Electrical Safety

Goal

Improve electrical hazard recognition and emphasize the importance of following proper electrical safety procedures.

Objective

Workers will be able to identify and maintain safe conditions in the workplace to avoid electrical hazards.

Background

Electricity is so commonplace that it is easy to forget the dangers associated with its use. This lack of respect for the dangers of electricity results in a high number of electrocution deaths both in the workplace and at home. Shocks severe enough to kill occur when electric current travels though the body, especially when near the heart.

Electric shock can also cause

- Severe pain
- Damage to nerves, muscles, or tissues
- Internal bleeding
- Loss of muscle control and coordination
- Cardiac arrest

Electric shock can be avoided by following safety procedures.

Hazards

Electricity always flows along the path of least resistance. The human body poses little resistance to electric current because of its high water content. The following conditions take advantage of the body's conductive properties and may cause electrocution:

- Contact with improperly insulated wires
- Direct contact with electrical conductors such as power lines
- Touching an electrically charged appliance with wet hands or while standing in water

Electric current flowing through the body can cause serious internal or external burns. Severe external thermal burns often result from direct contact with equipment overheated by electrical current. Overloaded circuits or equipment may cause fires or explosions, especially if they occur in areas where flammable or explosive substances are stored.

Safety Procedures

Creating a safe work environment includes safe work practices and identifying common hazards. The following procedures provide an effective way of reducing electrical accidents:

- Use lockout/tagout procedures before working on electrical circuits and equipment
- Avoid working around electrical sources when you, your surroundings, tools, or clothing are wet
- Keep a towel or rag handy for drying your hands
- Stop outdoor electrical work when it begins to rain
- Ventilate the work area to reduce atmospheric hazards like dust, flammable vapors, or excess oxygen
- Maintain a clean, orderly, and hazard-free environment
- Arrange tools and equipment neatly, returning everything to its proper place after each use
- Keep the work area free of rags, trash, and other debris
- Clean up spills promptly and keep floors completely dry
- Use waterproof cords outdoors
- Be sure all extension cords have their three-pronged plugs intact
- Secure all electrical cords when used in or around walkways
- Avoid using electrical cords near heat, water, and flammable or explosive materials
- Never use an extension cord with damaged insulation

Source: Texas Department of Insurance, Division of Workers' Compensation
Disclaimer: The content in this presentation represents only the views of the presenter. Examples and content within are purely hypothetical and are used for illustrative purposes only and are not intended to reflect Service Lloyds policy or intellectual property.

Safe Operation of Electrical Tools

Follow these suggestions when using electrical tools:

- Inspect tools for wear or defects before starting the job
- Check tools to be sure all safety guards or shields are in place
- Never modify tools or electrical equipment
- Inspect power cords and switches for cuts, frayed insulation, exposed terminals, and loose connections
- Make sure tools are clean, dry, and free of oily film or carbon deposits
- Do not carry, store, or hang up a power tool by the power cord
- Stop using tools immediately if they begin to smoke, spark, or shock – tag them and keep them out of use until repaired or replaced
- Do not overload wall plugs or extension cords
- Make sure the extension cord is the right size or rating for the tool being used
- Never remove the grounding prong from a three-pronged plug to make it fit into a two-pronged wall socket.

Clothing & Personal Protective Equipment

- Wear comfortable and practical clothes for the job
- Wear a good pair of oil-resistant safety shoes with nonskid soles and heels rated for work near electrical hazards
- Do not wear clothes that restrict movement
- Wear cotton or fire resistant clothing
- Avoid loose clothing which might get caught in equipment
- Button shirt cuffs
- Remove neckties, jewelry, scarves, and wrist watches
- Secure long hair in a hat or hair net
- Use Class B protective hats when working around overhead electrical lines
- Avoid belts with large metal buckles
- When wearing a tool belt, do not allow tools to hang out of their holders or dangle from the belt
- Remove the tool belt before working in tight spaces

The following personal protective equipment (PPE) is recommended to prevent your body from becoming an electrical conductor:

- Nonconductive head, eye, and face protection
- Rubber gloves and clothing
- Rubber-soled boots or shoes

All PPE must fit properly and be cleaned and properly stored when not in use. All electrical protective equipment and devices must be tested for functional soundness at regular intervals.

First Aid

Follow these procedures in case of an electrical accident:

- Do not touch the victim
- Call for immediate, professional medical help
- Turn off the power if it can be done safely
- Use a dry pole (or anything that does not conduct electricity) to push the person away from the electrical source
- Once the victim is separated from the power source, treat them for shock and cover them lightly until help arrives
- Administer artificial respiration if breathing has stopped
- Administer CPR if heart has stopped
- Cover electrical burns with a clean, dry cloth

For electrical fires:

- Notify the local fire department or call 911 immediately
- Do not touch the burning object
- Do not use water on an electrical fire
- Use a Class C fire extinguisher such as carbon dioxide or a multi-purpose ABC extinguisher to put out small fires
- Stay clear of the area and wait for the professionals unless you are qualified to fight this kind of fire

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Summary

Working on energized electrical systems can present a hazard to the unqualified worker. By following the procedures outlined above, many accidents and injuries may be avoided.

Review

1. What precautions should be taken before using electrical equipment?
    a. Inspecting electrical tools before use for visible damage or defects
    b. Ventilating the work area to eliminate a potentially explosive atmosphere
    c. Using lockout/tagout procedures on all affected electrical components
    d. All of the above
2. The steps that should be taken when an electrical accident occurs are _____?
    a. Call for emergency response help, apply wet compresses to all burned skin, keep the victim mobile, and turn off power
    b. Call for emergency response help, pull victim off of electrical source, give CPR, and secure the scene of the accident
    c. Call for emergency response help, turn off power, push victim off electrical source using a nonconductive stick, and give first aid as needed
    d. None of the above
3. What are the environmental conditions that promote electric shock?
    a. Dry hands, dusty surroundings, using defective electrical equipment, and failure to follow electrical safety workplace practices
    b. Using defective electrical equipment, wet hands, failure to follow electrical safety workplace practices, and wet surroundings
    c. Wet hands, insulated hand tools, using repaired electrical equipment, and wet surroundings
    d. Dry surroundings, dry skin, using defective electrical equipment, failure to follow electrical safety workplace practices, and wet surroundings
4. Three conditions which take advantage of the body's conductive properties and may cause electrocution are _____?
    a. Defective PPE, contact with improperly insulated wires, and indirect contact with electrical conductors
    b. Touching and electrically charged appliance with dry hands, contact with improperly insulated wires, and indirect contact with electrical conductors
    c. Failure to observe proper safety procedures, defective PPE, and direct contact with electrical conductors
    d. Touching an electrically charged appliance with wet hands, contact with improperly insulated wired, and direct contact with electrical conductors

Answers

1. D
2. C
3. B
4. D

For more information on electrical safety and other topics see the Service Lloyds website. In Risk Control's Training Materials section, we have additional resources including:

- Electric Shock – Toolbox Talk
- Parlay Handouts:
    - Working Safely with Electricity
    - The Hazards of Electrical Shock
    - Responding to an Electrical Emergency
- Lockout/Tagout
- Lockout/Tagout Program + Quiz – Sample Safety Program

Remember to practice Safety; don't learn it by accident.

For additional assistance, please contact
RiskControl@ServiceLloyds.com
P.O. Box 26850, Austin, Texas 78755
(512) 212-7064
www.servicelloyds.com

Source: Texas Department of Insurance, Division of Workers' Compensation
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