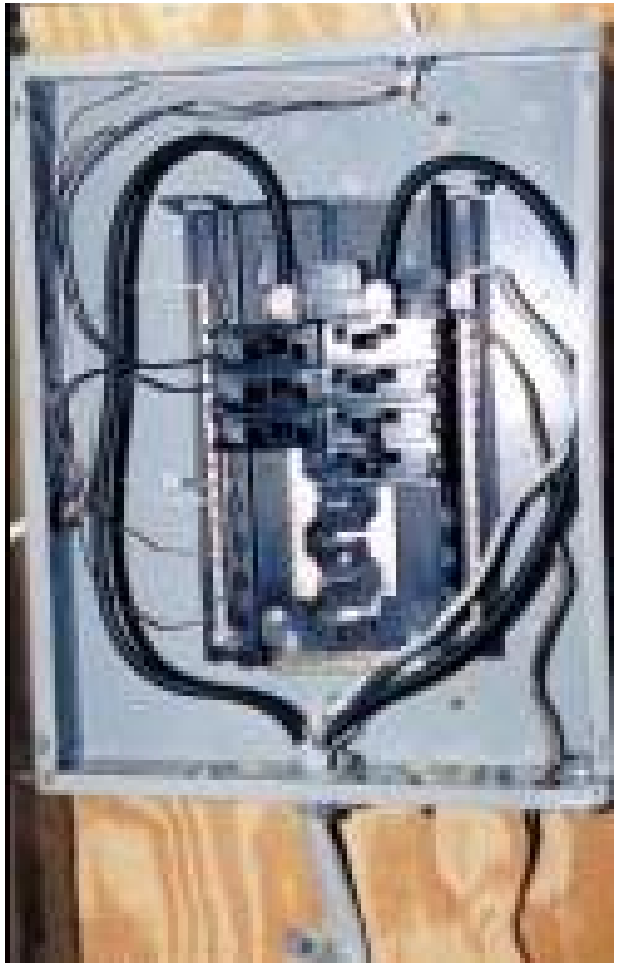
Electrical Safety

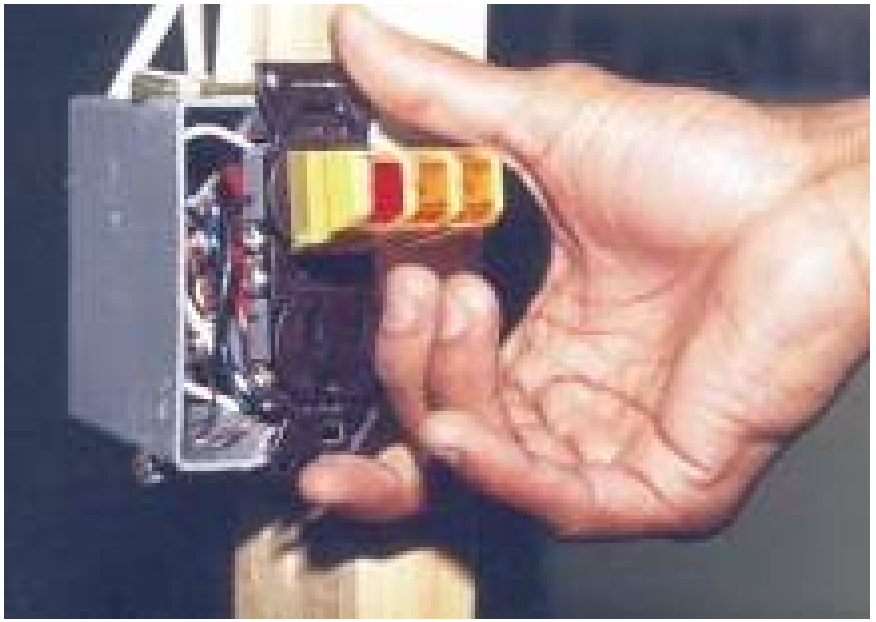
Definitions

- Exposed part
- Live or energized part
- De-energized part



Definitions

- De-energized exposed parts that are not locked/tagged are considered to be energized exposed parts



Working on or near exposed electrical parts

- Don’t work on or near exposed electrical parts unless:
  - the part is de-energized,
  - the part is locked/tagged out, and
  - the part is tested to ensure it is de-energized

