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| HSE Procedure | | | |
| Energized and Potentially Energized Electrical Equipment | | | |
| Issuing Department: Corporate HSE | | Previous Rev. & Issue Date: Rev. 2, 15 Aug 01 | Effective Date: 3 Apr 06 |

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1.0 PURPOSE AND SCOPE

This HSEP applies where exposure to energized or potentially energized electrical equipment is possible. Following these procedures will help to ensure that electrical work is conducted under the safest conditions possible.

This procedure does not apply to:

- Electrical work from 0-to-50 volts AC or 0-to-100 volts DC or
- Work performed on equipment by authorized service representatives in compliance with procedures approved by the manufacturer of the equipment.

This HSEP applies to all employees and subcontractors engaged in operations covered by the Company HSE Program.

2.0 RESPONSIBILITIES

General responsibilities for HSE Program implementation are stated in Roles and Responsibilities. Additional management, staff, employee, and subcontractor responsibilities that address duties specific to this topic are stated in this procedure.

2.1. Site Superintendent

The Site Manager is responsible for designating and authorizing

- An Electrical Superintendent/Electrical Competent Person and
- One or more on-site Qualified Electricians, as set forth in HSEP 19.3.

The Site Manager or the Electrical Superintendent must review and sign all SPAs for work on energized electrical equipment, prior to the work proceeding.

2.2. Electrical Subcontractor Superintendent

The Electrical Superintendent is responsible for planning, reviewing, and authorizing any work that is to be performed on or near potentially energized equipment of 480 volts or above.

2.3. Qualified Electrician

Workers, who will perform work on energized or potentially energized electrical equipment, shall:

- Possess the experience and education necessary to properly and safely perform the work.
- Successfully complete the company’s electrical safety training, including a thorough review of this HSEP.
- Have a history of adhering to site HSE rules and procedures.
- Have been designated as Qualified Electricians and be authorized by the Site Manager to perform electrical work according to the requirements of this HSEP.

3.0 DEFINITIONS

| | |
|-----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| De-energized | Free from any electrical connection to a source of potential difference and from electrical charge not having a potential different from that of the earth. |
| Electrical Equipment | Wiring, circuits, switches, switch gear, fuses, breakers, distribution systems, and any other equipment or systems capable of containing electrical energy. |
| Energized | Electrically connected to or having a source of voltage, including “live parts.” |
| Electrical Hazard | A dangerous condition such that contact or equipment failure can result in electric shock, arc flash burn, thermal burn, or blast. |
| Electrically Safe Work Condition | A state in which the conductor or circuit part to be worked on or near has been disconnected from energized parts, locked/tagged in accordance with established standards, tested to ensure the absence of voltage, and grounded. |
| Electrical Superintendent and Electrical Competent Person | An experienced supervisory or management level person, who is capable of identifying existing and potential electrical hazards in the surroundings or working conditions and who has the experience and expertise in electrical work to determine effective corrective measures to mitigate them. (This person may or may not be a company employee.) |
| Exposure | Where hazards are present or could be created that might result in harm to personnel, equipment, or the environment if not properly controlled. |
| Exposed To Live Parts | Capable of being inadvertently touched or approached nearer than a safe distance by a person. It is applied to parts that are not suitably guarded, isolated, or insulated. |
| Flash Protection Boundary | An approach limit at a distance from exposed live parts within which a person could receive a second degree burn if an electrical arc flash were to occur. |
| Grounded | Intentionally connected to earth through a ground connection or connections of sufficiently low impedance and having sufficient current-carrying capacity to prevent the buildup of voltages that may result in undue hazards to connected equipment or to persons. |
| Live Parts | Energized conductive components. |
| Potentially Energized | Electrical equipment capable of containing electrical energy that has not been locked-out, tagged-out, grounded, and verified as de-energized by proper testing methods. |

| | |
|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Qualified Electrician (Qualified Person) | An electrician who has skills and knowledge related to the construction and operation of electrical equipment and installations, and who has received training and been qualified and authorized to perform work on energized or potentially energized electrical equipment. A person can be considered qualified with respect to certain equipment and methods but still be unqualified for others. |
| Shock Hazard | A dangerous condition associated with the possible release of energy caused by contact or approach to live parts. |
| Standby Person | A person assigned to support a Qualified Electrician, who is trained in energized electrical procedures, methods of release of victims from contact with energized parts, and response for electrical shock victims. |
| Working Near Live Parts | A distance from an exposed live part within which a shock hazard exists. Also known as a Limited Approach Boundary. |
| Working On Live Parts | Coming in contact with live parts with the hands, feet, or other body parts, with tools, probes, or with test equipment, regardless of the personal protective equipment a person is wearing. |

