

Common Electrical Hazards

Identifying common electrical hazards and how to reduce risk.

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Hazards are not always obvious



Why Should Self Inspection Include Electrical?

- Shock or severe injury due to contact with exposed or damaged electrical components
- Falls from height as a result of contact with electrical energy
- Death
- Damage to critical or costly equipment, loss of income
- Fire



Codes and Standards

- OSHA 1910 and 1926
- NFPA 70E – Standard for Electrical Safety in the Workplace
 - Electrical hazards only, not installation
 - Safe work practices based on the electrical exposures
 - Hierarchy of control
- NFPA 70 – National Electric Code – NEC
 - Installation of electrical conductors, raceways, and equipment
 - Public and private premises including substations
 - Code adoption across the country varies



Electrical Exposure

| | |
|------------|---|
| 1 mA | Barely perceptible |
| 16 mA | Maximum current an average man can grasp and “let go” |
| 20 mA | Paralysis of respiratory muscles |
| 100 mA | Ventricular fibrillation threshold |
| 2 Amps | Cardiac standstill and internal organ damage |
| 15/20 Amps | Common fuse or breaker opens circuit* |

*A common household circuit breaker may be rated at 15, 20, or 30 amps

Common household electrical system – 120 volts

$120 \text{ Volts} / 100,000 \text{ Ohms} = 1\text{mA}$

$120 \text{ Volts} / 1,000 \text{ Ohms} = 120\text{mA}$

What OSHA looks for

- Faulty and inadequate wiring
- Exposed electrical wiring or components
- Potential electrical contact with flammable or combustible substances
- Improper grounding
- Exposure to overhead powerlines
- Damaged wire insulation
- Overloaded circuits
- Wet conditions



Overhead Powerlines

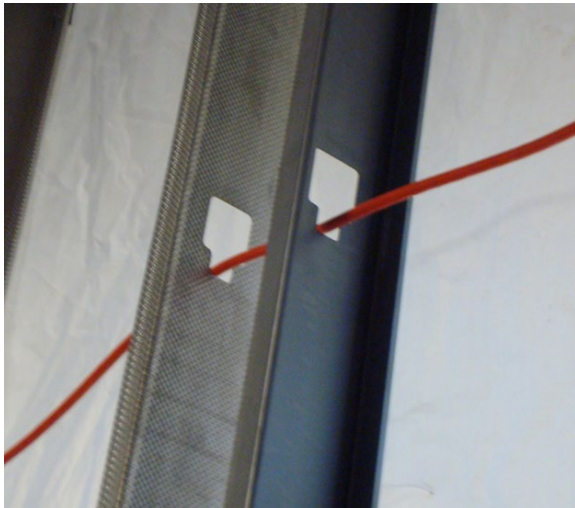
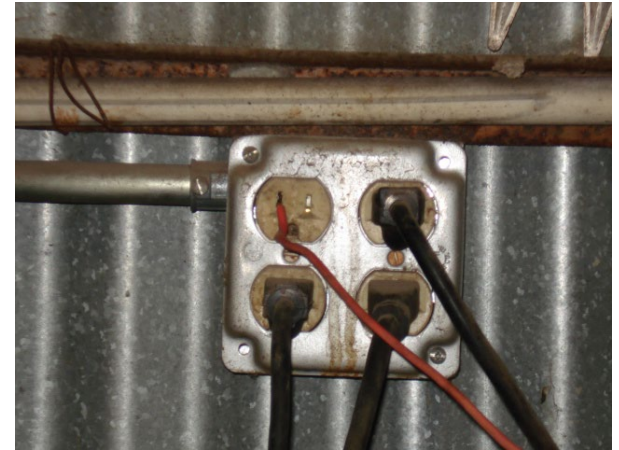




