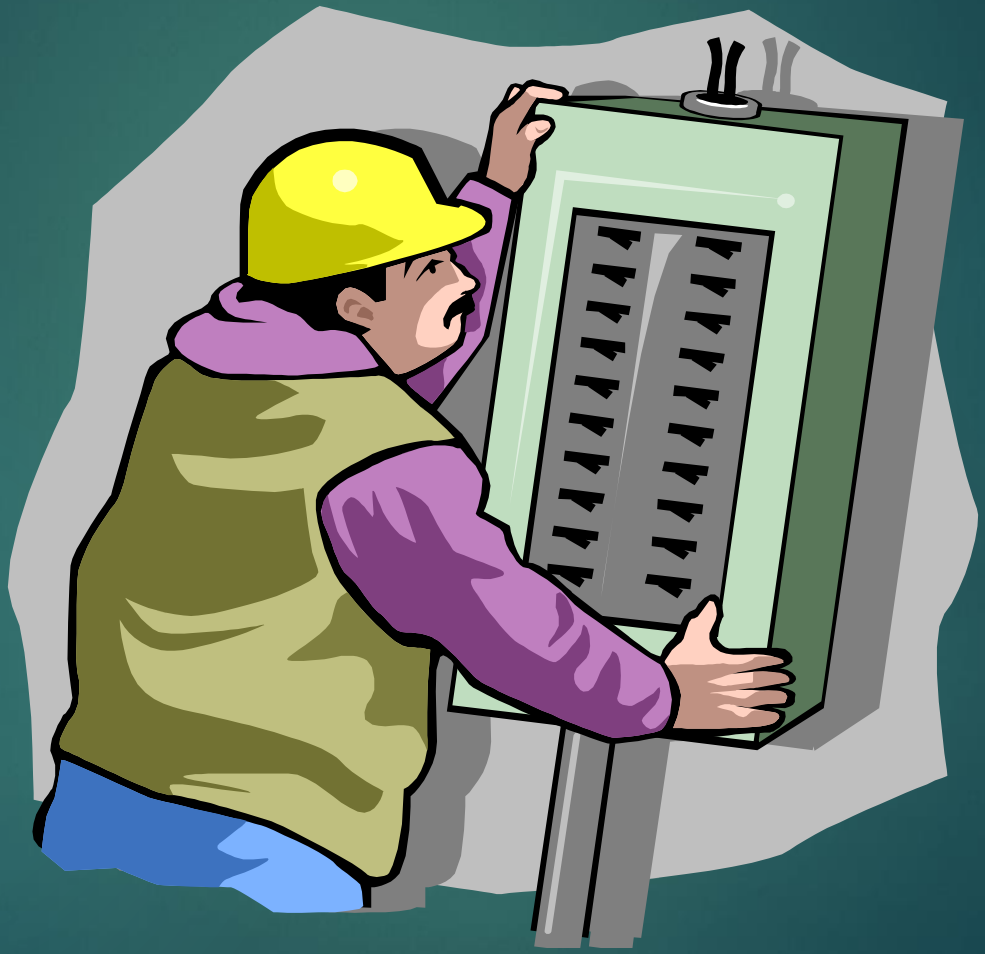
Electrical Safety - Construction

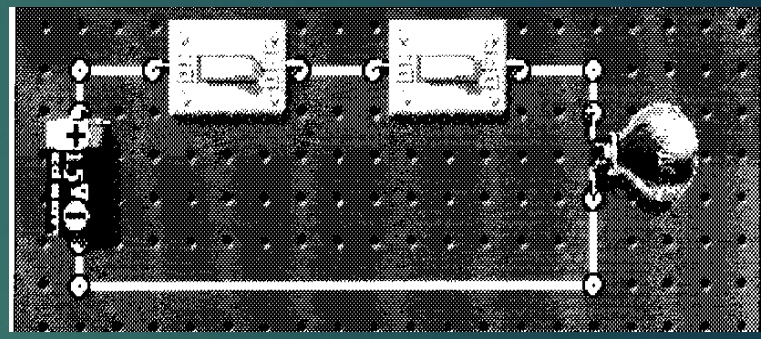


Electricity - The Dangers

- About 5 workers are electrocuted every week
- Causes 12% of young worker workplace deaths
- Takes very little electricity to cause harm
- Significant risk of causing fires