4.0 PROCEDURE

4.1. Work Practices

Every effort must be made to de-energize the electrical equipment to be worked and other electrical equipment in the area that may affect the work. Prior to conducting work on any energized equipment, approval must be obtained from the Site/Project Manager, Electrical Superintendent, and the company maintenance or construction manager.

Prior to beginning work on or near energized or potentially energized electrical equipment, the Electrical Safety Checklist, [Figure 1](#), must be completed. The checklist is designed to ensure appropriate safety measures have been addressed when performing this type of work. The Electrical Safety Checklist will also serve as the authorization form for the performance of energized electrical work. Most facility owners also require an electrical safe work permit for this type of activity. See Sample Permit for Energized Electrical Work, [Figure 2](#).

Additionally, a Safe Plan of Action must be completed. SPAs for work on energized electrical equipment must be reviewed and signed by the site manager or electrical superintendent prior to the work beginning. The Electrical Safety Checklist and SPA must be maintained or posted at the location where the work is being performed.

The following safe practices, when working on or near energized or potentially energized electrical parts, shall be followed:

- All electrical equipment and circuits must be considered energized unless tested and verified to be de-energized.
- No bare-hands work is permitted on exposed energized systems above 50 volts AC or 100 volts DC.
- Only personnel who have been appropriately trained and authorized by the site manager may perform work on electrical equipment.
- Only personnel who have been appropriately trained and authorized by the site manager may enter energized electrical substations and motor control centers. Unauthorized employees must be accompanied by a Qualified Electrician.
- Never assume that an electrical insulation is intact; take the necessary precautions prior to contacting insulated conductors.
- Do not wear jewelry when working on potentially energized equipment.
- Never reach blindly into electrical cabinets or enclosed areas.

- Make sure work areas have good lighting.
- Secure electrical cabinet doors to prevent them from closing unexpectedly.
- Keep the work area clear of non-essential tools and equipment.
- Use only voltage-rated insulated tools.
- Barricades should be used to provide warnings and limit access to work areas.
- Portable ladders shall be made of nonconductive materials, if they are to be used where the worker or ladder could contact exposed live parts or where an electrical hazard exists.
- Ropes or hand lines used near live parts shall be made of non-conductive material.
- Handle conductive objects carefully when in the area of electrical equipment.
- Identify all sources of electricity and take the appropriate safety measures before proceeding with the work.
- Clearly visible identification plates must be provided for electrical equipment. Equipment having auxiliary circuits must have a label, such as "Has Auxiliary Circuit" or "Dual Power Sources."
- When racking or stabbing in/out electrical equipment, stand to one side of the cabinet and turn your face away from the work.
- Only use exact duplicates of the same rating when replacing fuses.
- Wear appropriate level of PPE, as determined by the hazard potential for arc and flash.

4.2. Work On or Near Potentially Energized Electrical Equipment

Energized parts that operate at less than 50 volts to ground shall not be required to be de-energized if there will be no increase in exposure to electrical burns or to explosion due to electrical arcs.

To work on any electrical part rated at or above 50 volts that are not placed in an electrically safe work condition (disconnected, locked and tagged, tested and grounded), safe work practices and personal protective equipment (PPE) must be used that will protect each worker from arc flash and from contacting live parts directly with their body or indirectly with another conductive object.

Both a shock hazard analysis and a flash hazard analysis shall be conducted prior to work on or near potentially energized equipment. Shock and flash hazard analysis data taken from local standards or regulations can be used in conducting this analysis. This analysis shall define what the safe approach distances are and what PPE is required based on the voltage level of the equipment.

