

General Safety – Electrical and Mechanical Safety

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Electrical Safety



Electricity Basics

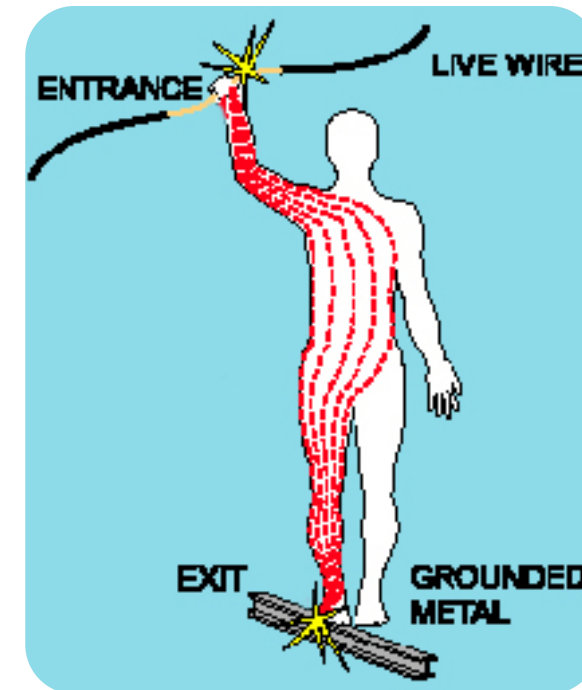
Electrical Flow:

- **Conductors** – substances, such as metals- little resistance to electricity
- **Insulators** – substances, such as wood, rubber, glass, and bakelite and plastics -- high resistance to electricity
- **Current** – the movement of electrical charge
- **Resistance** – opposition to current flow
- **Voltage** – a measure of electrical force
- **Grounding** – a conductive connection to the earth which acts as a protective measure



What causes shocks?

- Electricity travels in closed circuits, usually through a conductor
- **Your body can be a conductor which may mean an electrical shock!**
- Current passes through the body
- Severity of the shock depends on:
 - Path of current through the body
 - Amount of current flowing through the body
 - Length of time the body is in the circuit
- **Low voltage does not mean low hazard**
- Arc in a low voltage as much risk for ignition
- Partial local paralysis risk
- Loss of balance can lead to other risks





“Freeze” and “Severe Shock”

- Electrical shock may cause the muscles to contract
- This “freezing: effect” is dangerous
 - Increases the length of exposure
- If you witness a “freeze”
 - Shut off the power
 - Use a non-conductive object to knock the person free of the contact
- A **severe shock** requires medical help immediately
- Unseen medical issues may be present, such as:
 - Internal Hemorrhages
 - Destruction of tissues, nerves or muscles
- Electrocution may also lead to severe burns leading to other complications.



Related hazards:

- Fire
- Equipment damage
- Flammable gases, vapors or combustible



Static Electricity

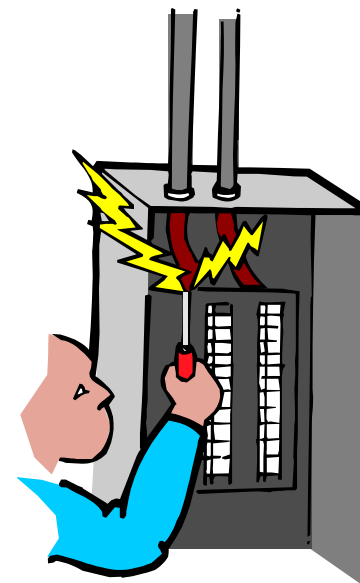
- Can cause shocks or even minor skin burns
- Reduced or prevented by:
 - Proper grounding
 - Rubber matting
 - Grounding wires, gloves, or shoes



Water and Electricity

- Water and electricity
 - Pure water is a poor conductor
 - Impurities can make water a conductor
 - Salts
 - Working in a damp environment requires preventive measures against electrical hazards

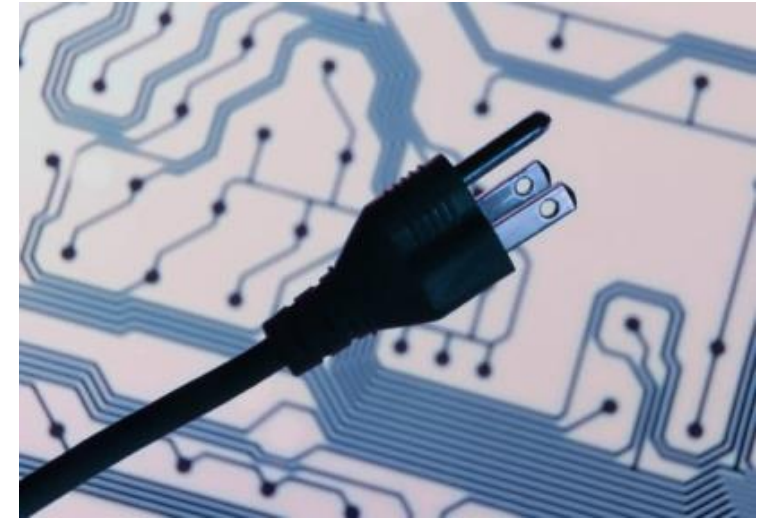
**—NEVER PUT OUT ELECTRICAL FIRES
WITH WATER!!**





Protection Against Electrical Hazards

- Proper Insulation of all wiring
- Grounding
 - Most electrical equipment is designed with a grounding system
 - Do not use equipment with damaged grounding connectors
 - Do not use adapters that interrupt the grounding connection
- Circuit Protection
 - Energize or de-energize with appropriate switches, breakers, etc.
 - If circuit protection device is tripped—inspect thoroughly before proceeding to handle the equipment

