

# Big Four Construction Hazards: Electrical Hazards



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# Introduction

The following presentations have been developed in both Spanish and English for the construction industry. These presentations focus on the Big Four Construction Hazards – **falls, electrocution, caught-in, and struck-by.**

All training materials will cover the four hazards seen regularly on construction sites and will focus on the methods for the recognition and the prevention of these common hazards.

# Electrical Hazards - Overview

## A. Electrical Hazards – What is Electricity?

1. Improper Grounding
2. Exposed Electrical Parts
3. Inadequate Wiring
5. Damaged Insulation
6. Overloaded Circuits
7. Damaged Tools & Equipment
8. Wet Conditions
9. Overhead Power Lines

## B. Accident Prevention:

1. Personal Protective Equipment
2. Inspect Tools & Cords
3. GFCIs
4. Lock-Out/Tag-Out

# Electrical Hazards

Electrocutions are one of the greatest hazards on construction sites.

This program will help you recognize common fall hazards.

The symbols will tell you if the situation in the picture is either safe or not safe.



*Safe*



*Not safe*

# Electrical Hazards Statistics

□ Each year workers die from contacting electric current. During the year 2007:

- 212 workers died after contacting electric current
- 108 were construction workers
- Nearly 5% of all deaths result from electrocutions



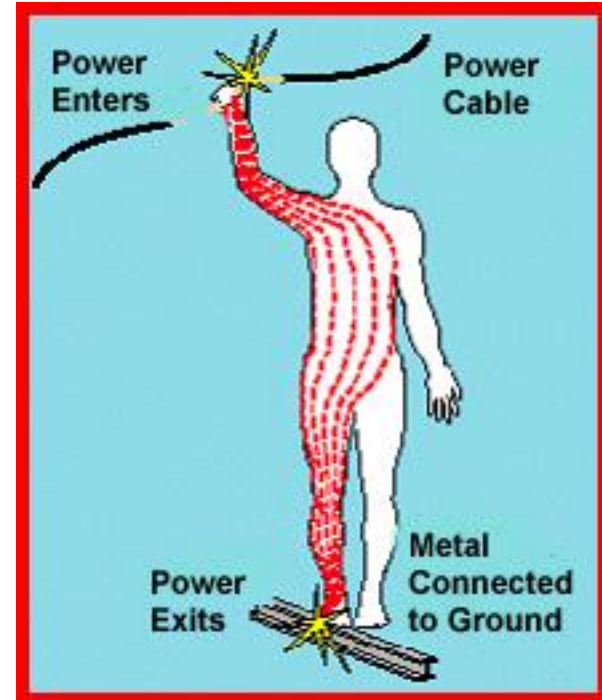
# What is electricity?

- ❑ Electricity is a natural energy force.
- ❑ Electricity is also a man made energy force.
- ❑ It is essential to modern life and taken for granted everyday.



# What is Electricity?

- ❑ Electricity flows through conductors.
- ❑ Conductors include metals, water, the Earth and the human body.
- ❑ Electricity must have a complete circuit or path to flow.



# How Electricity Works

- When electrical tools are working properly a complete circuit is maintained between the tool and the energy source.





# How Electricity Works

- ❑ However, if the tool is damaged the person may come in contact with the electricity and can become a path for the current.
- ❑ The person will be shocked!



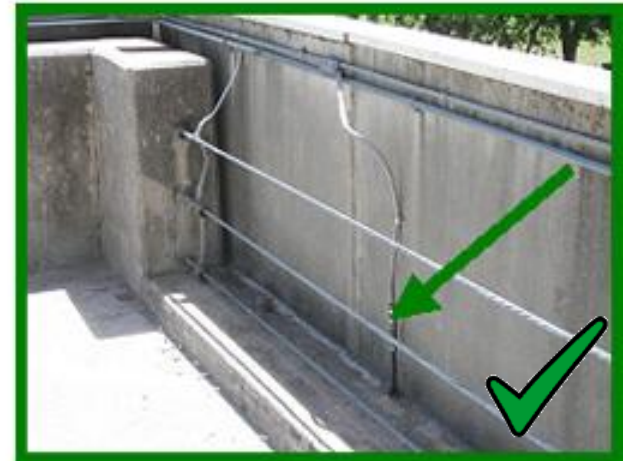
# Electrical Hazards

The following is a list of a common electrical hazards found on construction sites:

- Improper grounding
- Exposed electrical parts
- Inadequate wiring
- Overhead power lines
- Damaged insulation
- Overloaded circuits
- Wet conditions
- Damaged tools and equipment

# Improper Grounding

- ❑ Grounding is the process used to eliminate unwanted voltage.
- ❑ A ground is a physical electrical connection to the earth.