Work on energized or potentially energized electrical equipment of 480 volts or above can only be performed by Qualified Electricians and shall not be done unless the following additional conditions are met:

- Prior to the performance of electrical work, confirm that all alternate solutions and scheduling options for de-energizing the system have been considered and are not feasible.

Examples of work that may be performed on or near energized circuit parts because of "infeasibility" due to equipment design or operational limitations, according to OSHA, would include testing of electric circuits that can only be performed with the circuit energized and work on circuits that form an integral part of a continuous industrial process in a chemical plant that would otherwise need to be completely shut down in order to permit work on one circuit or piece of equipment.
- A designated standby person must be present at all times and equipped with a level of personal protection equal to that of the Qualified Electrician performing the work.

- The supervisor of the Qualified Electrician performing the work must be notified that such work shall be done, the exact location of the work, and when the work will begin. Once the work is complete, the supervisor must also be notified.
- If the work site does not have an energized electrical work permit, prepare one using the Sample Permit for Energized Electrical Work found in [Figure 2](#).

4.3. Flash Protection Boundaries for Work on or Near Live Parts

No person shall approach or take a conductive object closer to exposed live parts or to potentially energized parts than the approach boundaries defined below unless they are:

- A Qualified Electrician,
- Using only voltage-rated insulated tools,
- Attended by a stand-by person if the circuit is rated at 480 volts or above,
- Following an approved safe work plan,
- Using an authorized safe work permit, and
- Wearing all required PPE, as defined by the PPE section of this procedure.

| <u>Nominal Voltage, Phase to Phase</u> | <u>Flash Protection Boundary (feet)</u> |
|----------------------------------------|-----------------------------------------|
| 50 volts to 169 kV | 4 |
| 230 kV to 242 kV | 6 |
| 345 kV to 362 kV | 9 |
| 500 kV to 550 kV | 12 |
| 765 kV to 800 kV | 15 |

4.4. Lock-out and Tag-out Procedures

Prior to beginning work on electrical equipment, every effort must be made to de-energize the equipment and other electrical equipment in the area that might affect the work.

In order to accomplish this task, the company or site-specific lock-out/tag-out procedures (HSEP 15.1) must be strictly followed.

Before implementing lock-out and tag-out procedures or being allowed to work on electrical equipment, employees must have completed the company’s lock-out/tag-out training.

4.5. Qualified Electrician Duties and Functions

Only Qualified Electricians may:

- Operate any circuit switching device 480 volts or above, except motor starters and valve operators from push button stations.
- Test or troubleshoot electrical equipment.
- Repair or alter electrical equipment.
- Remove or install fuses.
- Climb electrical poles.
- Perform work on non-insulated energized circuits and apparatus over 50 volts.
- Perform work within 10 feet of non-insulated energized circuits and apparatus that are not barricaded or covered or otherwise guarded to prevent electrical shock hazards and contact by tools, equipment, or personnel.

Only personnel, who have been appropriately trained and authorized by the site manager, may enter energized electrical substations and motor control centers (see HSEP 19.3). Unauthorized employees must be accompanied by a Qualified Electrician.

4.6. Standby Persons

Designated Standby Persons must be present when work is being performed on energized or potentially energized circuits 480 volts or above.

Standby Persons must be trained in energized electrical procedures and emergency rescue and response for electrical shock victims. They must, at a minimum:

- wear high voltage protective gloves,
- remain within line-of-sight of the work at all times while the work is in progress,
- have an effective means for notifying emergency response personnel, and
- know how and who to call for emergency medical response.

If the Standby Person does not have appropriate medical training, emergency medical response may be provided by another appropriately trained designated person, who is either at the site of the work or immediately available, e.g., 3 – 4 minutes maximum response time.

Insulated rescue hooks may also be provided to Standby Persons.

