



Safety Training Topics

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Identifying Electrical Hazards in the Home

Understanding Arc Flash as a Hazard

Understanding Electrical Injuries

Accident Review: Electrocution

SAFETY TRAINING TOPIC

Identifying Electrical Hazards in the Home

Electrical hazards exist in the home and office in addition to a variety of different job sites. In fact, many electrical injuries and electrocutions occur away from work. Fortunately, there are some tips that you can follow, to help protect yourself from electric shock, electrocution and fires in the home or office setting.

Inspect electrical outlets for loose fitting plugs, as they can increase the likelihood of shock and electrical fires. If you observe missing or broken wall plates, replace them immediately and avoid overloading outlets with too many appliances. In the event that small children will be around unused outlets, you should make sure to use tamper resistant safety covers.

It is important to check cords of appliances as well as the plugs and connectors, to make sure they are not frayed, cracked or damaged, placed under rugs or carpets, resting on furniture or located in high traffic areas. Never nail or staple cords to walls, floors or any other objects.

If you need to use an extension cord for any purpose, it should only be done so on a temporary basis. If you are using extension cords, make sure that they have safety closures to protect young children from shocks or mouth burns. Never use an indoor extension cord for outdoors. Never use multiple extension cords.

You should check all electrical panels to make sure that all breakers and fuses are properly rated for the circuit that they are protecting. If you are not sure what the correct rating is, have a qualified electrician identify and label the correct size that needs to be used. When an appliance keeps blowing a fuse, trips a breaker or shocks you, immediately unplug, repair or replace it. When replacing a fuse, you must replace it with the same size as the fuse you're removing.

Additionally, inspect all light bulbs and appliances to ensure the wattage matches each fixture requirements. Never replace bulbs with those that have higher wattage than recommended. When changing a light bulb, make sure that it is screwed in properly to prevent overheating.

Check for ground fault circuit interrupters (GFCIs) on electrical outlets. A GFCI is an inexpensive electrical device that shuts off power instantly if there is a problem. If you do not have them, you should install them, especially in all "wet" areas of the home such as bathrooms, kitchens and basements. Test them monthly to ensure they are operating properly.

You may also consider adding arc-fault circuit interrupters (AFCIs) on bedroom circuits, carbon monoxide and smoke detectors. If you have additional questions or concerns consult with an electrician or local electrical inspector.

REVIEW AND DISCUSSION

- What can happen if you use an electrical appliance with a loose fitting plug?
- When is it acceptable to nail or staple appliance cords to walls or the floor?

SAFETY TRAINING TOPIC

Understanding Arc Flash as a Hazard

Arc flash occurs when a flashover of electric current leaves its intended path and travels through the air from one conductor to another, or to the ground. The results can be detrimental if you or a colleague is in close proximity to the arc flash. This hazard can cause serious injury or even be fatal. It is important to understand what causes arc flash and how to avoid it.

Arc flash can be caused by many things including dust, dropping tools, accidental touching, condensation, material failure, corrosion, and faulty installation. Three factors determine the severity of an arc flash injury:

- Proximity to the hazard
- Temperature
- Time for circuit to break

If you experience an arc flash injury, your quality of life may never be the same. It is important to understand how to avoid the hazard. An arc can result in burns, fires, flying objects, blast pressure, and a sound blast.

The National Fire Protection Association (NFPA) has developed shock and arc flash boundaries designed to protect you when working on or near energized equipment. These are:

- Limited Approach – distance from an exposed energized electrical conductor or circuit part within which a shock hazard exists. No unqualified workers are allowed inside this boundary.
- Restricted Approach - distance within which there is an increased risk of shock, due to electrical arc over combined with any inadvertent movement while working close to an energized electrical conductor or circuit part.
- Prohibited Approach (inner boundary) - a distance from an exposed part which is considered the same as making contact with the live part. This distance is not common between equipment. Some equipment will have a greater flash protection boundary while other equipment will have a lesser boundary.
- Arc Flash Boundary- distance within which an arc flash hazard exists and the incident energy level could cause severe damage and appropriate PPE is needed. At 1.2 cal/cm² second degree burns occur.

