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Energized and Potentially Energized Electrical Equipment		Supersedes: EHSP 19.4	Revision: Issue Date: 11/9/17
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1.0 PURPOSE AND SCOPE

This EHSP 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.

Energized electrical work shall only be performed in the following situations:

- **Deactivating the circuit or system creates additional hazards or risks**: Examples include interruption of life-support equipment, emergency alarm systems and other situations where deactivating a system creates a bigger hazard.
- **Infeasibility**: Energized work shall be permitted when it can be demonstrated that the task to be performed is infeasible in a de-energized state due to equipment design or operational limitations. Diagnostic and troubleshooting is a common example.

  ***Note**: Infeasible should never be confused with inconvenient. Just because it takes a few minutes to track down a panel and put a lock on a breaker does mean it is infeasible to do so.*

- **Equipment operating at less than 50 volts**: Energized electrical conductors and circuit parts that operate at less than 50 volts shall not be required to be de-energized where the capacity of the source and any overcurrent protection between the energy source and the worker are considered and it is determined that here will be no increased exposure to electrical burns or to explosion du to electrical arcs.

  Note: Be aware of other circuits or systems in the area that might be higher voltage that might need to be deenergized to perform the work safely.

- **Normal operating Condition**: Normal operation of electrical equipment shall be permitted where a normal operation condition exists. A normal operating condition exists when all of the following conditions are satisfied:

  1. The equipment is properly installed

2. The equipment has been properly maintained
3. The equipment is used in accordance with instructions included in the listing and labeling and in accordance with manufacturer's instructions.
4. The equipment doors are closed and secured.
5. All equipment covers are in place and secured.
6. There is no evidence of impending failure.

Note: the condition of the equipment is critical for safe work. If the condition or maintenance of the equipment is suspect then it should not be worked on energized even if it meets the above standards.

This procedure does not apply to:

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

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

2.0 RESPONSIBILITIES

General responsibilities for HSE Program implementation are stated in EHSP 1.5. Additional management, staff, employee, and subcontractor responsibilities that address duties specific to this topic are stated in this procedure.

2.1. Project Manager

The Project 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 EHSP 19.3.

The Project 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 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. Safety Manager

Assure the energized electrical work program is being followed properly, review the program regularly and perform at least annual field audits of the work being performed.

2.4. 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 EHSP.
- Have a history of adhering to site HSE rules and procedures.
- Have been designated as Qualified Electricians and be authorized by the Project Manager to perform electrical work according to the requirements of this EHSP.

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 Foreman 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.
Live – Dead – Live Testing	A process of verifying a circuit, system or device has been isolated or locked out by testing the meter against live circuit with known voltage, then testing the equipment you are have isolated or locked out to be sure it is deenergized then you test the meter again against a known voltage to be sure the meter is functioning properly. All of this testing will be done in the required PPE for the equipment being tested.
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. Communication with Host Site Representative

Prior to starting any work at a site the person responsible for directing work, normally the foreman or superintendent, will contact the host site representative to ascertain any of the following:

4.1.1. Any unique hazards presented by the contract employer's work

4.1.2. Any unanticipated hazards found during the contract employer's work that the host employer did not mention; and

4.1.3. The measures the contractor took to correct any hazards reported by the host employer to prevent such hazards from recurring in the future.

If any unique or unexpected hazards are observed during the work the foreman or superintendent will notify the host site representative of the hazards and any measures implemented or necessary to control the hazards.

4.2. 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, 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 project 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. Always use Live – Dead – Live testing to verify the circuit, system, or equipment is properly locked out and/or deenergized.
- No bare-hands work is permitted on exposed energized systems above 50 volts AC or DC.
- Only personnel who have been appropriately trained and authorized by Delta Services LLC may perform work on electrical equipment.
- Only personnel who have been appropriately trained and authorized by Delta Services LLC 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.

4.3. 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 arch flash and from contacting live parts directly with their body or indirectly with another conductive object. ALL ENGERGIZED WORK @ 50 VOLTS OR GREATER SHALL COMPLLY WITH CURRENT NFPA 70 STANDARDS!