4.7. Overhead Power Lines

Overhead power lines must be considered energized unless disconnected and physically grounded. When working in the vicinity of overhead power lines, Qualified Electricians may not approach or carry conductive objects any closer than outlined in the table below unless:

- The conductive object has an approved insulating handle.
- The person is insulated from the energized part by the appropriate personal protective equipment rated for the expected voltage.
- The energized part is insulated from the person and other conductive objects in the area.
- The person is insulated from all conductive objects in the area.

| Approach Distances for Qualified Employees, Alternating Current | |
|------------------------------------------------------------------------|---------------|
| 300 volts and less | avoid contact |
| Over 300 volts, not over 750 volts | 1 ft. 0 in |
| Over 750 volts, not over 2 kvolts | 1 ft. 6 in. |
| Over 2 kvolts, not over 15 kvolts | 2 ft. 0 in. |
| Over 15 kvolts not over 37 kvolts | 3 ft. 0 in. |
| Over 37 kvolts, not over 87.5 kvolts | 3 ft. 6 in. |
| Over 87.5 kvolts, not over 121 kvolts | 4 ft. 0 in. |
| Over 121 kvolts, not over 140 kvolts | 4 ft. 6 in. |

Source of table: 29 CFR 1910.333(c)(3)(ii)(C), Table S-5

All power lines must be barricaded or flagged when there is danger of contact by mobile equipment.

For procedures related to rigging, lifting, clearance distances, and other mobile crane work, refer to HSEP 17.1.

4.8. Conduit and Cable Dismantling

Before the dismantling of conduit or electrical cable begins, the following procedures must be implemented:

- The electrical circuit(s) to be dismantled must be de-energized and locked out and tagged out by a Qualified Electrician in accordance with the company's lock-out/tag-out procedures.
- All disconnects and the identification and verification of conduits must be performed by a Qualified Electrician.
- All affected conductors must be checked with an appropriate voltage tester by a Qualified Electrician to assure that the conductors to be dismantled have been de-energized and are out of service.
- The voltage tester and all other electrical safety equipment (e.g. gloves, mats, etc.) must have current inspection stickers and be in good condition.
- Immediately before and after each use, the voltage tester shall be tested on a known source to ensure proper operation.
- After determining that all electrical circuits are de-energized and locked out and tagged out, the cables and conductors must be disconnected by a Qualified Electrician at all points of termination (energy source and equipment being served).
- After the cables and conductors have been de-energized and removed from the voltage sources, the conduit and/or cable shall be air-gapped at least 12 inches by a Qualified Electrician at both the source and at the equipment being supplied.
- Conduit and/or cables to be dismantled must be tagged by a Qualified Electrician at each end, each intersection, and at intervals not to exceed fifty feet in any direction along the entire length of the conduit and/or cable. Cable enclosed in an underground duct does not have to be tagged every fifty feet. A unique tag that specifies "demolition" should be used for this purpose.
- Each demolition tag should specify the name of the Qualified Electrician, who performed the work, the date, and the supervisor's name.
- All electrical cable and/or conduit dismantled should be removed in a safe manner and placed where it will not cause a tripping hazard.
- Every effort should be made to ensure that the Qualified Electrician, who began the dismantling work continues with the work until completion. If, for any reason, the electrician performing the work should be absent or unavailable, a second Qualified Electrician may assume the task; however, the status and energy state of the work must be re-verified.

4.9. Test Equipment

- 4.9.1. Only Qualified Electricians may perform tests on energized or potentially energized electrical circuits or equipment of 480 volts and above.

When performing tests, these requirements must be strictly followed:

- The test equipment must be evaluated for proper operation immediately before and after the test on a known voltage source.
- Test instruments, equipment, and all associated test leads, cables, power cords, probes and connectors must be visually inspected for external defects and damage before the equipment is used. If there is a defect or evidence of damage that could expose someone to injury, the defective or damaged item must be properly tagged out and removed from service. It may not be used again until repairs and tests to assure the equipment is safe to use have been made.
- Test equipment, instruments, and their accessories must be rated for the circuits to which they will be connected and must be designed for the environment in which they will be used.