When determining what the appropriate boundary should be for a given hazard, you will need to assess the severity of the hazard. There are a variety of factors that will impact what the safe approach boundary will be. They include level of voltage, atmosphere and other activities being conducted in proximity to the hazard.

REVIEW AND DISCUSSION

- What are some things that can cause an arc flash from occurring?

SAFETY TRAINING TOPIC

Understanding Electrical Injuries

When working on or near electricity, a variety of electrical hazards are encountered on a daily basis. At some point you may encounter a colleague that becomes a victim of electric shock or an electrical burn. If this occurs, there are some reactionary measures that you should be familiar with to help respond to the situation.

First, it is imperative to understand that electrical injuries are very different than other types of injuries. Electric shock occurs when electricity flows through the body. When electricity flows through your body it has an impact on the normal electric impulses that occur in your nerves. It can damage your internal organs, heart rhythm, and even cause death.

Once electricity enters your body it generates heat, which can cause burns to internal organs. Electric arcs can also occur at the point of entry/exit, generating dangerous levels of heat that can result in severe burns to the skin.

If you observe a victim of an electrical injury, do not touch them while they are still in contact with the source of electricity. If you do, the electricity could enter your body and you both will become victims. If the source of the electricity can be shut off, do so immediately. If it cannot and there is suitable equipment on hand to protect against appropriate voltage, you can use it to free the victim.

Once the person is free from the electrical source, check to see if they are breathing and they have a pulse. If the victim is not breathing or does not have a pulse, you may need to begin cardiopulmonary resuscitation (CPR). Never perform artificial respiration on a victim that is breathing.

Additionally, you should look for the following symptoms for shocking sensations; numbness or tingling, change in vision, speech, or any unusual sensation, burns or open wounds, muscle spasms or contractions, sudden immobility or fractures, potentially deformed body parts, interrupted breathing, irregular heartbeats or chest pain, seizures, or unconsciousness.

In the event that any of these symptoms are evident, you should immediately call 911. Even if the contact was a low voltage source or there are no real symptoms of electric shock, you should still have the victim seek medical attention. Certain effects of the electricity are not always immediately apparent.

REVIEW AND DISCUSSION

- What should you never do if you observe a victim of an electrical injury still in contact with a source of electricity?
- When should you never attempt to perform CPR on a victim of an electrical injury?
- What type of symptoms should you look for to contact emergency following an electrical injury?

SAFETY TRAINING TOPIC

Accident Review: Electrocution

A steelworker was electrocuted when he contacted the energized case of a toaster oven. While taking a break from his normal work routine, the victim sat upon a wooden bench and rested his right forearm on a floor model air conditioner upon which the 120-volt toaster oven was setting. The victim's right arm contacted the energized casing of the toaster oven while his right calf contacted the grounded air-conditioning unit.

The victim received an electrical shock and went into cardiac arrest. The victim was treated by the local emergency medical service and transported to the local hospital where he was pronounced dead on arrival.

The company had a written safety policy and a comprehensive safety program. On-the-job and classroom training was provided to all employees, as well as training videos and safety manuals on electrical hazards. Additionally, weekly safety contacts were made and documented.

Following the incident investigators concluded that, in order to prevent future occurrences, employers should:

- Employers should periodically inspect all areas of their facilities, especially non-production areas, lunch rooms, break rooms, rest rooms, etc., to identify non-polarized plugs, improper grounding, and any other electrical hazards that may be present, and then apply appropriate measures to eliminate the hazard.
- Employers should require that all appliances brought into their facility be tested for electrical integrity by a qualified person before they are used. Employers should not only require such testing, but also ensure that all supervisors and workers are aware of the testing policy. [Note: The employer in this incident has adopted such a policy.]
- Employers should periodically re-evaluate safety programs and reinforce training related to worker recognition, avoidance, and reporting of hazards. A subsequent interview of the witnesses revealed that the victim and his co-workers were aware that a problem existed with the oven. On a number of occasions the workers, including the victim, had received electrical shocks from the oven.
- Employers should provide CPR training to all workers, both management and labor. Employers should ensure that all workers are provided with CPR training to support circulation and ventilation until trained medical personnel arrive.

REVIEW AND DISCUSSION

- What types of hazardous conditions might you look for to prevent a similar incident?