

USING FIRE EXTINGUISHERS **IN INDUSTRIAL ENVIRONMENTS**

COURSE OUTLINE

- **Fire extinguishers are designed to put out small fires before they grow out of control.**
 - But putting out fires with an extinguisher isn't always easy, and can be dangerous if you go about it in the wrong way.
 - To use an extinguisher effectively it's helpful to know what causes things to burn.
- **Fire always needs three ingredients...**
 - Fuel.
 - Oxidizer.
 - ... and heat.
- **The "fuel" is any material that will burn, including...**
 - Combustible solids such as wood, paper, cardboard and some metals.
 - Flammable and combustible liquids such as gasoline, toluene and some solvents and cleaning solutions.
 - And ignitable gases such as propane and natural gas.
- **A fire must also involve an oxidizer.**
 - In most cases, atmospheric oxygen takes on this role.
 - But there are some situations where an oxidizer such as fluorine or chlorine, combined with heat and fuel, can lead to a fire too.
- **Regardless of the type of oxidizer, the more of it a fire has, the better it can burn.**
 - This is why fires that rely on oxygen can flare up when you "fan" it.
- **The third element that a fire needs is heat.**
 - This is a "source of ignition" such as a match or an electric spark that "lights" the fire and keeps it burning.
- **The best way to put a fire out is to deprive it of oxygen or heat.**
 - That is what fire extinguishers are designed to do.

- **Though they may look more or less the same, all fires are not alike.**
 - The types of materials that are burning and the location of the fire determine how they behave, and how you should try to put them out.
- **Fire extinguishers work by applying substances called "fire retardants".**
 - They can cool a fire, deprive it of oxygen... or they can do both.
- **But using the wrong type of retardant on a fire can make a bad situation even worse.**
 - For example, an air-pressurized water extinguisher will do a great job of putting out burning cardboard.
 - But using a water extinguisher on burning liquids will only spread the fire further.
 - And since water conducts electricity, you wouldn't want to use it on a fire that is burning in or around electrical equipment, because someone could be electrocuted.
- **To make it easier to distinguish between different types of fires and determine what type of extinguisher should be used on them, fires have been divided into classes.**
- **"Class A" fires involve everyday solid combustibles like paper, cardboard and wood.**
 - Extinguishers that discharge water, foam and some dry chemical agents can be used on this class of fires.
- **"Class B" fires involve flammable gases, liquids and some plastics.**
 - Extinguishers that discharge dry chemicals, foam and carbon dioxide should be used on these.
- **"Class C" fires involve electricity and can occur in any type of electrical equipment.**
 - Extinguishers that apply "nonconductive" substances, such as carbon dioxide and dry chemicals, must be used on Class C fires.
- **"Class D" fires involve combustible metals.**
 - This type of fire is less common but can still occur in industrial environments because of the high levels of heat that metals can be exposed to.
 - These fires can be very dangerous to extinguish, so if you do encounter one, don't try to put it out unless you have been specifically trained to do so.

- **“Class K” fires involve cooking-related materials, such as cooking oil, grease, and animal fats.**
 - They spread quickly and can be difficult to manage, so if you are working around these materials, be cautious.
- **The labels on fire extinguishers are always marked with the classes of fires they should be used on.**
 - Sometimes they also display "pictograms" that illustrate the classes.
 - It's important to pay close attention to this information, as many extinguishers are designed to put out multiple classes of fires.
- **So you can see why you need to know what types of fires could occur at your facility, as well as what extinguishers you should use to fight them.**
 - Talk to your supervisor if you have questions.
- **The fire extinguishers in your facility need to be appropriate for the classes of fires that are most likely to occur there.**
 - Since industrial facilities can contain wood, flammable liquids and electrical machinery, they should be equipped with extinguishers that are rated for Class A, B and C fires.
- **As a result, multi-purpose dry chemical ABC fire extinguishers are by far the most popular type of extinguisher in use today.**
 - These extinguishers use a chemical called monoammonium phosphate that coats the fuel and smothers the fire.
- **But the residue that ABC extinguishers can leave behind is not only hard to clean up, it's also mildly corrosive.**
 - So they should only be deployed when there is the real possibility of a Class A fire occurring.
- **Dry chemical extinguishers that are rated for Class B and C fires discharge sodium bicarbonate, (also called "baking soda").**
 - This material is non-corrosive and easy to sweep up.
 - So these extinguishers are preferable when fighting B and C Class fires.
- **The heat from a fire causes the baking soda to release carbon dioxide gas.**
 - This smothers the fire.
 - Its residue also forms a barrier between the fuel and oxygen, so that the fire won't reignite.

- **Carbon dioxide (CO₂) extinguishers are another type of extinguisher that is rated for Class B and C fires.**
 - They don't leave any residue.
 - They are especially good for use in computer rooms and other areas that contain electronics or other delicate equipment.
- **While CO₂ can smother a fire effectively, it also tends to disperse into the atmosphere very quickly.**
 - As a result, a blaze that has not been completely extinguished could easily reignite.
 - So if you're using a CO₂ extinguisher you need to watch closely to make sure that the fire is really out.
- **When a fire needs to be extinguished, our first instinct can often be to douse it with water.**
 - In fact, water and water-based foams are good at putting out some types of fires but can be very dangerous if they are used on others.
- **While water can be a convenient and effective retardant for putting out Class A fires, it cannot be used safely on...**
 - Class B fires that involve burning liquids.
 - Class C fires that occur in or near electrical equipment.
- **So most water extinguishers have been replaced by dry chemical "ABC" equipment.**
- **But dry chemicals don't work well on some Class A fuels.**
 - For example, they can't reach the burning embers within a stack of paper or a pile of sawdust.
 - But water can soak into these materials to extinguish the fire, so water extinguishers still have some uses.
- **Extinguishers that discharge water-based foams are usually rated for Class A and Class B fires, though not for Class C.**