# Improper Grounding

- ❑ Electrical equipment must be properly grounded.
- ❑ Grounding reduces the risk of being shocked or electrocuted.



# Improper Grounding

- ❑ The ground pin safely returns leakage current to ground.
- ❑ **Never** remove the ground pin.



# Improper Grounding

- ❑ Removing the ground pin removes an important safety feature.
- ❑ You can get shocked!



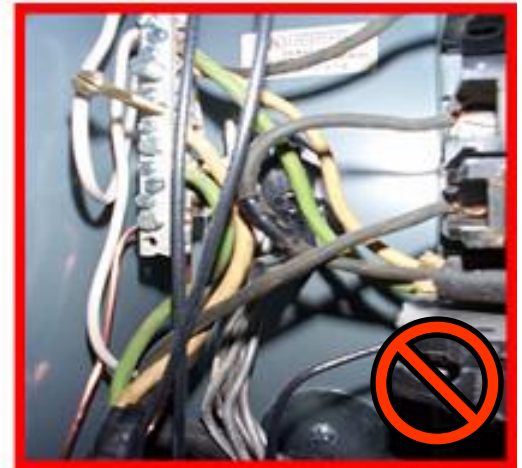
# Exposed Electrical Parts

- ❑ Exposed wires or terminals are hazardous.
- ❑ Report these conditions to your supervisor.



# Exposed Electrical Parts

- ❑ This electrical panel has missing circuit breakers.
- ❑ Never use a panel that has exposed wires.





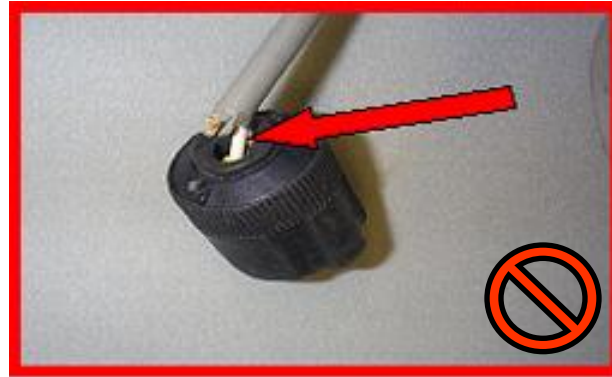
# Exposed Electrical Parts

- ❑ All openings must be closed.



# Exposed Electrical Parts

- ❑ Outer insulation on electrical cords must be intact.



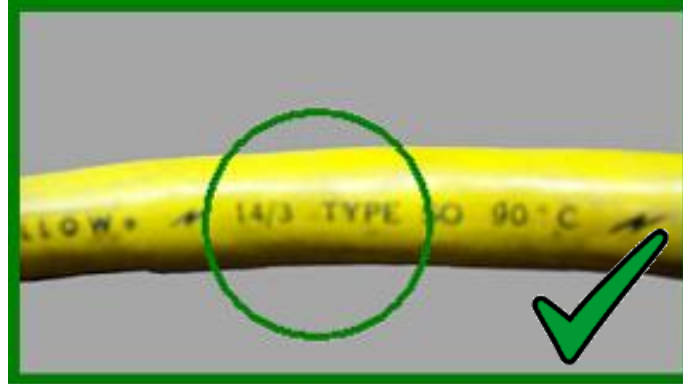
# Exposed Electrical Parts

- ❑ On construction sites, temporary lighting must be properly guarded and protected to avoid contact with broken bulbs and avoid potential shocks.