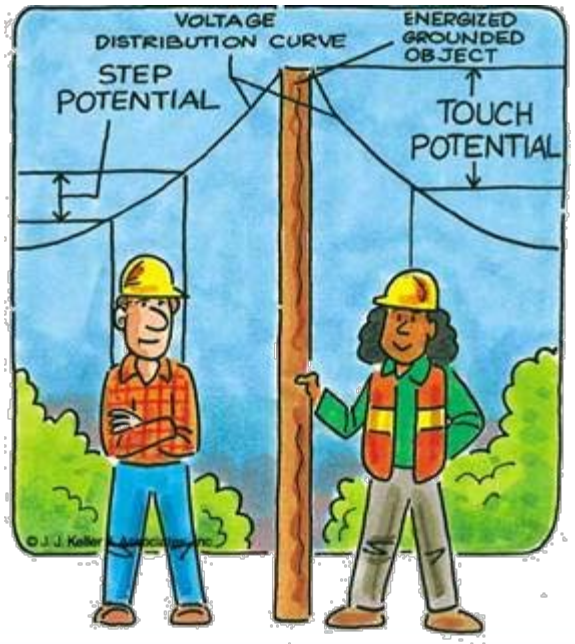
Working on or near exposed electrical parts

- Lockout/tagout must be performed by a qualified person

- Who is qualified?

Clearance for unguarded, overhead energized lines

- For unqualified employees working near <u>elevated surfaces</u> and voltages 50kv or less to ground:
  - the distance is 10 feet



Clearance for unguarded, overhead energized lines

- For elevated surfaces and voltages greater than 50 kv to ground:
  - the distance is 10 feet plus 4 inches for every 10 kv greater than 50 kv

Clearance for unguarded, overhead energized lines

- When working on the ground in the vicinity of unguarded, energized overhead lines 50 kv or less to ground:
  - keep conductive objects at least 10 feet away

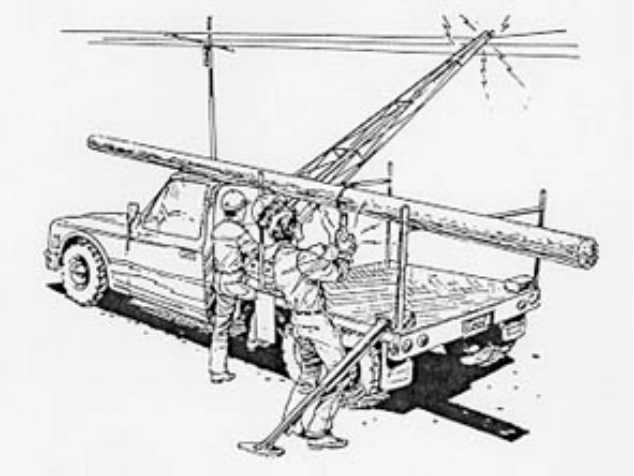
Clearance for unguarded, overhead energized lines

- When working on the ground in the vicinity of unguarded, energized overhead lines greater than 50 kv to ground:
  - keep conductive objects at least 10 feet away, plus 4 inches for every 10 kv over 50 kv

Clearance between overhead lines and vehicles/equipment

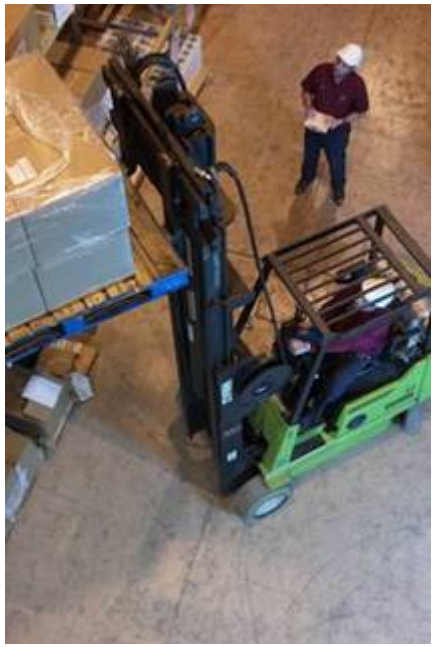
- For voltages 50 kv or less:
  - the clearance distance is 10 feet

