Electrical Safety Awareness

Research and Development
Environment, Health and Safety

Cargill Electrical Safety Statement

Electrical Safety is one of the core building blocks of Cargill's Corporate Safety Program, and avoiding workplace electrical hazards begins with safety awareness.

This training fully supports Cargill's LIFE Program to ensure that the appropriate safeguards are in place to protect our people, contractors, visitors, customers and assets.

Purpose of Training

-Provide employees with an electrical awareness

-Provide basic guidelines of “what to do” and “what not to do”

-Identify electrical hazards and risks

-Review employee expectations

Electricity Definitions

Electricity – is all around us powering technology like our cell phones, computers, lights, air conditioners, etc.

Electricity in simple terms is defined as the **flow of electric charge**

Other Common Definitions

- **Voltage** = is the difference in charge between two points
- **Amphere (Amps)** = measures the electrical flow rate (measures current)
- **Resistance** = is a material's tendency to resist electrical flow (resistance to current)
- **Current** = is the rate at which charge is flowing

Rules of Electricity

- Electricity travels in a completed circuit
- Electricity always travels in the path of least resistance
- Electricity tries to travel to ground

Ground Fault Circuit Interrupter (GFCI) or Residual Current Device (RCD)

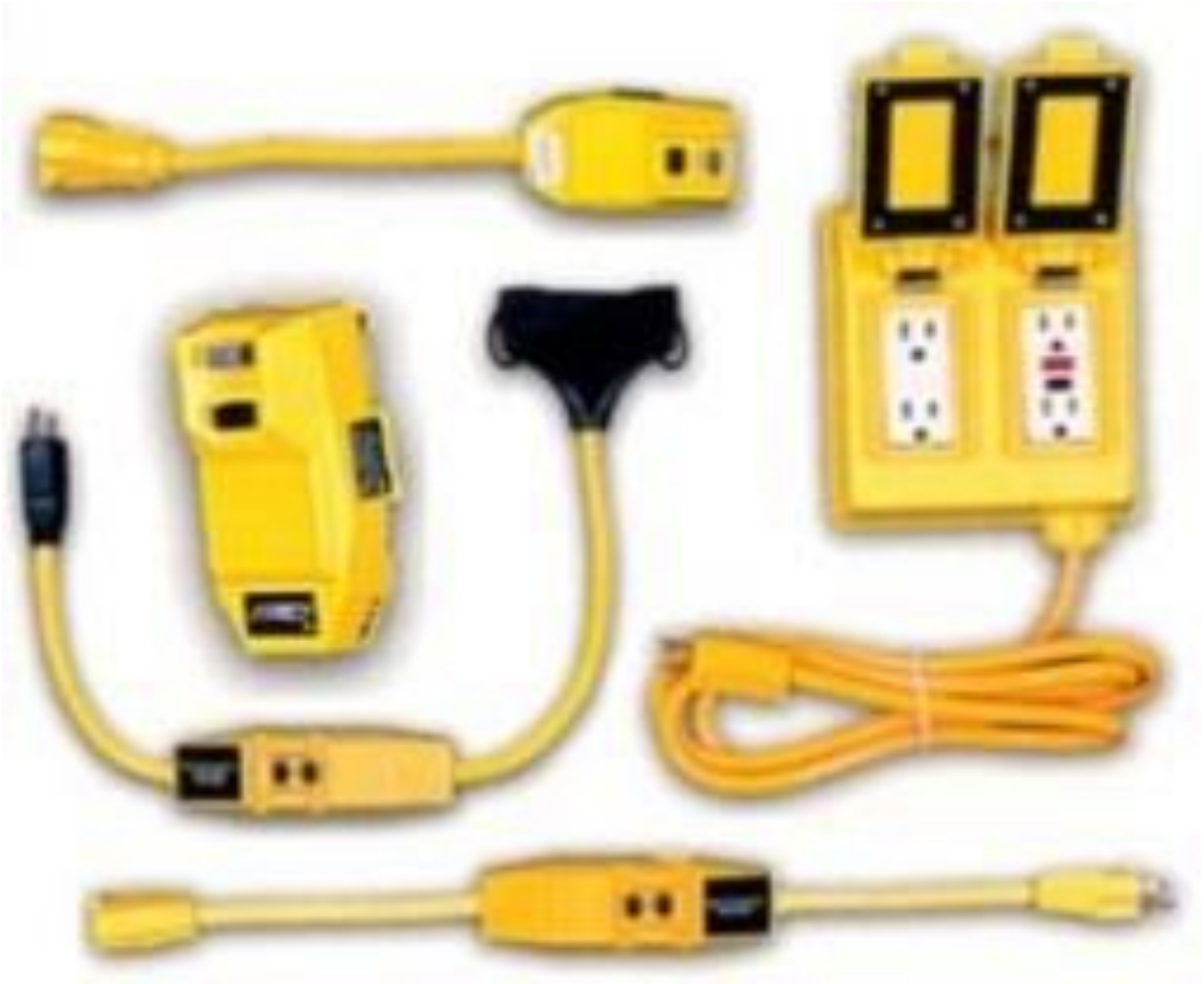
- Both are safety devices used to **immediately cut off the electricity supply to protect you from severe electrical shocks**
- Power Tools and Extension Cords = Must use GFCI protection
- Electrical Heat Trace = Must use GFCI protection
- Sinks and Water Sources = Electrical equipment used within 6 feet of water sources should use GFCI's
- Most of our Minneapolis locations have installed GFCI's that are built in to the outlets near sinks in bathrooms and laboratories, etc.