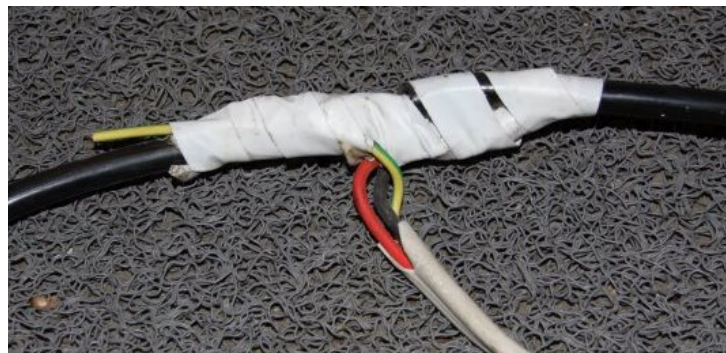




Protective Measures

- De-energize electric equipment before inspection or repair
- All electric tools should be periodically checked and properly maintained,
- Exercise caution when working near energized lines
- Use the correct protective equipment – Gloves, shoes etc. **NOT NITRILE GLOVES!**

Electrical Hazards & Steps for prevention – Summary in pics



1. Replace any worn-out or stripped wires



2. Only use 3-pin plugs if possible



3. Earth all equipment



4. Power strips

- Avoid them for high power equipment
- Use power strips with fuse
- Always calculate the electrical load

ES: Electrical Hazards & Steps for prevention



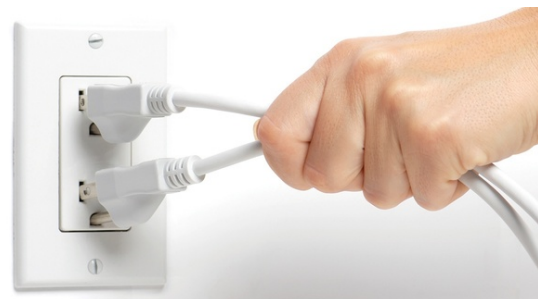
5. No trip hazard



6. No water in vicinity



7. No wet hands



8. Don't pull cord



9. Don't poke power sockets

- No jugaad please



10. Switch off



Take-aways about Electrical Safety

- Electricity will try to reach ground even if it means going through a person
- Even the “small” voltage in daily household use can cause serious injury
- Always inspect power tools and cords and do not use them if damaged
- Do not attempt to repair electrical equipment unless trained and qualified
- Seek medical examination even after ‘mild’ shocks to prevent any long-term damage.



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Common mechanical safety hazards both on and off workplace

- Working in the vicinity of sharp tools
- Heavy machinery with moving parts in proximity
- Construction work going on around us
- Using common tools during household activities such as gardening
- Improper storage of objects on unstable surfaces/containers
- Improper use of ladders to access objects placed higher up
- Lifting heavy objects



Safe Working Practices

Personal Protective Equipment's (PPEs)

- **Eye protection**

Appropriate eye protection (spectacles, goggles or a face mask), should be worn where there is a hazard of flying objects, small particles or dust arising out of the use of the machinery.

- **Foot protection**

Many accidents can be avoided by the wearing of boots or shoes having built-in steel toecaps and non-skid soles.

- **Emergency stop controls**

Should be readily accessible to the operator at any of the positions where he is likely to be situated in the course of operating the machinery.

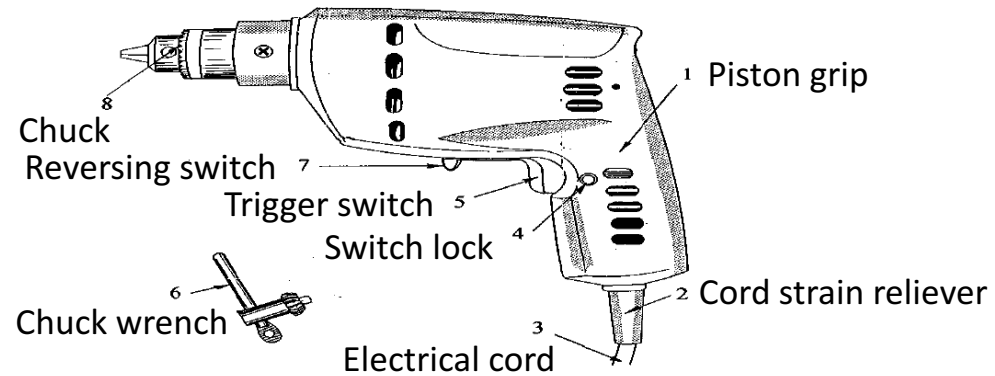
- **Manual lifting**

For convenience and speed many people will be tempted to lift a load manually which is too heavy or too awkwardly placed to be moved without causing damage to their backs. Handling loads is one of the major causes of accidents.



Safe Working Practices for those working with some Common Hand Held Tools

Electric drill machine



- Use safety glasses
- Clamp the stock being drilled so that it will not move during the drilling operation
- Before drilling, turn the drill on to see if the bit is centred and running true
- Align the bit with the desired hole location before turning the drill on
- Disconnect the drill from the electrical supply when installing bits

Hacksaw



- Select a saw with the appropriate number of **teeth per inch (TPI)** and **appropriate material** for the object being cut
- Use appropriate **personal protective equipment** such as safety footwear and safety glasses
- Ensure the work area is clear of sharp debris capable of causing injury



- Safety First!
- In case of fire or other emergencies, evacuate the affected area when in doubt about handling it according to the safety protocol.
- It is never worth risking your life to save equipment or devices – however expensive they may be!

Thank you