- No person shall attempt to use any type of test equipment unless they are trained, qualified, and competent and are familiar with the proper use and limitations of the equipment.
- Test equipment that has been exposed to excessive moisture shall be immediately removed from service and may not be returned to service until repairs and tests to assure its safe operation are performed.
- All electrical test equipment must be stored in a clean, dry location, kept clean and in good operating condition.
- Solenoid type testers (also known as “wiggies”) produce a spark during use and may not be used in flammable or explosive environments.
- Voltmeters must be inspected monthly by a designated Competent Person. The inspection results are to be documented and kept on file. Any equipment that is, or is suspected to be defective, shall be tagged and removed from service until proper repairs are made and tests verify that the equipment is accurate and safe to use.
- Proximity testers or “no contact” testers, where approved, may only be used to verify presence of voltage, not the absence of voltage.
- Electrical test equipment that is rated for use on 2,300 volts or higher must be electrically tested and calibrated by an approved testing facility at intervals not to exceed twelve months. If the integrity of such equipment is suspect, it must be taken out of service until it is tested at an approved testing facility and deemed accurate and safe for use. Records of all tests and repairs are to be maintained on file.
- Voltage tester leads shall be kept in a separate pouch (other than tool pouch) to prevent damage by other objects.
- Phasing sticks shall be used when verifying that circuits 1,000 volts or greater are de-energized. Phasing sticks must be tested prior to and after each use.

4.9.2. Use of PPE During Testing

When using a voltage meter to check any energized or potentially energized source that is above 480 volts, and when troubleshooting any energized or potentially energized source that is above 480 volts, the following protective equipment must be worn:

- Approved and tested high voltage rubber gloves of the proper rating, with leather protectors,
- A full-face protective hood,
- Arc flash protective jacket and pants, and
- Dielectric boots of the proper rating.

All personal protective equipment shall be rated and designed to protect the worker from arc and flash potential of the equipment on which they are working. Dielectric switchboard matting between the equipment and worker may also be used to provide additional necessary protection.

4.10. Personal Protective Equipment

Workers shall wear nonconductive PPE when they are within the Flash Protection Boundary or when there is a danger of injury from electric arcs or flashes or burns due to contact with live parts or from flying objects resulting from electrical explosion.

4.10.1. Selection

Appropriate head protection, gloves, eye protection, hearing protection, foot protection, and flame resistant clothing must be worn by personnel who will be working on or near energized electrical equipment.

Selection of PPE must be made by using one of these two methods, either:

- Use the National Fire Protection Association (NFPA) 70 E Table 130.7(C)(9)(a) and Table 130.7(C)(10), or
- Use PPE rated for the level of protection required, as determined by calculations for potential shock and flash hazards of the equipment being worked on or near.

4.10.2. Maintenance of PPE

PPE required by this procedure must be inspected and maintained in compliance with this procedure and the manufacturers' guidelines.

Any defective PPE must be immediately removed from service and properly repaired or replaced.

4.10.3. Body Protection

Personnel shall wear flame retardant (FR) clothing when there is potential exposure to an arc flash above the threshold incident energy level of a second degree burn, 5 J/cm^2 (1.2 cal/cm^2).

FR clothing must be labeled with its arc protection rating, cover all ignitable clothing and other PPE, and shall allow for movement and visibility.

FR clothing must be inspected prior to each use. Clothing contaminated with grease, oil, or flammable or combustible materials shall not be used.

4.10.4. Flash Suits

Flash suits, including the hood's face shield, shall have an arc rating that is suitable for the arc flash exposure. Flash suit design shall permit easy and rapid removal by the wearer.

If exterior air is supplied into the hood, the air hoses and pump housing shall be either covered by flame retardant materials or constructed of non-melting and nonflammable materials.

4.10.5. Face Protection

Face shields shall have an arc rating suitable for the arc flash exposure. Face shields without an arc rating shall not be used. Eye protection (safety glasses or goggles) shall always be worn under face shields or hoods.

Face shields made with energy-absorbing formulations that can provide higher levels of protection from radiant energy are commercially available, but these shields are tinted and can reduce visibility. Additional illumination of the task area might be necessary when these types of face shields are used.

4.10.6. Foot Protection

Where insulated footwear is used as protection against step and touch potential, dielectric overshoes/boots shall be used. Insulated soles shall not be used as primary electrical foot protection.

4.10.7. Hand Protection

Leather or flame retardant gloves shall be worn where required for arc flash protection.

Where insulating rubber gloves are used for shock protection, leather protectors shall be worn over the rubber gloves. Insulating rubber gloves and gloves made from layers of flame-resistant material provide hand protection against the arc flash hazard. The leather protectors worn over insulating rubber gloves provide additional arc flash protection for the hands.