Both a shock risk assessment and an arc flash risk assessment shall be conducted prior to work on or near potentially energized equipment. Shock risk and arc flash risk assessment data taken from local standards or regulations can be used in conducting this analysis. This analysis shall define what the safe approach boundaries 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 Permit for Energized Electrical Work in Figure 2.

4.4. Arc 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 arc flash boundaries listed 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,
- Have received current training on NFPA 70E,
- Using an authorized safe work permit, and
- Wearing all required PPE, as defined by the PPE section of this procedure.

Equipment specific labels will take precedence and shall be used in available. The chart below shall only be used if equipment specific labels are not available

Table 130.7(C)(15)(a) Arc-Flash PPE Categories for Alternating Current (ac) Systems

Equipment	Arc-Flash PPE Category	Arc-Flash Boundary
Panelboards or other equipment rated 240 volts and below Parameters: Maximum of 25 kA available fault current; maximum of 0.03 sec (2 cycles) fault clearing time; minimum working distance 455 mm (18 in.)	1	485 mm (19 in.)
Panelboards or other equipment rated greater than 240 volts and up to 600 volts Parameters: Maximum of 25 kA available fault current; maximum of 0.03 sec (2 cycles) fault clearing time; minimum working distance 455 mm (18 in.)	2	900 mm (3 ft)
600-volt class motor control centers (MCCs) Parameters: Maximum of 65 kA available fault current; maximum of 0.03 sec (2 cycles) fault clearing time; minimum working distance 455 mm (18 in.)	2	1.5 m (5 ft)
600-volt class motor control centers (MCCs) Parameters: Maximum of 42 kA available fault current; maximum of 0.33 sec (20 cycles) fault clearing time; minimum working distance 455 mm (18 in.)	4	4.3 m (14 ft)
600-volt class switchgear (with power circuit breakers or fused switches) and 600-volt class switchboards Parameters: Maximum of 35 kA available fault current; maximum of up to 0.5 sec (30 cycles) fault clearing time; minimum working distance 455 mm (18 in.)	4	6 m (20 ft)
Other 600-volt class (277 volts through 600 volts, nominal) equipment Parameters: Maximum of 65 kA available fault current; maximum of 0.03 sec (2 cycles) fault clearing time; minimum working distance 455 mm (18 in.)	2	1.5 m (5 ft)
NEMA E2 (fused contactor) motor starters, 2.3 kV through 7.2 kV Parameters: Maximum of 35 kA available fault current; maximum of up to 0.24 sec (15 cycles) fault clearing time; minimum working distance 910 mm (36 in.)	4	12 m (40 ft)
Metal-clad switchgear, 1 kV through 15 kV Parameters: Maximum of 35 kA available fault current; maximum of up to 0.24 sec (15 cycles) fault clearing time; minimum working distance 910 mm (36 in.)	4	12 m (40 ft)
Arc-resistant switchgear 1 kV through 15 kV [for clearing times of less than 0.5 sec (30 cycles) with an available fault current not to exceed the arc-resistant rating of the equipment], and metal-enclosed interrupter switchgear, fused or unfused of arc-resistant-type construction, 1 kV through 15 kV Parameters: Maximum of 35 kA available fault current; maximum of up to 0.24 sec (15 cycles) fault clearing time; minimum working distance 910 mm (36 in.)	N/A (doors closed) 4 (doors open)	N/A (doors closed) 12 m (40 ft)
Other equipment 1 kV through 15 kV Parameters: Maximum of 35 kA available fault current; maximum of up to 0.24 sec (15 cycles) fault clearing time; minimum working distance 910 mm (36 in.)	4	12 m (40 ft)