Damaged Equipment

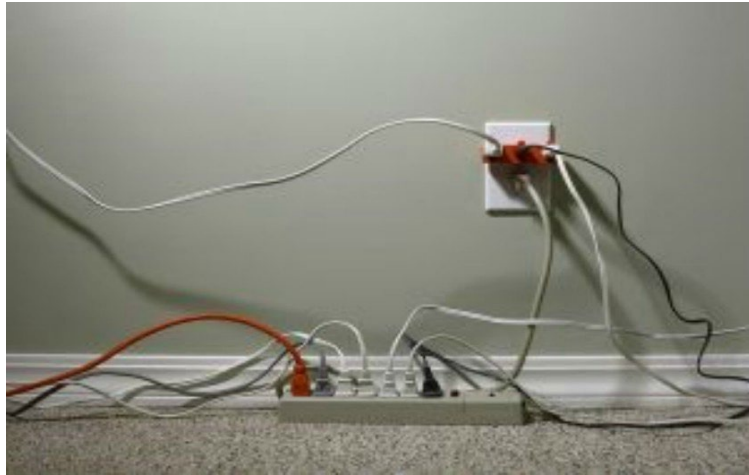


Improper Wiring, Extension Cords



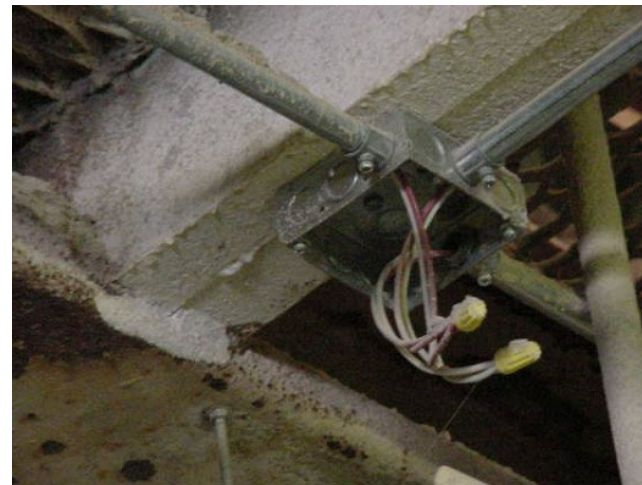


Overloaded Circuits





Exposed Electrical Components



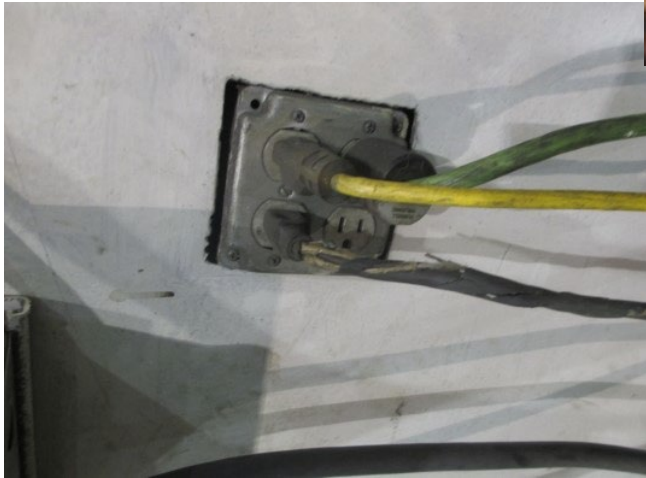
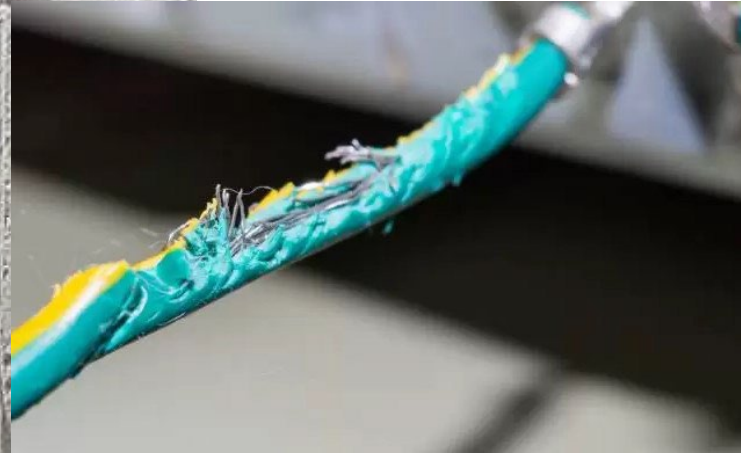


