EXIT ROUTES AND FIRE PROTECTION
Learning Objectives

By the end of this lesson, students will be able to:

- List or describe the three parts to an appropriate exit route.
- List at least three of the five classes of fire extinguishers and the types of fires they can properly extinguish.
- Describe the basic steps involved in using a fire extinguisher.

Time Needed: 45 Minutes

Materials Needed

- PowerPoints: *No Exit*
  *Which Fire Extinguisher*
- Handouts: Fire Safety at Work (A)
  Typical Fire Extinguisher Labels (B)
- Printouts: A,B,C,D,K fire extinguisher labels for posting
- Consider inviting a local fire department representative to train students on fire extinguisher use

Preparing to Teach This Lesson

Before you present this lesson:

1. Locate the PowerPoint slides *No Exit* (adapted from the OSHA-10 PowerPoint created by the OSHA Office of Training and Education) and *Which Fire Extinguisher?* on your CD. Review and test the slides in each file.

2. Make student copies of handouts (A) Fire Safety at Work and (B) Typical Fire Extinguisher Labels.

3. Make one copy each of printouts A, B, C, D and K and tape them up on the walls in different locations around the room.

Detailed Instructor’s Notes

A. PowerPoint Slide: *Exit Route* (10 minutes)

1. Start the presentation with the following introduction about why this subject is important.

   - Workplace fires and explosions kill 200 and injure more than 5,000 workers each year in the U.S.
   - Two examples of tragic workplace fires:
     - In 1911, 146 workers died at the Triangle Shirtwaist Factory in New York City because fire exits were locked and there was no fire extinguishing system.
     
http://en.wikipedia.org/wiki/Triangle_Shirtwaist_Factory_fire
• In 1991, 25 workers died and 54 were Injured in the Hamlet Chicken Processing Plant fire in North Carolina because of blocked or locked fire exits.
  http://en.wikipedia.org/wiki/Hamlet_chicken_processing_plant_fire

• In addition to fire, other kinds emergencies can endanger workers such as explosions, earthquakes, bomb threat, toxic vapors, storms, etc.

2. Use the PowerPoint presentation, No Exit, to go over key elements of exit routes and what’s required in the workplace.

B. Practice Emergency Exit Drill (10 minutes)

1. Use your classroom and the school to demonstrate exit route principles. Point out your exit route map, exit signs, and a final safe place to debrief. Time how long it takes to get the class out of the building.

2. In the debriefing session, ask the students about some of the main points from the PowerPoint presentation and what they noticed when exiting your building such as:

What are the three things every exit must have?

• Access to the exit from inside
• The exit itself (the doorway)
• A clear place safe to exit out to (discharge)

What are important things to look for when checking for adequate exits in your workplace?

• Enough exits for everyone to get out
• Well-marked and well-lighted exits
• Doors can’t be locked from the inside
• Unobstructed exits
C. Understanding fire extinguishers (25 minutes)

1. Distribute the Handouts (A) Fire Safety at Work and (B) Typical Fire Extinguisher Labels.

Go over key points, including the importance of using the right fire extinguisher. Remind students that in most workplace settings, the most important thing for employees to know is the procedures in their workplace: who is trained to use a fire extinguisher? what is the alarm system? when and how should employees leave the building? Remind students that if they have not been trained to use the fire extinguisher, at their workplace, they should not use it.


This activity helps students recognize fire types and the appropriate extinguishers. Print out the labels for fire extinguishers (A,B,C,D,K) and place them on the wall around the room.

Show the PowerPoint presentation Which Fire Extinguisher? Each slide has pictures of different types of fires. Instruct the students to point to the proper fire extinguisher type as you present each slide. Discuss the correct answer, which will appear with a mouse click for each picture. Note that combination extinguishers, e.g. ABC, often replace single types today, but for the purposes of this exercise the correct answers are single answers.

3. Optional Activity: You may want to invite the local fire department in to train students on fire extinguisher use. This is an excellent hands-on activity. Emphasize that they should not use the extinguisher in their workplace unless they’ve been trained to do so, but that using an extinguisher is an important skill for everyone to know. Ask them if they have fire extinguishers in their homes.