Table 130.7(C)(15)(b) Arc-Flash PPE Categories for Direct Current (dc) Systems

Equipment	Arc-Flash PPE Category	Arc-Flash Boundary
Storage batteries, dc switchboards, and other dc supply sources Parameters: Greater than or equal to 100 V and less than or equal to 250 V Maximum arc duration and minimum working distance: 2 sec @ 455 mm (18 in.)		
Available fault current less than 4 kA	2	900 mm (3 ft)
Available fault current greater than or equal to 4 kA and less than 7 kA	2	1.2 m (4 ft)
Available fault current greater than or equal to 7 kA and less than 15 kA	3	1.8 m (6 ft)
Storage batteries, dc switchboards, and other dc supply sources Parameters: Greater than 250 V and less than or equal to 600 V Maximum arc duration and minimum working distance: 2 sec @ 455 mm (18 in.)		
Available fault current less than 1.5 kA	2	900 mm (3 ft)
Available fault current greater than or equal to 1.5 kA and less than 3 kA	2	1.2 m (4 ft)
Available fault current greater than or equal to 3 kA and less than 7 kA	3	1.8 m (6 ft.)
Available fault current greater than or equal to 7 kA and less than 10 kA	4	2.5 m (8 ft)

4.5. 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 (EHSP 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.

4.6. Qualified Electrician Duties and Functions

Only Qualified Electricians may:

- Operate any circuit switching device 50 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 project manager, may enter energized electrical substations and motor control centers (see EHSP 19.3). Unauthorized employees must be accompanied by a Qualified Electrician.

4.7. 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.

4.8. Overhead Power Lines

Overhead power lines must be considered energized unless disconnected and physically grounded. Overhead power lines should never been approached by a lift, bucket truck or other elevated equipment by personnel that are not qualified to work on high voltage overhead power lines. This work should be performed by the overhead line division only.

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

4.9. 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.

4.10. Test Equipment

4.10.1. Only Qualified Electricians may perform tests on energized or potentially energized electrical circuits or equipment of 50 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.
- Proximity testers or "no contact" testers, where approved, may only be used to verify presence of voltage, not the absence of voltage.
- 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.

4.10.2. Use of PPE During Testing

When using a voltage meter to check any energized or potentially energized source that is above 50 volts, and when troubleshooting any energized or potentially energized source that is above 50 volts, the following protective equipment must be worn:

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

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.

4.11. Personal Protective Equipment

Workers shall wear nonconductive PPE when they are within the Arc Flash 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.

4.11.1. 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 Table130.7(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.

4.11.2. 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.

4.11.3. 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.

4.11.4. 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.

4.11.5. 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.

4.11.6. 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.

4.11.7. Hand and Arm 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. Sleeves shall be worn when required by the work being performed.

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.

Insulating sleeves gloves must be:

- electrically tested by an approved outside testing facility at intervals not to exceed twelve months. The type, class, and latest test date must be clearly marked on each glove. Any sleeve 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
- 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.

4.11.8. 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 EHSP and the manufacturers' guidelines. All PPE must be inspected each day before first use. Any defective personal protective equipment must be immediately removed from service and properly repaired or replaced.

4.12. 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.

4.13. Training

4.13.1. 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. Training records shall be maintained for the duration of the employee's employment.

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 specific hazards associated with electrical energy
- 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.

4.13.2. Retraining

All qualified electricians will be retrained on all items form 4.13.1 above for the following reasons:

- If the employee is observed not complying with safety-related work practices
- If workplace changes or new equipment necessitate retraining
- If the employee has not performed work covered by this program in the previous 12 months
- Refresher training will be provided at least every 24 months.

4.13.3. 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.

4.13.4. 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.

4.13.5. 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

EHSP 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
_____	_____	Proper Personal Protective Equipment On Site

*All "No" answers must be explained: _____

_____

_____

_____

_____

Foreman 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 Site Foreman

Figure 2

Energized Electrical Work Permit

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: _____

Project Manager: _____ Date: _____

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

SAFE WORK PRACTICES	
O Restrict access	O Insulated tools
O Eyewash/shower facilities	O Insulate mat
O Communication equipment	O Insulate blanket
O Non-conductive lighting	O Means to secure doors/panels
O Non-conductive fuse puller	O Equipment testing
O Protective grounding set	O Warning signs/tags
O Non-conductive ladder	O Barricades and shields Other Work Practices
O Lockout/Tagout/Checkout	
Other Work Practices:	

