to 25 seconds.

D. Halon Extinguishers (1111) and (1301)
These extinguishers are normally for Class B and C fires (Flammable Liquids and Electrical). The extinguishing stream is approximately 4 to 10 feet. The normal discharge time is approximately 8 to 25 seconds. This type of extinguisher is recommended for electronic equipment.

E. Dry Powder Extinguisher
This extinguishing agent may be powered graphite, granular sodium chloride, or copper based. All of which are effective at separating the fuel (the ignited combustible metal) from the oxygen. These agents are used on Class D combustible metals fires such as magnesium, titanium, sodium, etc., Class D or Type D portable fire extinguishers must be specifically matched to the type of material they are to protect, as there is no suitable general extinguishing agent for Class D fires. The normal discharge time is approximately 25 to 30 seconds. The extinguishing stream reach is approximately 8 to 10 feet.

V. General Safety Rules in Fighting Fires

A. If you are inside a structure, you should not fight the fire alone. You should have a "buddy" assisting you to keep you aware of any spreading fire, escape route being blocked, toxic smoke accumulation, or other fires breaking out, etc.

B. Fight the fire only if you have had the appropriate training in the use of the portable fire extinguishers and you are confident that you can operate the extinguisher effectively.

C. Fight the fire only if the fire is small and confined to the immediate areas where it started (wastebasket, cushion, small appliance, etc.).

D. Fight the fire only if you can keep your back to a safe escape route.

E. Make sure you have the proper class or type of portable fire extinguisher to fight the fire.

F. Stay upwind of the fire so the flames will be blowing away from you and stay approximately ten (10') away from the fire.

G. Never let the fire get between you and the escape route.

H. Stay low and avoid breathing the heated smoke and fumes or the extinguishing agent.

I. If the fire starts to spread or threatens your escape route, run, get out immediately.

VI. Know When Not to Fight a Fire

There are times when it is reckless to fight a fire with a portable fire extinguisher:

A. If the fire is spreading beyond the immediate area where it started or is already a large fire.

B. If the fire could block your escape route.

C. If you are unsure of the proper operation of the available portable fire extinguisher.

D. If you are in doubt whether the extinguisher you are using is proper enough for the type of fire at hand.

If even one of the above conditions is true, then leave immediately, close off the area, and leave the fire to the Fire Department personnel.

VII. How to Operate a Portable Fire Extinguisher "PASS"

A. Remember that the portable fire extinguisher can be quite heavy so be prepared to hold the weight when you unhook the unit from its holder. Hold the extinguisher securely in an upright position and "**PULL**" the ring pin out.

B. Remove the hose from the security catch and aim the nozzle in a safe direction. Conduct a "test firing" of the extinguisher before attempting to fight the fire. Squeeze the operating handle briefly to see if extinguishing agent is released. If the extinguisher operated properly then you can now proceed to fight the fire.

C. "**AIM**" the nozzle at the base of the fire and sweep the nozzle from side to side as the extinguishing agent is released. "**SQUEEZE**" the operating handle to release the extinguishing agent. Remember that the extinguisher contain fire- fighting agents that are under pressure (water, carbon dioxide, dry chemical, halon, etc.) so hold the extinguisher lever and hose nozzle securely. Remember there will be a cloud of extinguishing agent released at high speed.

D. And "**SWEEP**" the hose nozzle from side to side near the ground or floor level at the base of the fire until the fire goes out or until the extinguishing agent is depleted.

VIII. Live Burn Training

All employees will be given an opportunity for hands on experience with a fire extinguisher.

John F. Connet

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