Insulating rubber gloves must be:

- electrically tested by an approved outside testing facility at intervals not to exceed six months. The type, size, class, and latest test date must be clearly

marked on each glove. Any glove that fails the electrical test must be immediately removed from service and destroyed.

- stored in a manner to prevent physical damage. Do not store them folded, creased, or compressed. The storage location should be free from chemicals, solvents, sunlight, heat, moisture, ozone, or any objects that could cause damage.
- inspected by the wearer for defects before each use and at other times if there is cause to suspect damage. They must be inspected over the entire surface and be gently rolled between the hands to expose any defects. If any of the following defects are found, the gloves must be repaired and retested before they are put back into service:
 - Holes, tears, punctures, or cuts
 - Ozone cutting or checking
 - Imbedded foreign objects
 - Texture changes such as softening, hardening, becoming sticky or inelastic
- given an air test before each use and at other times if there is reason to suspect damage. The test is performed by rolling the cuff tightly toward the palm in such a manner that air is trapped inside the glove. Once this is accomplished, look, listen and feel for air leaks throughout the glove. If no leaks are detected, the glove is safe to use. No part of the glove is to be stretched more than 1.25 times its normal size.
- worn with leather protector gloves to prevent damage. If the protectors have been used for any other purpose, they cannot be used to protect insulating gloves. Protectors with holes, tears, cuts, chemical, or oil contamination, holes, or any other defects that diminish their capacity to provide protection must not be used.
- free of any marking, labels, or adhesive tape other than those applied by the manufacturer or testing facility.
- cleaned of any grease, perspiration, etc. after each use. Use only a mild, non-bleaching soap, and rinse with clean water.
- kept and carried in a box, bag, or other container intended exclusively for this purpose. These containers must be kept free of chemicals, dirt, or any other material that could harm the gloves or protectors.

4.10.8. Inspection of PPE and Documentation

All personal protective equipment, including gloves, mats, boots, clothing, faceshields, hoods, etc. must be inspected and maintained in compliance with this HSEP and the manufacturers' guidelines. Any defective personal protective equipment must be immediately removed from service and properly repaired or replaced.

All inspections, repairs, and tests done on protective equipment shall be documented by the Competent Person or approved outside testing facility performing the inspection, repair and/or test. All such documentation is to be maintained on site and available for review.

4.11. Rubber Insulating Blankets

Rubber insulating blankets must be:

- electrically tested by an approved outside testing facility at intervals not to exceed twelve months. Defective or suspect defective blankets cannot be used until they have been tested and approved.

- visually inspected by the user before each use and any time there is reason to suspect any defect or damage. They are to be inspected on both sides over the entire blanket surface for defects and embedded materials. Blankets with any defects must be returned to an approved electrical testing facility for inspection and retesting.
- cleaned as necessary to remove foreign substances or chemicals. They may be cleaned with a mild, non-bleaching detergent and water and then be rinsed thoroughly with clear water to remove all of the detergent. If washed, the blanket should be air-dried. The cleaning agent used must not degrade the insulating or physical properties of the blanket.
- stored in a cool, dark, dry location that is free of chemicals, solvents, ozone, vapors, fumes, electrical discharges and sunlight. They are to be stored in a container, bag, box, or compartment designed for and used exclusively for this purpose. They must not be stored folded, creased, or compressed in any manner that could cause stretching, compression, or abrasion.
- free from any adhesives, tape, labels, or other markings, other than those placed by the manufacturer or testing facility. Tape cannot be used to secure blankets for shipment or storage.
- of the proper class, type, and voltage rating for the task being performed.
- repaired only by an approved facility. Blankets must be retested after any repair. Any rubber insulating blanket not suitable for electrical service must be destroyed.

4.12. Training

4.12.1. Qualified Electricians

A qualified person shall be trained and knowledgeable of the construction and operation of equipment or a specific work method and be trained to recognize and avoid the electrical hazards that might be present with respect to that equipment or work method.

