Electrical Safety

Electrical accidents can occur in any part of the job because we use electrical devices in every aspect of working..

Here we discuss electrical hazards and electrical safety.

Hazard means:

* any potential or actual threat to the wellbeing of people, machinery or environment

Electrical hazard safety means:

* taking precautions to identify and control electrical hazards

Failing to take the necessary precautions can lead to:

* injury or death
* fire or property damage

Electrical hazards exist in every workplace. Common causes of electrocution are:

* making contact with overhead wires
* undertaking maintenance on live equipment
* working with damaged electrical equipment, such as extension leads, plugs and sockets
* using equipment affected by rain or water ingress

**BE SAFE:**

* **B**urns
* **E**lectrocution
* **S**hock
* **A**rc flash/arc blast
* **F**ire
* **E**xplosions

Reporting electrical incidents

* Electricity is invisible – this in itself makes it dangerous
* It has great potential to seriously injure or kill
* The company has a duty of care to its employees and contractors
* Everyone is exposed to electrical hazards, not just electricians
* Report all electrical shocks and near misses

Responding to electrical incidents

If you come across a person receiving an electric shock:

* if possible, disconnect the electrical supply (switch?)
* assess the situation – never put yourself at risk
* take precautions to protect yourself and anyone else in the vicinity
* apply the first aid principles (e.g. DRSABCD)
* assess the injuries and move the casualty to a safe area if required
* administer first aid if trained
* seek urgent medical attention

Don’t be a victim

You could be the victim if you:

* don’t follow proper procedures around electricity
* use electrical equipment improperly
* use faulty electrical equipment

Types of electrical injuries

* Burns
* Arc flash
* Thermal contact
* Shocks
* Organ damage
* Death

Electrical Hazard Injury

Electrocution:

* Is fatal
* Meaning: to kill with electrical shock
* Results when a human is exposed to a lethal amount of electrical energy

Shock:

* Body becomes part   
  of electrical circuit
* Reflex response to   
  passage of electric   
  current through the body

Arc Flash/Arc Blast

* Arc flash
  + Sudden release of electrical energy through air when a high-voltage gap exists and there is a breakdown between conductors
  + Gives off thermal radiation (heat) and bright, intense light that can cause burns
  + Temperatures as high as 35,000°F
* Arc blast – high-voltage arcs can also produce considerable pressure waves by rapidly heating the air and creating a blast

Fire:

* Most result from problems with "fixed wiring”
* Problems with cords, plugs, receptacles, and switches also cause electrical fires

Explosions:

* Occur when electricity ignites explosive mixture of material in the air
* Note:
  + Electricity is source of these hazards
  + All hazards are of equal importance
  + Lesson focuses on eliminating electrical hazards

Dangers

* Damaged or bare wires
  + Fault current may travel through a body, causing electrical burns or death, if
    - Power supply is not grounded
    - Path has been broken
    - There are live parts or bare wires
  + Extreme conditions and rough treatment can change electrical equipment from safe to hazardous
  + Poor and improper repairs
* Power strips:
  + Can be over loaded   
    because of multiple   
    plug arrangement
  + Most have overload protection   
    but often malfunction causing fire
  + Use fixed wiring when possible
* Portable heaters and appliances:
  + Manufacturer recommendations   
    not followed
  + Do not plug into a power strip!   
    This causes overloads and fires.

Affects of different amounts of electricity

|  |  |
| --- | --- |
| **AC Current (mA)** | **Effect To The Human Body** |
| 1 | Tingling or buzzing sensation |
| 2-9 | Small shock |
| 10-24 | Muscle contraction, muscle locking – “Can’t let go” |
| 25-74 | Paralysis of respiratory muscles, exit burns visible |
| 75-300 | Usually fatal, heart dysrhythmia, entry & exit wounds |
| >300 | Death certain, if resuscitated will have organ damage, likely amputations |

Contact with energized sources:

* Live parts
  + The major hazards
    - Electrical shock and burns
    - Electrical shock occurs   
      when the body becomes   
      part of the electric circuit

Severity and effects of an electrical shock depend on a number of factors

* + - Pathway through the body
    - Amount of current
    - Length of time of the exposure
    - Whether skin is wet or dry

Water

* + - Great conductor
    - Allows current to flow more easily in wet conditions and through wet skin

Contact with overhead power lines:

* Overhead and buried   
  power lines carry   
  extremely high voltage
* Risks
  + Electrocution (main risk)
  + Burns and falls

What to do in an electrical emergency

For low voltage electricity >50 V AC and 110 V DC

* remove the source of electricity supply
* commence CPR if trained
* call the emergency number on site

For high voltage electricity >1000 V

* call the emergency number for your site
* don’t go near the casualty
* don’t touch the casualty or try to free them with anything

Protecting yourself from electrical accidents

* Don’t wear metal objects
* Turn power off
* Wear appropriate clothing
* Don’t touch live parts
* Don’t install or repair electrical equipment
* Use qualified personnel
* Clean and dry leads and plugs before use
* Use PPE

Use ground-fault circuit interrupters (GFCI):

* Designed to protect people from electrical shock
* Detects ground faults and interrupts electric current
* Limits duration of electrical shock

Safety Measures

* Heed warning signs
* Use the right equipment
* Study the operation manual
* Take care of extension leads
* Use only approved extension lamps
* Don’t pull on leads
* Use residual current devices – RCDs
* Use the proper fuses and circuit breakers

Inspect portable tools and extension cords:

* Workers need to inspect extension cords prior to their use for any cuts or abrasion.
* Electric hand tools that are old, damaged, or misused may have damaged insulation inside.

Use power tools and equipment as designed:

* Follow tool safety tips to avoid misusing equipment
* Follow manufacturer’s instructions
* Avoid accidental starting. Do not hold fingers on the switch button while carrying a plugged-in tool.
* Use gloves and appropriate footwear.
* Store in dry a place when not using.

Tool safety tips

* Never carry a tool by the cord.
* Never yank the cord to disconnect it.
* Keep cords away from heat, oil, and sharp edges.
* Disconnect when not in use and when changing accessories such as blades and bits.
* Don’t use in wet/damp environments.
* Keep working areas well lit.
* Ensure that cords do not cause a tripping hazard.
* Remove damaged tools from use.
* Use double-insulated tools.

Safety Inspections

* Electrical equipment should be checked each time before use for defects
* If not tagged or the tag is out of date then report it and place it out of service

Powerlines

* Do you know if there are overhead powerlines on your site?
* Do you know where they are located?
* Do you know what the safe work clearance is?
* Strict regulations are laid down to cover any work that may have to be performed close to overhead powerlines

To Summarize

* The risk of electric shock from correctly installed and maintained power sources is negligible, provided that sensible precautions are taken by the operator and correct work procedures are followed
* Ensure that the right person is carrying out electrical work – licensed versus competent
* Electricity is essential but, improperly used, it can be DEADLY!

To STAY ALIVE, you have to STAY ALERT