- For voltages greater than 50 kv:
  - the clearance is 10 feet plus 4 inches for every 10 kv over 50 kv



Clearance between overhead lines and vehicles/equipment

- For vehicles in transit and the structure is lowered:
  - the clearance distance is 4 feet for 50 kv or less; or
  - the clearance distance is 4 feet plus 4 inches for every 10 kv over 50 kv for voltages greater than 50 kv



Clearance between overhead lines and vehicles/equipment

- When insulating barriers designed for line voltage are installed, and not attached to, or part of, the vehicle or mechanical equipment:
  - the clearance is the designed working dimensions of the barrier

Clearance between overhead lines and vehicles/equipment

- Employees standing on the ground must avoid contact with any vehicles, mechanical equipment, or parts under energized lines unless:
  - employee is wearing the proper electrical PPE; or
  - equipment/vehicle is located so that no uninsulated part can provide a conductive path to employees

Clearance between overhead lines and vehicles/equipment

- Do not stand near the grounding location for intentionally grounded equipment or vehicles when contact with overhead wires is possible

- Use insulation and barriers to protect employees from the grounding area

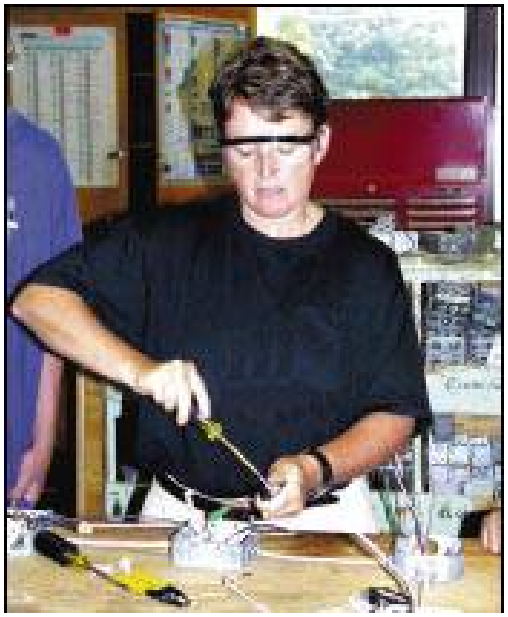
Use of nonconductive ladders

- Portable ladders must have nonconductive side rails when used near energized parts

- Metal ladders can conduct electricity and cause arcing and shocks

Hazards of conductive apparel

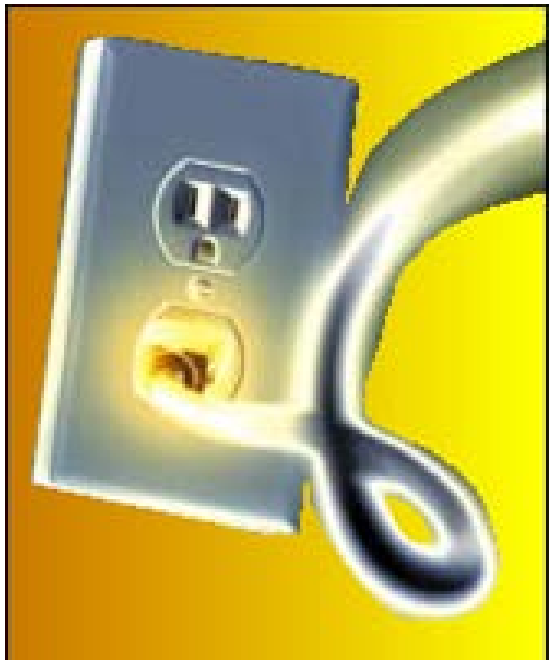
- Conductive jewelry and clothing can cause arcing when exposed to energized parts



- If conductive jewelry and clothing are not removed, they must be covered so they are no longer conductive

Procedures for using portable electrical equipment

- Proper handling of cords
  - don’t raise or lower equipment by its cord
  - don’t unplug the equipment by pulling on its cord
  - don’t staple or fasten the cord so as to damage outer jacket