Improper Grounding





Damaged Insulation



Electrical Exposed to Water





Other Hazards



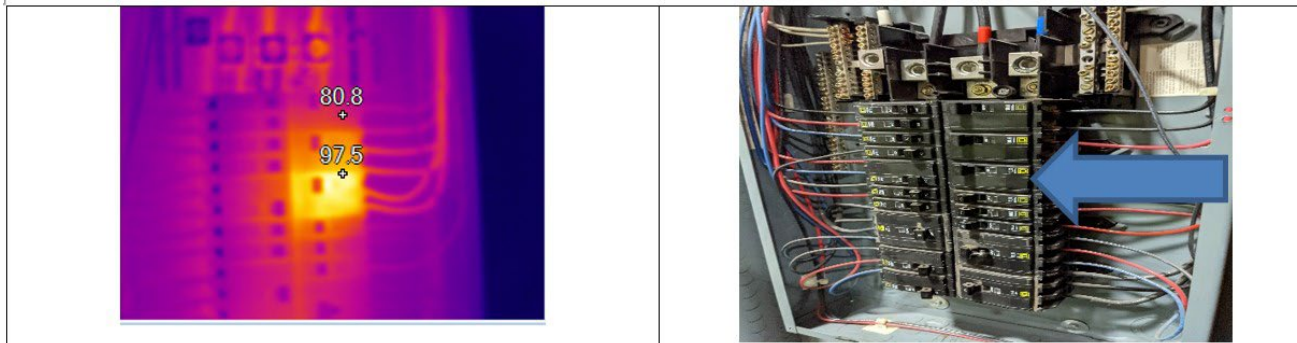


Arc Flash

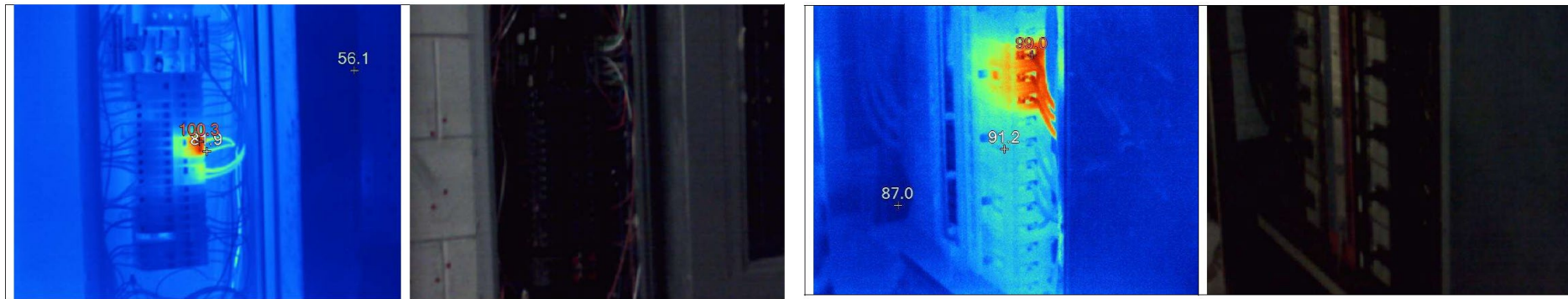
- Equipment should be labeled
- Arc Flash Calculations
 - Must be completed by an Electrical PE
 - Define hazard boundaries and PPE requirements
- PPE
 - Ratings - Layering
 - Inspection, Testing & Maintenance
- Training



Thermal Imaging / Infrared Thermography



2021-01: Possible breaker deterioration, replace breaker and check connection. Rated amperage of breaker 20amps, amperage readings 8amps across both phases.



Breaker overload

Possible overload/imbalance/breaker wear



Prevention

Conduct a self-assessment to determine your exposure

- Facilities
- Personnel
- Procedures

Hierarchy of Controls

- Elimination
- Substitution
- Engineering Controls
- Administrative Controls
- PPE

Prevention

- Treat all wires as if they are live
- Inspect all electrical cords for damaged insulation and broken ground pins before use
- Check extension cord ratings to ensure they can handle the required load
- Do not “repair” damaged cords with tape, replace damaged cords
- Do not use nails or sharp objects to hang extension cords from walls or ceiling
- Immediately report exposed electrical parts, wires, terminals, missing circuit breakers, etc.
- Keep at least 10 clearance from any overhead power lines
- Keep floor and work surfaces dry
- Regularly inspect electrical tools and equipment for damage



Emerging Hazards

Solar

- Shutoff identification and access
- Preplanning with FD
- Inspection and Maintenance

Electric Vehicles

- Charging – Gases
- Salt Water Exposure

Electrical Storage Devices

- Chemical Runaway
- Difficult to Protect



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