D. Additional resources

The following websites may help with this module:
OSHA’s e-tool for exit routes (with online, interactive demonstrations of the rules):
OSHA’s website on fire safety: http://www.osha.gov/SLTC/firesafety/index.html

The following OSHA and State of Washington L&I-DOSH-WISHA codes correspond to information in this unit:
OSHA 29 CFR 1910.33, Means of Egress
OSHA 1910.155 Fire Protection
L & I DOSH WISHA WAC 296-800-300 Fire Extinguishers
Fire Safety at Work

Fire is a hazard on any job. Fires can be started many ways. Heating systems, cooking, careless smokers, electricity, appliances, poor housekeeping and the improper storage of chemicals are a few examples. With fires or other emergencies, the primary concern is to protect the building occupants.

Always know the location of escape routes (more than one) and what to do in case of fire or other emergency. If you do not know, ask. Every workplace should post evacuation routes and have exits clearly marked.

For a fire to burn three things must be in place. They are:

1. **Fuel: the material which burns.** Solids and liquids do not burn — it is their gases or vapors that burn. When materials such as wood and gasoline are heated to a certain point, they give off vapors. If enough vapor is present and mixed with air, the mixture can be ignited. A flashpoint is the lowest temperature at which there is enough vapor to form a mixture that can produce a flame.

2. **Heat: the means by which the fire is ignited.** This may be from a spark, hot surface, hot air or a chemical reaction.

3. **Oxygen: feeds a fire.** Oxygen is required for a fire to begin and for it to continue to burn.

If one of these three elements is absent, there is no chemical reaction and the fire cannot burn. If you remove one of the three components, the triangle collapses and fire cannot occur. To prevent fires, keep the three components of fuel, heat and oxygen from combining and causing a chemical reaction.

In case of fire...

*Firefighting is best done by trained professionals.* Only fight a fire if you have been trained to do so and have the proper equipment.

**Fires and fire extinguishers are classified by type of fuel:**

- **Class A fires** involve ordinary materials like wood, paper, plastic and cloth. Prevent these types of fires by keeping work areas free from litter and placing cleaning rags in special covered containers. When working near a source of heat or open flame, ensure that you keep things that can burn well away from the heat source.

- **Class B fires** involve flammable or combustible liquids, such as paint thinners, grease, gasoline, propane, kerosene, fuel oil, paint and lamp oil. To prevent these types of fires, use the following:
  - Allow machinery to cool before refueling.
  - Do not refuel or pour liquid near an open flame (furnace, barbecue or cigarette).
Make sure that the areas where the fuels are stored are well ventilated to prevent the buildup of fumes that could be ignited.

Store fuels away from sources of sparks. The containers that the flammable liquids are stored in should be tightly closed and spill proof.

- **Class C fires** are electrical fires involving electrical equipment, switches, and power tools. Prevent these types of fires by keeping electrical equipment in good repair. Do not use equipment that has faulty wiring. Do not overload wall outlets. Use three-prong plugs. Fight Class C fires with a fire extinguishing material that does not conduct electricity. Never use water on fires where there is electricity.

- **Class D fires** involve metals that burn, such as magnesium, potassium and sodium. Special materials, which differ according to the metal involved, are needed to extinguish Class D fires. If you work on a work site with metals that burn, be sure you know what to do in case of a fire.

- **Class K fires** involve cooking oil and greases, such as animal and vegetable fats. Remember K is for kitchen fire. To prevent these types of fires:
  - Don't leave food cooking unattended.
  - Turn pot handles inward to prevent knocking pots over accidentally.
  - Keep stove top clean. Grease can ignite.
  - Roll your sleeves up when cooking.
  - Keep all flammable things, including utensils and potholders, away from open flames.

**Fire Extinguishers**

Fire extinguishers are rated according to the type of fire (A,B,C,D, K) they are suited to extinguish. The rating should be on a plate on the extinguisher. Do not use a fire extinguisher unless you have been trained to do so.

**What should you do if there is a fire?**

- Always alert emergency response people in the case of fire.
- When you leave a burning room or building, close the door if you are the last one out. This prevents air (oxygen) from reaching the fire.
- Do not use elevators — use the stairs. Stairways should always be kept free of obstacles.
- Stay low to the floor to avoid smoke and toxic gases.
- Try to cover your nose and mouth with a damp cloth.
- Before opening doors, place the back of your hand on them to see if they are hot. If a door is hot, use another exit.
If you become trapped, seal the cracks around the doors and vents. Look for a telephone, call the fire department and give your exact location. Keep the vents and windows closed but make sure that you can open them to let fresh air in if breathing becomes difficult. Stay low.