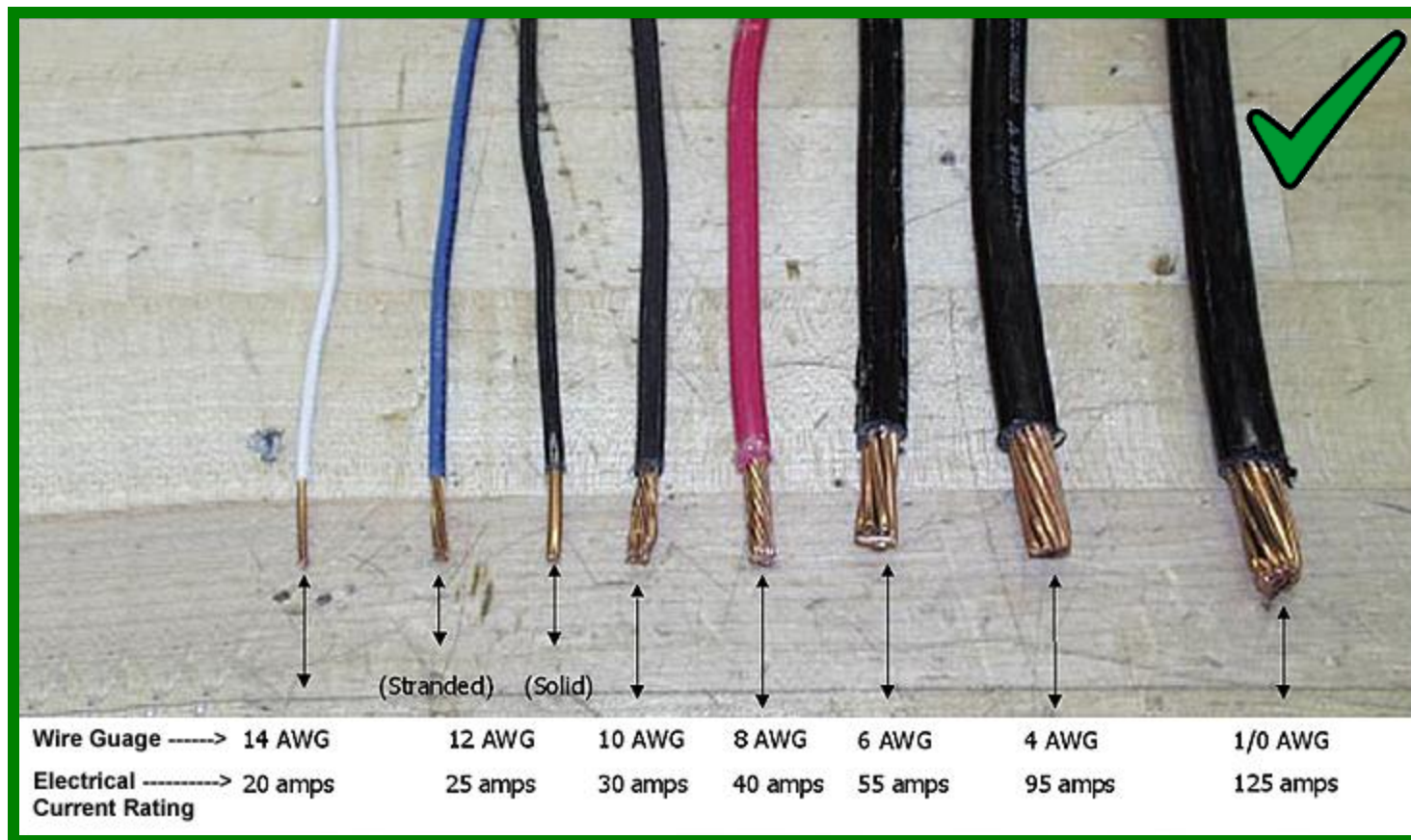
# Inadequate Wiring

- ❑ Use properly rated extension cords.
- ❑ Make sure your power tools are being used with a properly rated extension cord.



# Inadequate Wiring

DIFFERENT TYPES OF WIRES WITH THEIR ELECTRICAL CURRENT RATING



# Damaged Insulation

- ❑ Defective or inadequate insulation is a hazard.
- ❑ Insulation prevents conductors from contacting each other or you.



# Damaged Insulation

- ❑ Never attempt to repair a damaged cord with tape.



# Damaged Insulation

- ❑ Never use tools or extension cords with damaged insulation.