What types of GFCI's or RCD to use?

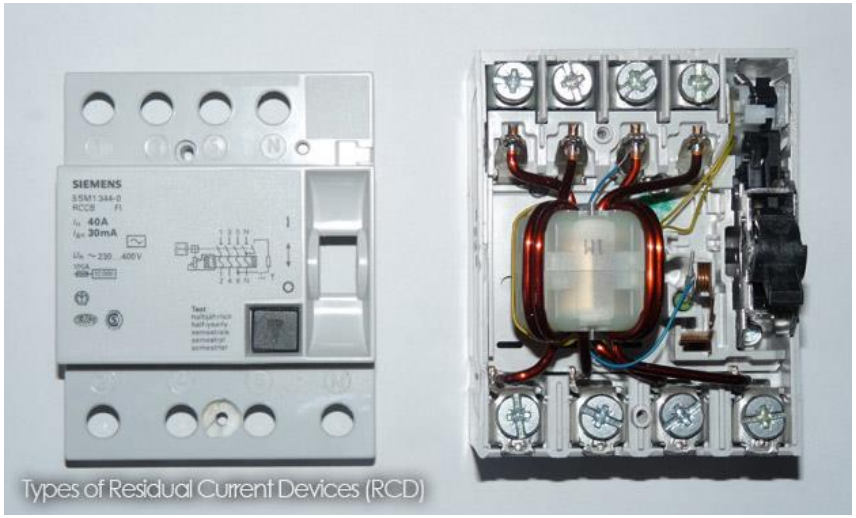
- Always use a GFCI / RCD that is electrically rated for the area where it will be used
- The GFCI / RCD must match the plug and design voltage, current, frequency and grounding system of the wall outlet
- GFCIs / RCDs are primarily designed for single phase circuits, so make sure to check the voltage and amperage when you select your portable GFCI / RCD

Examples of Portable GFCI's – *these can be purchased*

at any local hardware store or through Cargill preferred suppliers like Grainger



Examples of a Residual Current Device (RCD)



There are many different classifications of RDC's and requires an electrician or engineer to determine which RCD is best for different applications

WHAT IS ELECTRICAL SYSTEM INTEGRITY?