Procedures for using portable electrical equipment

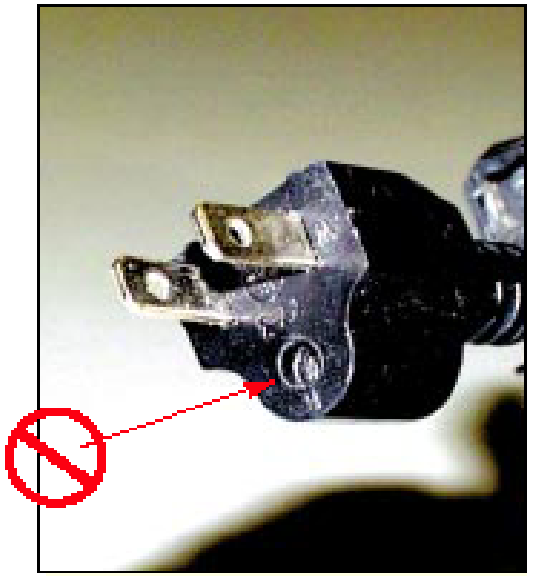
- Equipment inspection
  - visually check for:
    - loose parts
    - deformed or missing parts
    - damaged jackets or insulation

Procedures for using portable electrical equipment

- Equipment inspection
  - inspect for internal defects, as indicated by pinched or crushed outer jackets
  - perform inspections prior to beginning each shift

Procedures for using portable electrical equipment

- Equipment inspection
  - remove defective equipment from service
  - check the plug and receptacle mating configuration before connecting



Never use a three-prong grounding plug with the third prong broken off.

Procedures for using portable electrical equipment

- Flexible cords
  - flexible cords with grounding-type of equipment must have an equipment grounding conductor
  - never remove or alter the cord's grounding pin

This cord has been spliced using a wire nut. Spliced cords are very dangerous!

Procedures for using portable electrical equipment

- Never use an adapter with a missing grounding pin. Adapters cannot interrupt the continuity of the grounding connection.
- Electrical equipment and cords to be used near water must be approved for this use

Procedures for using portable electrical equipment

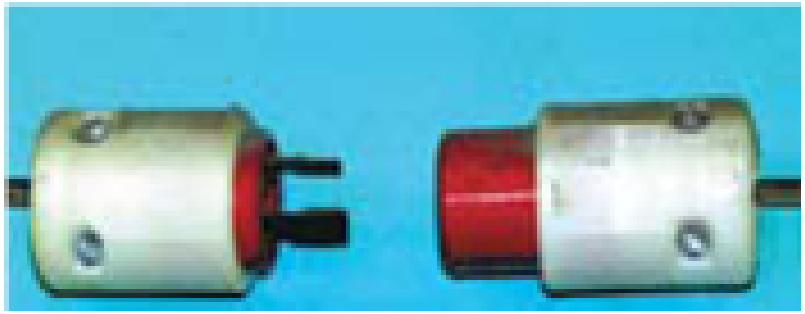
- Plugging/unplugging cord and cord-connected equipment and flexible cords
  - ensure hands are dry
  - never pull the plug out by the cord
  - Adapters cannot interrupt the continuity of the grounding connection.

Procedures for using portable electrical equipment

- Plugging/unplugging cord and cord-connected equipment and flexible cords
  - handle cords and equipment with insulating protective equipment if the condition of the connection could provide a conducting path to the employee. An example is: when the cord connector is wet
- Secure locking-type connectors after making connection

Electric power and lighting circuits

- Circuit breakers and load rated switches
  - never use the following to open and close electrical circuits
    - fuses
    - terminal lugs
    - cable connectors
    - cable splice connections



Electric power and lighting circuits

- Circuit breakers and load rated switches
  - don’t manually re-energize a circuit without first determining if the equipment and circuit can be safely energized
  - repeatedly closing a circuit breaker or replacing a fuse is not allowed

Protective equipment

- Use appropriate protective equipment in areas where there are potential electrical hazards

- Inspect protective equipment to ensure reliability

Alerting techniques

- Signs and markings
- Barricades
- Attendants

Summary of key points

- Definitions
- De-energized means locked/tagged out and tested
- Safe distances for clearances between workers and energized lines

Summary of key points

- Nonconductive ladders
- Nonconductive clothing
- Proper use of cords, plugs, receptacles

Summary of key points

- Protective equipment
- Alerting techniques