# Damaged Insulation

- ❑ Never hang extension cords from nails or sharp objects.



# Damaged Insulation

- ❑ Do not run extension cords through doors or windows.



# Overloaded Circuits

- ❑ Overloaded circuits can cause fires.
- ❑ Use proper circuit breakers.



# Overloaded Circuits

- ❑ Never overload an outlet.



# Overloaded Circuits

- ❑ Do not use power strips or surge protectors on construction sites.
- ❑ Use a 3-way extension with a GFCI instead.



# Damaged Tools and Equipment

- ❑ Do not use electric tools that are damaged.
- ❑ You may receive a shock or be electrocuted.



# Damaged Tools and Equipment

- ❑ Double insulated tools are labeled.
- ❑ It will be marked "Double Insulated".
- ❑ It will have the following symbol:



# Wet Conditions

- ❑ Wet conditions are hazardous.
- ❑ Damaged insulation increases the hazard.





# Wet Conditions

- ❑ Always avoid using tools in wet locations.
- ❑ Water increases the risk of electric shock.



# Overhead Power Lines

- ❑ Survey the site for overhead power lines.
- ❑ Never store materials or equipment under overhead power lines.



# Overhead Power lines

- ❑ Maintain a distance of at least 10' between tools and equipment and overhead power lines.
- ❑ Shocks and electrocutions occur where physical barriers are not in place to prevent contact with the wires.



# Overhead Power lines

- ❑ Maintain safe distances between scaffolding and overhead power lines.



# Overhead Power lines

- ❑ Overhead power lines are very dangerous.
- ❑ Never attempt to contact an overhead power line.



# Quiz



- You will be presented with a specific hazard recognition question to test your understanding of this material.

# Question 1

The process of grounding is:

A – Falling to the ground

B – Standing in one place

C – Making a physical connection to Earth

D – None of the above

# Question 1

The process of grounding is:

The correct answer is:

C – Making a physical connection to Earth



## Question 2

You should remove the ground pin from electrical cords because it is not necessary.

A – True

B – False

## Question 2

You should remove the ground pin from electrical cords because it is not necessary.

The correct answer is:

**B – False**

## Question 3

It is acceptable to have missing breakers from an electrical panel box.

A – True

B – False

## Question 3

It is acceptable to have missing breakers from an electrical panel box.

The correct answer is:

**B – False**

# Question 4

When working under overhead power lines, the minimum safe distance between equipment and the overhead lines is:

- A – 8 feet
- B – 20 feet
- C – 10 feet
- D – 12 feet

## Question 4

When working under overhead power lines, the minimum safe distance between equipment and the overhead lines is:

The correct answer is:

C – 10 feet

# Question 5

When the insulation on a cord is damaged, you should:

- A – Use duct tape to repair it
- B – Do nothing
- C – Remove it from service immediately
- D – Touch the conductors to see if they are energized

# Question 5

When the insulation on a cord is damaged, you should:

The correct answer is:

C – Remove it from service immediately



# Accident Prevention

- ❑ A willing, positive attitude towards safety will help make a safer work environment.



# Accident Prevention

- ❑ Always consider these safety precautions:
  - Personal protective equipment (PPE),
  - Inspect tools,
  - Ground fault circuit interrupters (GFCIs),
  - Lock-out/tag-out.



# Personal Protective Equipment (PPE)

❑ PPE for electrical hazards include:

- hardhats
- rubber or insulating gloves
- insulating clothing

❑ **NEVER** use damaged PPE!



# Personal Protective Equipment (PPE)

- Use appropriate rubber insulating gloves.
- Make sure the gloves fit properly.
- Make sure the glove rating matches with the work to be performed.
- Not all gloves can be used to prevent electric shock.



# Personal Protective Equipment (PPE)

- Hard hats offer protection.
- Hard hats are rated for certain uses.
- Metal hard hats **SHOULD NOT** be used when working close to electrical lines.



# Inspect Tools and Cords

- ❑ Inspect tools and cords completely before using for:
  - cracks
  - damaged insulation
  - broken ground pins
  - frayed line cord
  - loose parts
  - any other damage



# GFCI

- ❑ OSHA requires the use of GFCIs on all construction sites.