Electrical System Integrity is making sure that the electrical installation is used within the design limits and is in the same condition as when it was first installed

Inspections help us ensure electrical system integrity at our locations

Inspections

1. **Anyone can perform visual inspections**
2. Reduces our “Significant Injury and Fatality (SIF)” risk
3. Reduces our chance for electrical failure
4. Routine inspections are completed in our monthly inspections

If it doesn’t look right – it probably needs to get fixed

Visual Inspections

Avoiding workplace electrical hazards begins with safety awareness

- ***Anyone*** can conduct a visual inspection of electrical installations and equipment in our locations as part of our safety culture

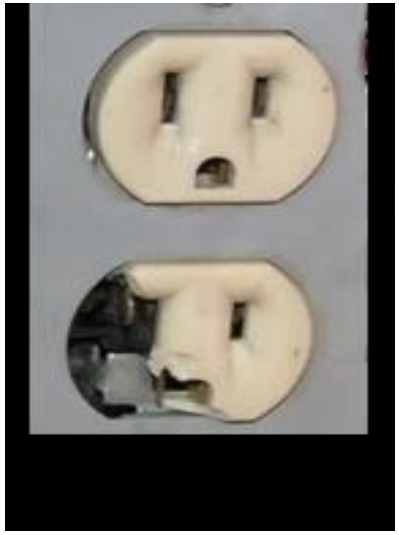
- Check for:
  - No missing covers, knock-outs etc.
  - No open or unlatched enclosures.
  - No insulation failures, exposed wires or exposed electrical parts.
  - No open conduit or broken motor connections.

Electrical System Integrity issues require ***IMMEDIATE ACTION!***

Please submit a work order to get electrical issues repaired

What is Wrong with these pictures?

Inadequate Installation



Defective Socket

Damaged Insulation/Cord

Open Panel/Enclosure

Electrical Shock

3 considerations that contribute to a serious electrical injury

1. **Path** entering the body and exiting the body
   - When electricity passes through the chest, head, neck, stomach, limbs or other sensitive areas that contain important organs, this can result in serious injury
   - The person becomes part of the electrical pathway to ground or part of the circuit

2. **Amount** of current or energy flowing in the body
   - High amps and high voltage – increases the likelihood of a severe injury

3. **Duration of exposure -** degree of injury also depends on the duration and frequency of the current
   - Longer the exposure - increases the likelihood of a severe injury

Immediate medical attention is required to treat electrical injuries

Many shock injuries are hidden internally, with only an entry and exit wound visible

Electricity and People

- Electricity will travel through a person because most often that person offers less resistance than the electrical user that is currently on the circuit
  - (i.e., machinery, power tools)

- If the person is touching the ground, that person will form a completed electrical circuit - Now the electricity will prefer to travel through the person (less resistance) and to the ground

Circuit Protection

- Circuits are protected with equipment such as breakers or fuses
- These allow a certain amount of amperage in the circuit before blowing, tripping, or otherwise breaking the circuit
- They are used to protect equipment and wiring in the system from being damaged by too much electrical current
- When a circuit breaker is tripped it needs to be investigated

Training

- OSHA has divided workers into two categories when it comes to working on or with electrical equipment:

1. ***Qualified workers*** are allowed to work on or near exposed energized equipment. They receive additional detailed training.
   - Our Contractors are “qualified workers”
2. ***Unqualified workers*** are not permitted to work on or near exposed energized equipment. They receive the training that has been discussed in this session, which includes:
   - How electricity works
   - How electricity can contact and harm the human body
   - Which tasks require a qualified worker to perform
   - How to identify potential electrical hazards and how to use equipment and machinery that is powered by electricity

Current Expectations

- Our contractors of “Trade” will perform all electrical work
- Scientists will not break the invisible plane of any open electrical panel
  - Do not reach in with your hands or with any tool
  - Do not enter the boundaries or barriers created by electricians
- If any circuit breaker trips then it needs to be investigated - What was the cause?
- Use the proper plug for the proper outlet/receptacle – with proper grounding
- Equipment should be UL listed or meet equivalent electrical standards by OSHA’s NRTL – nationally recognized testing laboratory standard

Summary

- All electrical injuries require immediate medical help
- Use GFCI and RCD protection
- Our contractors will perform all electrical work
- Inspections can be performed at anytime by anyone
- If you see an electrical hazard - submit a work order and get it fixed immediately


Cargill®