

IDENTIFICATION

TOPIC TITLE: Electrical

MINIMUM TIME: 1 hour

OBJECTIVES

Terminal Objective:

Given current OSHA and industry information regarding construction worksite illnesses, injuries, and/or fatalities, the student will be able to recognize how to protect themselves from electrical hazards.

Enabling Objectives:

1. Identify major electrical hazards.
2. Describe types of electrical hazards.
3. Describe electrical protection methods.
4. Recognize employer requirements to protect workers from electrical hazards.

INSTRUCTOR MATERIALS AND RESOURCES

- PowerPoint presentation: *Electrical*
- Knowledge Check Answer Key: *Electrical*
- Internet access to show videos linked in PPT presentation

STUDENT MATERIALS

- OSHA Fact Sheet: *Working Safely with Electricity*
- Knowledge Check: *Electrical*

TEACHING PROCEDURES ---Preparation, Presentation, Application, Evaluation

Anticipatory Set (Focus Attention/Gain Interest)

Estimated Time: ?? hours

Key Points	Methods
Ask class to define electricity; also discuss related terms including: current, resistance, voltage, conductors, insulators, and grounding. Ask the class if they can give an example of an electrical hazard that could cause a worker to be electrocuted. Discuss the examples with the class.	PPT slides #1 - #7

<p>II. Describe types of electrical hazards</p> <p>A. Contact with overhead power lines</p> <ol style="list-style-type: none">1. Can carry extremely high voltage2. Risks<ol style="list-style-type: none">a. Electrocutionb. Burns and falls3. Cranes, ladders, aerial lifts, equipment with lengthy extensions can all contact overhead lines4. Video: https://www.osha.gov/dts/vtools/construction/ladder_powerline_fnl_eng_web.html <p>B. Contact with energized sources</p> <ol style="list-style-type: none">1. Live parts2. Damaged or bare wires3. Defective equipment or tools4. Improper repairs <p>C. Improper use</p> <ol style="list-style-type: none">1. Extension cords2. Power strips3. Portable heaters and appliances	<p>PPT slides #19 - #31</p> <p>Runtime: 00:05:39</p>
<p>III. Describe electrical protection methods</p> <p>A. Maintain safe distance from overhead power lines</p> <p>B. Use ground-fault circuit interrupters</p> <p>C. Inspect portable tools extension cords</p> <p>D. Use power tools and equipment as designed</p> <ol style="list-style-type: none">1. Common examples of misused equipment2. Tool safety tips <p>E. Follow lockout/tagout (LOTO) procedures</p> <p>F. Power source identification</p>	<p>PPT slides #32 - #44</p>
<p>IV. Recognize employer requirements to protect workers from electrical hazards</p> <p>A. Ensure overhead power line safety</p> <p>B. Isolate electrical parts</p> <p>C. Supply GFCI protection</p> <p>D. Establish and implement an AEGCP</p>	<p>PPT slides #45 - #46</p>

10-hour General Industry Outreach

- E. Ensure power tools are maintained in safe condition
- F. Ensure proper guarding
- G. Provide training
- H. Enforce LOTO safety related work practices
- I. Ensure proper use of flexible cords and power strips
- J. Ensure proper identification of power sources

Application (How students apply what they learn)

Estimated Time: ?? hours

Key Points

Methods

Show pictures of electrical hazards and have students explain ways to mitigate the hazards.

PPT #47 - #48

Evaluation/Summary

Estimated Time: ?? hours

Key Points

Methods

Knowledge Check: *Electrical*

PPT #49 - #55

References

OSHA Standard

https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10135

- [1910.301 - Introduction.](#)
- [1910.302 - Electric utilization systems.](#)
- [1910.303 - General.](#)
- [1910.304 - Wiring design and protection.](#)
- [1910.305 - Wiring methods, components, and equipment for general use.](#)
- [1910.306 - Specific purpose equipment and installations.](#)
- [1910.307 - Hazardous \(classified\) locations.](#)
- [1910.308 - Special systems.](#)
- [1910.331 - Scope](#)
- [1910.332 - Training](#)
- [1910.333 - Selection and use of work practices](#)
- [1910.334 - Use of equipment.](#)
- [1910.335 - Safeguards for personnel protection.](#)