# GFCI

- ❑ A GFCI is a fast-acting circuit breaker.
- ❑ It senses small imbalances in the circuit caused by current leakage to ground.





# GFCI

- ❑ It continually matches the amount of current coming and going to an electrical device.
- ❑ The GFCI looks for a difference of approximately 5 milliamps.



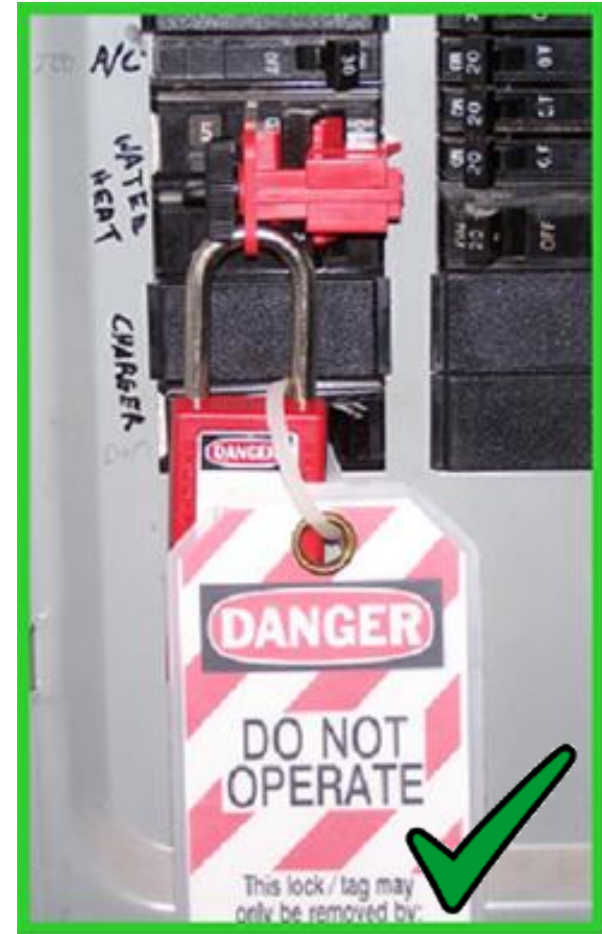
# Lock-out/Tag-out

- ❑ Workers must ensure electricity is off and “locked-out” before work is performed.



# Lock-out/Tag-out

- The switch must be tagged.
- The tag lets others know why the switch is off.



# Lock-out/Tag-out

- Locks and tags are warning signs.
- You must be trained in lock-out/tag-out procedures.



# Quiz



- You will be presented with a specific accident prevention question to test your understanding of this material.

# Question 1

GFCIs should be used in the following conditions:

- A – Wet or damp locations
- B – On construction sites
- C – Both A & B
- D – Neither A & B

# Question 1

GFCIs should be used in the following conditions:

The correct answer is:

C – Both A & B

## Question 2

3-way extensions with GFCIs can be used on construction sites:

A – True

B – False



## Question 2

3-way extensions with GFCIs can be used on construction sites:

The correct answer is:

A – True

## Question 3

Which of the following PPE should be worn when working with electricity?

- A – Metal hard hat and insulated gloves & clothing
- B – Non-metallic hard hat and insulated gloves & clothing
- C – Non-metallic hard hat and non-insulated gloves & clothing
- D – Metal hard hat and non-insulated gloves & clothing

## Question 3

Which of the following PPE should be worn when working with electricity?

The correct answer is:

B – Non-metallic hard hat and insulated gloves & clothing

# Question 4

When inspecting tools to see if they are damaged, what should you look for?

A – Cracks

B – Damaged insulation

C – Broken/removed ground pins

D – All the above

# Question 4

When inspecting tools to see if they are damaged, what should you look for?

The correct answer is:

D – All the above

# Question 5

A "Lock-out/Tag-out" system is used to:

- A – Keep people from stealing your tools
- B – Prevent accidental contact with electrical current
- C – Keep you from completing your work
- D – Add another step to your work

# Question 5

A "Lock-out/Tag-out" system is used to:

The correct answer is:

**B – Prevent accidental contact with electrical current**

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# **Big Four Construction Hazards: Electrical Hazards**

**This concludes the  
Electrical Hazards Module**

**“The End”**