Qualified persons shall also be trained in and familiar with the proper use of:

Qualified persons shall also be trained in and familiar with:

- The proper use of
 - any necessary special precautionary techniques,
 - PPE, including arc-flash, insulating, and shielding materials,
 - Insulated tools and test equipment,
- The skills and techniques necessary to distinguish exposed energized parts from other parts of electrical equipment,
- The skills and techniques necessary to determine the nominal voltage of exposed live parts,
- The allowable safe approach distances and the corresponding voltages, and
- The decision-making process necessary to determine the degree and extent of the hazard and the PPE and job planning necessary to perform the task safely.

4.12.2. Electrical Testing Equipment

No person shall attempt to use any type of test equipment unless trained, qualified, and competent to do so and familiar with the equipment, its proper operation, and limitations.

4.12.3. Standby Persons

Standby persons must be trained in energized electrical procedures, methods of release of victims from contact with energized parts, and response for electrical shock victims, including first-aid, CPR, and defibrillation.

4.12.4. Lock-out and Tag-out

Personnel who work on or near energized or potentially energized equipment, shall be trained to understand the lock-out/tag-out procedure and their responsibility in executing the procedure. New or reassigned workers shall be trained or retrained to understand the lock-out/tag-out procedure as related to their new assignment.

5.0 REFERENCES AND RELATED DOCUMENTS

NFPA 70 E

29 CFR 1910, Subpart S, Electrical

29 CFR 1926, Subpart K, Electrical

HSEP 19.3, Qualified Electrician Program

6.0 FIGURES

[Electrical Safety Checklist](#)

[Sample Permit for Energized Electrical Work](#)

Figure 1 Electrical Safety Checklist

Work Location and Description: _____

| Yes | No* | |
|-------|-------|------------------------------------------------|
| _____ | _____ | Electrical Work Order Obtained |
| _____ | _____ | Proper Permits Issued |
| _____ | _____ | Lockout/Tagout Procedures Properly Implemented |
| _____ | _____ | Equipment De-energized** |
| _____ | _____ | Safe Plan of Action (SPA) Complete |
| _____ | _____ | Task Safety Awareness (TSA) Meeting Conducted |
| _____ | _____ | Proper Personal Protective Equipment On Site |

*All "No" answers must be explained: _____

Supervisor Signature

**Prior to conducting work on any energized equipment, approval must be obtained from the Site/Project Manager, the Electrical Superintendent, and the Company Maintenance or Construction Manager.

This is to certify that we have reviewed the electrical work as described above and authorize this work to be performed in an energized state. I further certify that all required safety precautions have been taken to safeguard the employees involved.

Site/Project Manager

Electrical Superintendent

Figure 2 Sample Plan for Energized Electrical Work

PART I: TO BE COMPLETED BY THE REQUESTER

Job/Work Order Number: _____

(1) Description of circuit/equipment/job location: _____

(2) Description of work to be done: _____

(3) Justification of why the circuit/equipment cannot be de-energized or the work deferred until the next scheduled outage: _____

Requester/Title: _____ Date: _____

PART II: TO BE COMPLETED BY THE ELECTRICALLY QUALIFIED PERSONS DOING THE WORK

Enter details for each step and place check in each box when completed.

Detailed job description procedure to be used in performing the above detailed work: _____

Description of the safe work practices to be employed: _____

Results of the shock hazard analysis: _____

Determination of shock protection boundaries: _____

Results of the flash hazard analysis: _____

Determination of the flash protection boundary: _____

Necessary personal protective equipment to safely perform the assigned task: _____

Means employed to restrict the access of unqualified persons from the work area: _____

Evidence of completion of a job briefing (SPA), including discussion of any job-related hazards: _____

Standby person provided, who has required training, PPE, and emergency communication equipment and capabilities: _____

Do you agree that the work described above can be done safely? Yes No (If *no*, return form to requester.)

Qualified Electrician: _____ Date: _____

Qualified Electrician: _____ Date: _____

PART III: APPROVAL(S) TO PERFORM THE WORK WHILE ELECTRICALLY ENERGIZED:

Facility/Equipment Owner: _____ Maint./Engr. Manager: _____

HSE Manager: _____ Electrical Superintendent: _____

Site Manager: _____ Date: _____

Once the work is complete, forward this form to site HSE for review and retention.