Electricity – How it Works

- Electricity is the flow of energy from one place to another
- Requires a source of power: usually a generating station
- A flow of electrons (current) travels through a conductor
- Travels in a closed circuit



Electrical Terms

- **Current** -- electrical movement (measured in amps)
- **Circuit** -- complete path of the current. Includes electricity source, a conductor, and the output device or load (such as a lamp, tool, or heater)
- **Resistance** -- restriction to electrical flow
- **Conductors** – substances, like metals, with little resistance to electricity that allow electricity to flow
- **Grounding** – a conductive connection to the earth which acts as a protective measure
- **Insulators** -- substances with high resistance to electricity like glass, porcelain, plastic, and dry wood that prevent electricity from getting to unwanted areas

Electrical Injuries

There are four main types of electrical injuries:

- Direct:
  - Electrocution or death due to electrical shock
  - Electrical shock
  - Burns
- Indirect - Falls

Electrical Shock

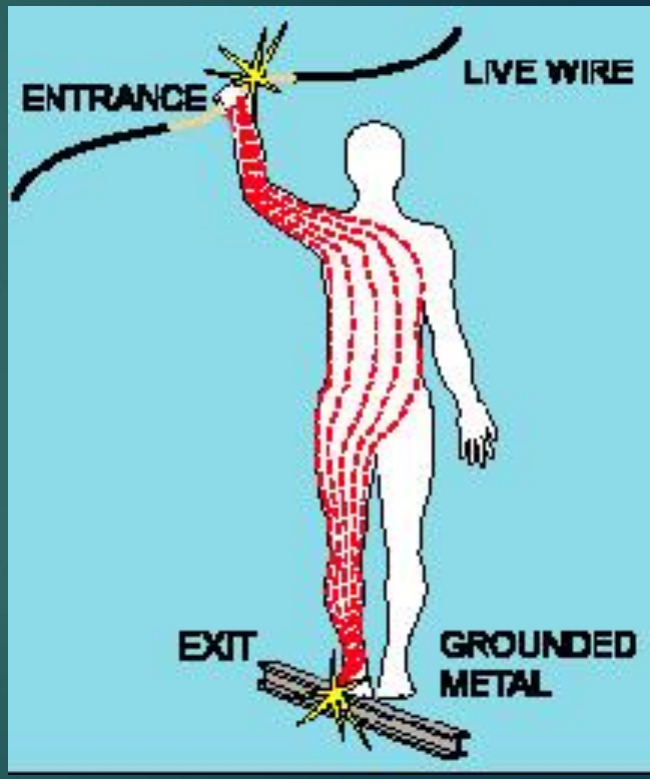
An electrical shock is received when electrical current passes through the body.

You will get an electrical shock if a part of your body completes an electrical circuit by…

- Touching a live wire and an electrical ground, or
- Touching a live wire and another wire at a different voltage.

Shock Severity

- Severity of the shock depends on:
  - Path of current through the body
  - Amount of current flowing through the body (amps)
  - Duration of the shocking current through the body,
- LOW VOLTAGE DOES NOT MEAN LOW HAZARD



Dangers of Electrical Shock

- **Currents above 10 mA* can paralyze or “freeze” muscles.**
- **Currents more than 75 mA can cause a rapid, ineffective heartbeat -- death will occur in a few minutes unless a defibrillator is used**

Defibrillator in use

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* mA = milliampere = 1/1,000 of an ampere

Burns

- Most common shock-related injury
- Occurs when you touch electrical wiring or equipment that is improperly used or maintained
- Typically occurs on hands
- Very serious injury that needs immediate attention

Falls

- Electric shock can also cause indirect injuries
- Workers in elevated locations who experience a shock may fall, resulting in serious injury or death