- **Foam retardants "blanket" burning materials to cut off their oxygen supply.**
 - As a result, foam extinguishers can do a good job of putting out burning liquids.
 - Foam extinguishers can also cover spills of flammable liquids to prevent them from catching fire.
 - So, for instance, foam extinguishers can be especially useful in commercial garages and chemical storage facilities.
- **There are also a number of other types of fire extinguishers that are designed to be used in specific environments, and to put out specific types of fires.**
 - Ask your supervisor about what types of extinguishers are appropriate for your work area.
- **While it is important to act quickly in a fire emergency, there are several things you should do before you reach for a fire extinguisher.**
 - First, make sure the fire alarm has been activated, or pull it yourself.
 - Then, help other people to start evacuating the area, especially anyone who has been injured.
 - And close nearby doors and windows that could feed the fire with oxygen.
- **A large fire, or one that has spread into ceilings or walls, may already be too dangerous for you to fight.**
 - Smoky fires can be very hazardous as well.
 - Smoke inhalation kills more people than flames do.
 - In these cases, you should leave the area and let professional firefighters handle things.
- **But if you feel that it's safe to try and combat a fire, grab the closest extinguisher.**
 - Check its label to be sure it's the right type to use in the situation.
 - Make sure that you have a clear escape route in case you need one.
 - Position yourself to be within the "effective range" that is marked on the extinguisher's label (it will be about 6-8 feet for most dry chemical ABC extinguishers).
 - Hold the extinguisher upright.

- **Even under the stress of fighting a fire, you can make sure you use the extinguisher correctly by remembering the word "P.A.S.S."**
 - Pull the extinguisher's pin.
 - Aim the nozzle at the base of the fire.
 - Squeeze the trigger.
 - Sweep from side to side with a slow, steady motion.
- **Remember that retardants cool and smother a fire by working on its fuel.**
 - So keep the nozzle of the extinguisher pointed at the base of the fire, not the flames.
- **If you are dealing with flammable liquids, be careful not to "splash" the spill.**
 - That will only cause the fire to spread.
- **As the fire gets smaller, step forward to stay within the extinguisher's "effective range".**
 - But don't get too close and be careful where you walk!
- **If fighting the fire is creating a lot of smoke, crouch down near the ground.**
 - There will be more fresh air there, and it will be easier to see.
- **Most portable dry chemical extinguishers provide about 10 to 15 seconds of continuous spraying.**
- **Once the extinguisher is empty...**
 - Leave it in an out-of-the-way area so no one will trip over it.
 - Place the extinguisher on its side so others will not try to use it.
 - Then get yourself to safety... even if the fire appears to have been extinguished.
- **When something in your facility is burning, seconds count.**
 - So fire extinguishers should be kept in all work areas where a fire might occur, in a place where they're easy to find.
 - They also need to be fully charged and functional.
- **OSHA regulations, state ordinances and local fire codes require many environments to have portable fire extinguishers by all fire hazards, including...**
 - Industrial facilities.
 - Offices.
 - ... and public buildings.

- **The Department of Transportation (DOT) requires that all commercial vehicles be equipped with fire extinguishers, as well.**
 - Extinguishers should be mounted on hangers or in marked fire extinguisher cabinets, where they can be clearly seen.
- **The Occupational Safety and Health Administration (OSHA) also has developed guidelines for mounting an extinguisher.**
 - The bottom of the extinguisher should be at least 4 inches off the ground.
 - If the extinguisher is over 40 lbs., the top of the extinguisher should be no more than 3.5 ft off the ground.
 - If the extinguisher is less than 40 lbs., the top of it should be no more than 5 ft off the ground.
- **Never store an extinguisher on the floor, in a closet, or behind furniture, plants or decorations.**
 - When a fire's burning you don't want to have to search for one.
- **You also need to make sure that all of the fire extinguishers in your facility work.**
 - So regular inspections and maintenance of the equipment should be an important part of your fire prevention program.
- **Extinguishers should be checked at least once a month to verify that they are in working order.**
 - Any that are located outdoors should be inspected every week.
- **As you inspect an extinguisher, you should check that...**
 - The pressure gauge indicates that it is fully charged.
 - The locking pin and plastic "tamper seal" are in place.
 - The hose and horn are undamaged and unobstructed.
 - And all metal parts are free of corrosion.
- **Fire codes require extinguishers to be inspected by an authorized service technician annually.**
 - They should have their cylinders pressure-tested at regular intervals as well.
 - The service tag on the extinguisher will show when it's due for its next inspection.

*** * * SUMMARY * * ***

- **Fires need fuel, an oxidizer such as oxygen and heat to burn. Take one of these elements away, and you put out the fire.**
- **Fires have been organized into classes to help you choose the right extinguisher to use with them.**
- **You should become familiar with the fire hazards in your facility, the classes of fires that can occur, and the types of extinguishers you should use on them.**
- **Fire extinguishers should be inspected regularly and maintained in good working order.**
- **When you're fighting a fire with an extinguisher, remember the "P.A.S.S." method.**
- **Fire extinguishers can provide a secure and reliable defense against fires in your facility, so you need to know how to use them.**
- **Now that you understand how fire extinguishers work and know how to use them effectively, you can help make your facility a safer place for yourself and your coworkers if a fire ever does occur!**