OSHA Publications

- *Circuit Breakers: Incorrectly Refurbished Circuit Breakers Hazard Alert* (2011) (English: [HTML PDF*](#))
- *Electric Power: Electrical Protective Equipment Requirements* (OSHA 3875 - 2016) (English: [PDF*](#))
- *Electric Power: Fall Protection Requirements* (OSHA 3874 - 2016) (English: [PDF*](#))
- *Electric Power: Major Changes to the Rule* (OSHA 3872 - 2016) (English: [PDF*](#))
- *Electric Power: Minimum Approach Distance, Information Transfer and Training Requirements* (OSHA 3873 - 2016) (English: [PDF*](#))
- *Electrical Hazards: Controlling Electrical Hazards* (OSHA 3075 - 2002) (English: [HTML PDF*](#))
- *Electrical Hazards: Downed Electrical Wires Fact Sheet* (2005) (English: [HTML PDF*](#))
- *Electrical Safety Hazards of Overloading Cable Trays Fact Sheet* (2006) (English: [HTML PDF*](#))
- *Electrical Safety QuickCard™* (OSHA 3294 - 2013) (English: [HTML PDF*](#)) (OSHA 3294 - 2013) (Spanish: [PDF*](#))
- *Electricity: Working Safely with Electricity Fact Sheet* (English: [HTML PDF*](#)) (Spanish: [PDF*](#))
- *Farmworker Electrocutation: Fatal Facts* (OSHA 3817 - 2015) (English: [PDF*](#))
- *Generator Safety QuickCard™* (OSHA 3277 - 2005) (English: [HTML PDF*](#)) (Spanish: [HTML PDF*](#))

- *Hazards of Improper Elevator Controller Wiring* (2004, August 16) (English: [HTML](#) [PDF*](#))
- *Lockout/Tagout Fact Sheet* (2002) (English: [PDF*](#))
- *Possible Failure of Metal Halide Lamps* (2000, September 13) (English: [HTML](#) [PDF*](#))
- *Potential for Feed Water Pipes in Electrical Power Generation Facilities to Rupture Causing Hazardous Release of Steam and Hot Water* (1996, October 31) (English: [HTML](#))
- *Potential Hazards of Mislabeled Steel Toe Logger Boots* (2004, September 30) (English: [HTML](#) [PDF*](#))
- *Safely Installing, Maintaining and Inspecting Cable Trays* (2009, January 16) (English: [HTML](#) [PDF*](#))
- *Snow Removal: Falls and Other Hazards to Workers Removing Snow from Rooftops and Other Elevated Surfaces* (OSHA 3513 - 2012) (English: [HTML](#) [PDF*](#))
- *Special Purpose Particle Accelerators* (2009, July 31) (English: [HTML](#) [PDF*](#))
- *Tree Care Work: Electricity and Tree Care Work Pamphlet* (OSHA 3861 - 2016) (English: [PDF*](#)) (OSHA 3861 - 2016) (Spanish: [PDF*](#))
- *Work Practices Employed by the Electric Utilities Industry Regarding Sulphur Hexafluoride Gas-Insulated Circuit Breakers* (1989, January 30) (English: [HTML](#))

OSHA References/Resources

Electrical Safety eTool:

http://www.osha.gov/SLTC/etools/construction/electrical_incidents/mainpage.html

Electrical Safety and Health Topics:

<http://www.osha.gov/SLTC/electrical/index.html>

Electrical Safety-Related Work Practices – Inspection Procedures and Interpretation Guidelines

https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=DIRECTIVES&p_id=1750

Electric Power Generation, Transmission, and Distribution; Electrical Protective Equipment; Corrections,

https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=FEDERAL_REGISTER&p_id=24734

Other Resources

Preventing Worker Deaths and Injuries from Contacting Overhead Power Lines with Metal Ladders,

<http://www.cdc.gov/niosh/docs/wp-solutions/2007-155/pdfs/2007-155.pdf>

Preventing Electrocutions of Crane Operators and Crew Members Working near Overhead Power Lines,

<http://www.cdc.gov/niosh/docs/95-108/>

Preventing Injuries and Deaths from Metal- Reinforced Hydraulic Hoses,

<http://www.cdc.gov/niosh/docs/93-105/>

Preventing Electrocutions during Work with Scaffolds near Overhead Power Lines,

<http://www.cdc.gov/niosh/docs/91-110/>

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Preventing Electrocutions from Contact between Cranes and Power Lines,

<http://www.cdc.gov/niosh/docs/85-111/>

Electrical Safety:

<http://www.cdc.gov/niosh/topics/electrical/>

Electrical Safety: Safety and Health for Electrical Trades Student Manual:

<http://www.cdc.gov/niosh/docs/2009-113/default.html>

Electrocutions during Work with Scaffolds near Overhead Power Lines:

<http://www.cdc.gov/niosh/91-110.html>

Fatality Assessment and Control Evaluation (FACE) Program:

<http://www.cdc.gov/niosh/face/>

NFPA 70E: Standard for Electrical Safety in the Workplace®

<http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=70E>

NIOSH Electrical Safety Manual:

<http://www.cdc.gov/niosh/docs/2009-113/>

NIOSH Face Reports:

<http://www.cdc.gov/niosh/face/stateface.html>

Portable Generator Safety Tips OSHA Quick Card:

Preventing Fatalities of Workers Who Contact Electrical Energy:

<http://www.cdc.gov/niosh/87-103.html>

Preventing Electrocutions Due to Damaged Receptacles and Connectors:

<http://www.cdc.gov/niosh/87-100.html>