**Stop, Drop and Roll**

If you or a co-worker catch on fire, remember Stop, Drop and Roll. Stop what you are doing, Drop to the ground and Roll around. This action will smother the flames and may save your life.

A special fire blanket, a blanket, rug or coat can be used to wrap a person who is on fire. This will prevent the flames from getting air.

Adapted from *Safety and the Young Worker - Student Manual*, Workers’ Compensation Board, Northwest Territories, Canada
Typical Fire Extinguisher Labels

Letter-shaped symbol markings are used to indicate which fire extinguisher to use for each type of fire.

**Extinguishers for Class A fires** should be identified by a triangle containing the letter “A.” If colored, the triangle should be green.

Extinguishers for Class B fires should be identified by a square containing the letter “B.” If colored, the square should be red.

Extinguishers for Class C fires should be identified by a circle containing the letter “C.” If colored, the circle should be blue.

Extinguishers for fires involving metals should be identified by a five-pointed star containing the letter “D.” If colored, the star should be yellow.

Extinguishers for fires involving cooking oils should be identified by the letter “K.” This is usually not colored.

Extinguishers suitable for more than one class of fire should be identified by multiple symbols placed in a horizontal sequence. For example ABC combination extinguishers are very common for multi-purpose application.
No Exit PowerPoint Presentation

(Adapted from OSHA Office of Training and Education)

Introduction

- Fires and explosions kill more than 200 and injure more than 5,000 workers each year!
- Tragic workplace fires have happened and can be prevented
- Other kinds of emergencies (e.g. explosions, earthquakes, bomb threats, toxic vapors, storms, etc) can also endanger workers.
- OSHA requires employers to provide:
  - proper exits,
  - fire fighting equipment,
  - employee training to prevent fire deaths and injuries in the workplace.
Exit Route

- An exit route is a **continuous** and **unobstructed** path from any point within a workplace to a place of safety
  - includes refuge area
- Exit routes have three parts:
  - Exit access
  - Exit (door)
  - Exit discharge

Basic Requirements

- Exit Routes must:
  - Be permanent
  - Have enough exits for a quick escape
- Exits must be separated by fire-resistant materials
- Openings into an exit must be:
  - limited to those necessary to allow access to the exit or to the exit discharge
  - protected by an approved self-closing fire door that remains closed or automatically closes in an emergency
Exit Discharge Requirements

- An exit discharge must lead directly to safe space
  - Outside, street, walkway, refuge area, public way, or open space with access to the outside
- The safe space must be large enough to accommodate everyone likely to use the exit
- Exit stairs that continue beyond where the exit discharge is located must have some effective means clearly indicating the discharge

Exit Doors Must Be Unlocked

- Everyone must be able to open exit doors from the inside at all times
  - without keys, tools, or special knowledge
  - may be locked from the inside only in mental, penal, or correctional facilities where there is constant supervision
- Device such as a panic bar that locks only from the outside is permitted
- Must be free of any device or alarm that could restrict emergency use if the device or alarm fails
Minimize Danger to Employees

- Exit routes must be:
  - Free and unobstructed
  - Free of explosive or highly flammable materials
  - Arranged so that employees will not have to travel toward a high hazard area, unless it is shielded

- Emergency safeguards must be in working order at all times
  - sprinkler systems, alarm systems, fire doors, exit lighting, etc.

Exit Marking

- Each exit must be clearly visible and marked with an “Exit” sign
- Each exit must be free of decorations or signs that obscure the visibility of the door
- The line-of-sight to an exit sign must clearly be visible
Exit Marking (cont’d)

- If the direction of exit travel is not immediately apparent, signs must be posted indicating the direction to the nearest exit.

- Doors along an exit route that could be mistaken for an exit must be marked “Not an Exit”, or be identified by a sign indicating its actual use (e.g. closet).

Importance of Safe Exit Routes

- Factors that may interfere with safe escape include:
  - Panic
  - Confusion
  - Poor visibility
  - Lack of information
  - Misinformation

- These factors frequently cause more injuries and fatalities than the hazard itself.

- Be prepared.
Which Fire Extinguisher? PowerPoint Presentation
Which Fire Extinguisher? PowerPoint Presentation

Magnesium recycling center
Which Fire Extinguisher? PowerPoint Presentation
Potassium fires are violet in color

Which Fire Extinguisher? PowerPoint Presentation
K