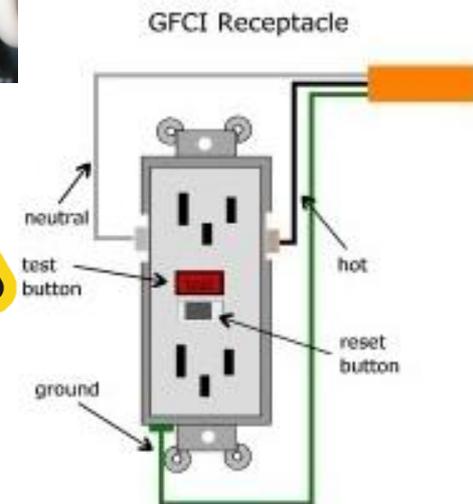


Ground Fault Protection

Review

Toolbox Talks

- When an electrical system is not grounded properly, a hazard exists. This is because the parts of an electrical wiring system that a person normally touches may be energized, or live, relative to ground.
- Grounding is connecting an electrical system to the earth with a wire. Excess or stray current travels through this wire to a grounding device deep in the earth. Grounding prevents unwanted voltage on electrical components.
- Equipment needs to be grounded under any of these circumstances:
 - The equipment is within 8 feet vertically & 5 feet horizontally of the floor or walking surface.
 - The equipment is within 8 feet vertically & 5 feet horizontally of grounded metal objects you could touch.
 - The equipment is located in a wet or damp area & is not isolated.
 - The equipment is connected to a power supply by cord & plug & is not double-insulated.
- One acceptable & common method to provide further protection is a ground fault circuit interrupter, commonly referred to as a GFCI.
- A ground-fault circuit-interrupter is not an overcurrent device like a fuse or circuit breaker. GFCI's are designed to sense an imbalance in current flow over the normal path.
- The use of GFCIs has lowered the number of electrocutions dramatically. A GFCI is a fast-acting switch that detects any difference in current between two circuit conductors. If either conductor comes in contact—either directly or through part of your body—with a ground (a situation known as a ground fault), the GFCI opens the circuit in a fraction of a second.
- GFCIs are usually in the form of a duplex receptacle. They are also available in portable & plug-in designs & as circuit breakers that protect an entire branch circuit. GFCIs can operate on both two- & three-wire ground systems.
- The NEC & NFPA 70E require that GFCIs be used in these high-risk situations:
 - Electricity is used near water.
 - The user of electrical equipment is grounded (by touching grounded material).
 - Circuits are providing power to portable tools or outdoor receptacles.
 - Temporary wiring or extension cords are used.
- Specifically, GFCIs must be installed in bathrooms, garages, outdoor areas, crawl spaces, unfinished basements, kitchens, & near wet bars.



Arc Flash Protection

Review

- OSHA severely limits the situations in which work is performed on or near equipment or circuits that are or may be energized.
- OSHA recommends that employers consult consensus standards such as NFPA 70E to identify safety measures that can be used to comply with or supplement the requirements of OSHA's standards for preventing or protecting against arc flash hazards.
- Arc flash results from an arcing fault (the flow of current through a higher impedance medium, typically the air, between phase conductors or between phase conductors & neutral or ground), where the electric arcs & resulting radiation & shrapnel can cause severe skin burns, hearing damage, & eye injuries.
- When live parts over 50 volts are not placed in an electrically safe work condition, it is considered energized electrical work & must be done under a written permit to prevent the general public from arc flash.
- When an energized conductor is exposed, you may not approach closer than the flash boundary without wearing appropriate personal protective clothing & personal protective equipment (PPE).
- A flash boundary is defined by IEEE as an approach limit at a distance from live parts operating at 50 V or more that are un-insulated or exposed within which a person could receive a second degree burn.
- PPE for the arc flash is the last line of defense. It is not intended to prevent all injuries, but is intended to mitigate the impact of an arc flash, should one occur.
- Skin damage will occur based on the intensity of the heat generated by an electrical arc accident. The heat reaching the skin of the worker is dependent on the following three factors:
 - Power of the arc at the arc location
 - Distance of the worker to the arc
 - Time duration of the arc exposure



! DANGER

ELECTRIC ARC FLASH HAZARD

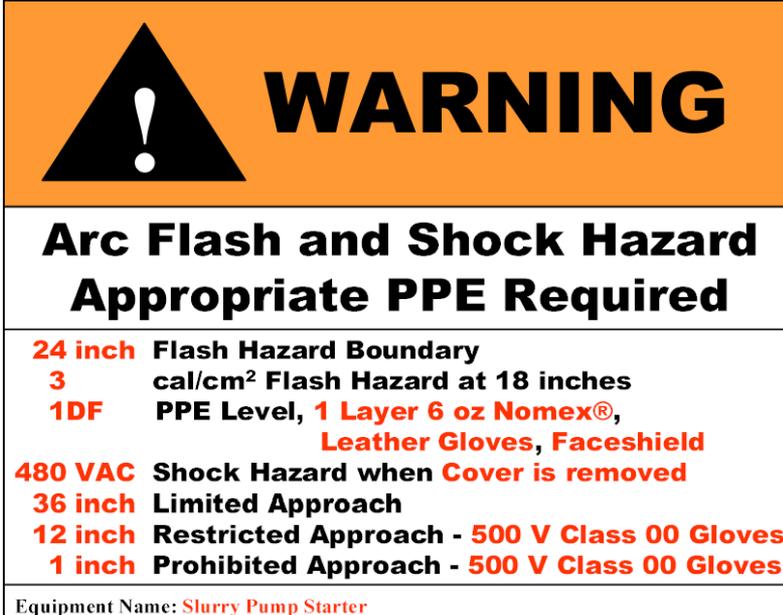
Will cause severe injury or death.

Turn OFF ALL power before opening. Follow ALL requirements in NFPA 70E for safe work practices and for Personal Protective Equipment.



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Toolbox Talks



! WARNING

Arc Flash and Shock Hazard
Appropriate PPE Required

24 inch	Flash Hazard Boundary
3 cal/cm²	Flash Hazard at 18 inches
1DF	PPE Level, 1 Layer 6 oz Nomex®, Leather Gloves, Faceshield
480 VAC	Shock Hazard when Cover is removed
36 inch	Limited Approach
12 inch	Restricted Approach - 500 V Class 00 Gloves
1 inch	Prohibited Approach - 500 V Class 00 Gloves

Equipment Name: Slurry Pump Starter