Electrical Hazards and How to Control Them

Electrical accidents are caused by a combination of three factors:

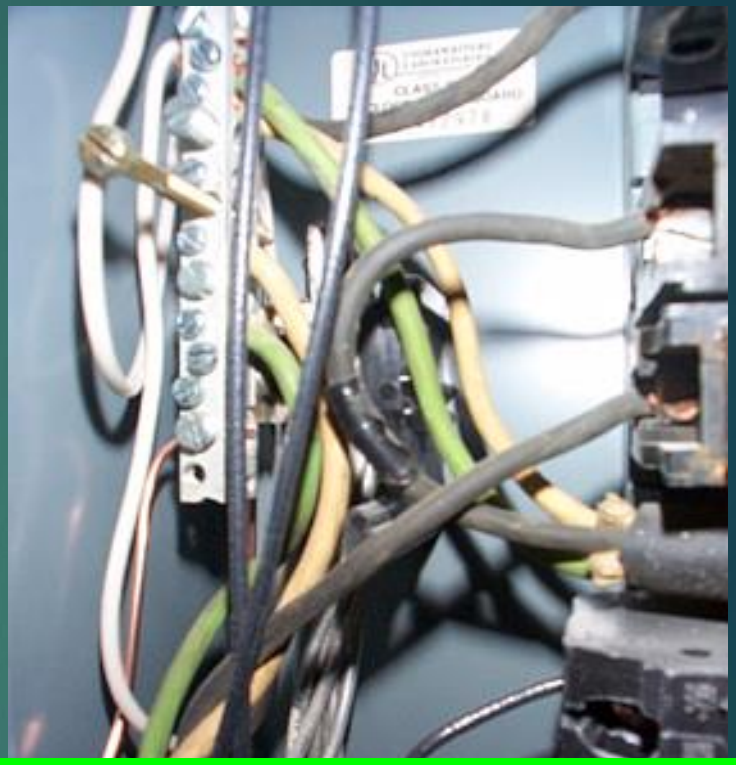
- Unsafe equipment and/or installation,
- Workplaces made unsafe by the environment, and
- Unsafe work practices.

Hazard – Exposed Electrical Parts

Cover removed from wiring or breaker box

Control – Isolate Electrical Parts

- **Use guards or barriers**
- **Replace covers**



Guard live parts of electric equipment operating at 50 volts or more against accidental contact

Control – Isolate Electrical Parts - Cabinets, Boxes & Fittings

Conductors going into them must be protected, and unused openings must be closed

Control – Close Openings

- Junction boxes, pull boxes and fittings must have approved covers
- Unused openings in cabinets, boxes and fittings must be closed (no missing knockouts)

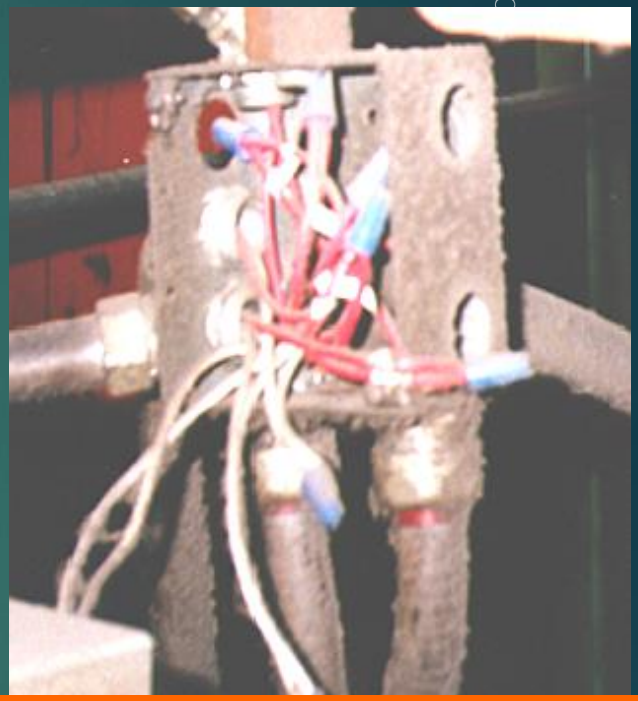


Photo shows violations of these two requirements

Hazard - Overhead Power Lines

- Usually not insulated
- Examples of equipment that can contact power lines:
  - Crane
  - Ladder
  - Scaffold
  - Backhoe
  - Scissors lift
  - Raised dump truck bed
  - Aluminum paint roller

Hazard – Defective Cords & Wires

- **Plastic or rubber covering is missing**
- **Damaged extension cords & tools**

Grounding

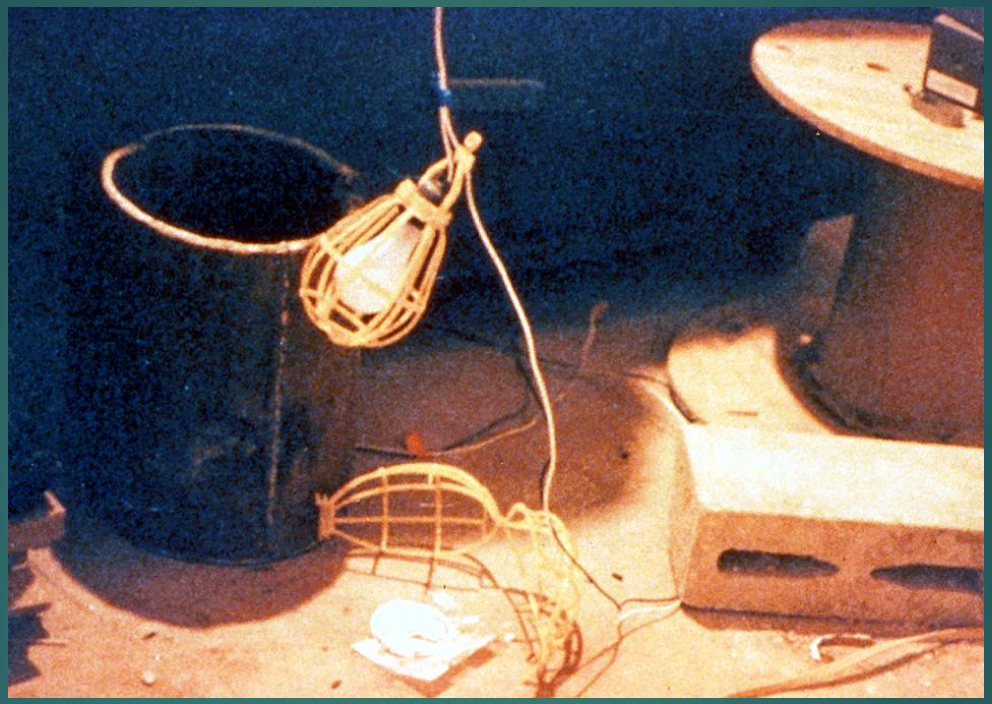
Grounding creates a low-resistance path from a tool to the earth to disperse unwanted current.

When a short or lightning occurs, energy flows to the ground, protecting you from electrical shock, injury and death.

Hazard – Improper Grounding

- **Tools plugged into improperly grounded circuits may become energized**
- **Broken wire or plug on extension cord**
- **Some of the most frequently violated OSHA standards**

Temporary Lights



Protect from contact and damage, and don't suspend by cords unless designed to do so.

Lockout and Tagging of Circuits

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- Apply locks to power source after de-energizing
- Tag deactivated controls
- Tag de-energized equipment and circuits at all points where they can be energized
- Tags must identify equipment or circuits being worked on

Preventing Electrical Hazards - Planning

- Plan your work with others
- Plan to avoid falls
- Plan to lock-out and tag-out equipment
- Remove jewelry
- Avoid wet conditions and overhead power lines

Preventing Electrical Hazards - PPE

- Proper foot protection (not tennis shoes)
- Rubber insulating gloves, hoods, sleeves, matting, and blankets
- Hard hat (insulated - nonconductive)