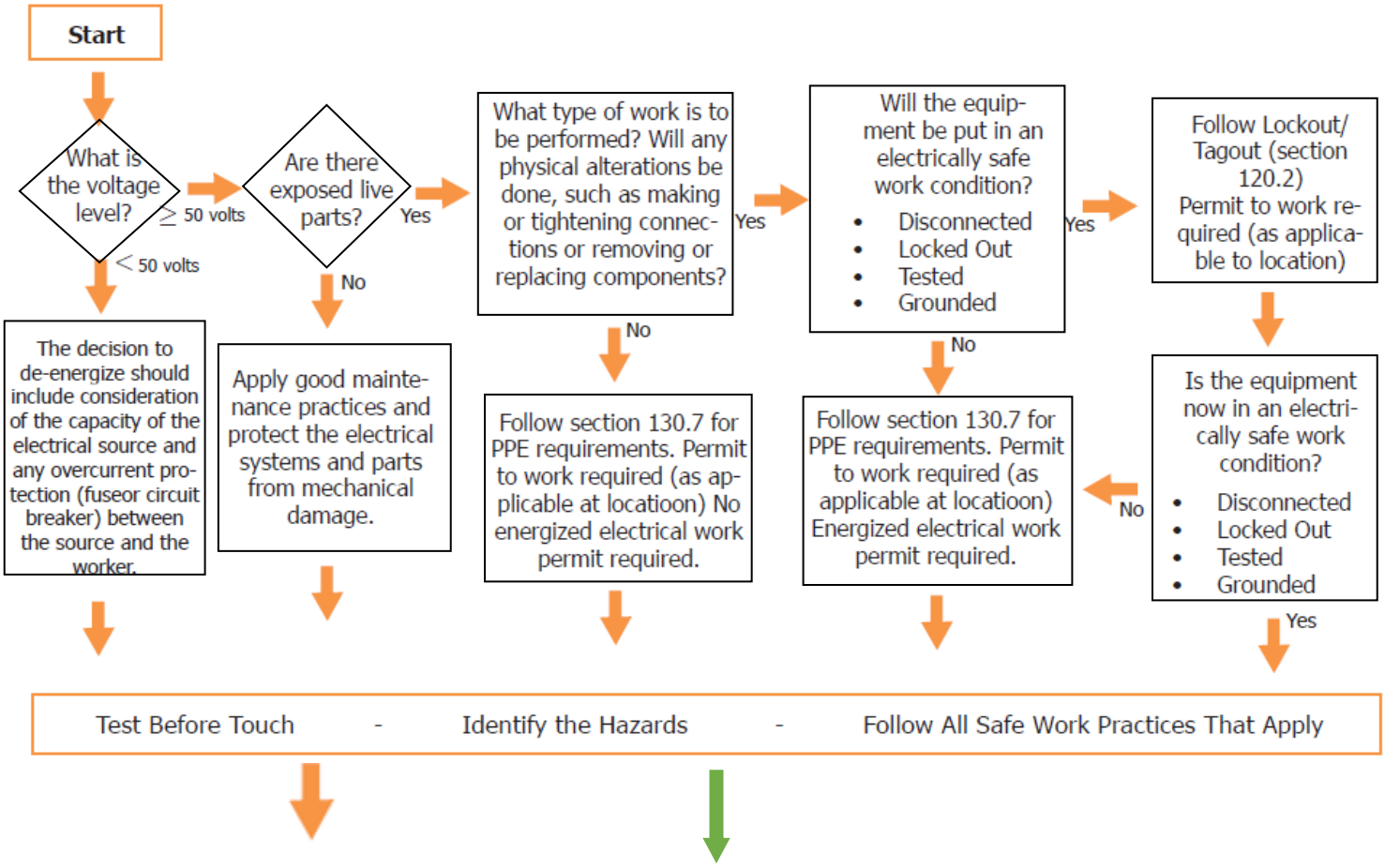
PRE-JOB REQUIREMENTS	
O Review Diagrams, work orders, manuals	O Determine equipment. tools and PPE needed
O Notify affected personnel	O Inspect PPE, insulating materials and tools
O Conduct job briefing	O Test equipment
O Remove conductive apparel/jewelry	O Don PPE
O Restrict access to unqualified personnel	O Determine safe body positioning
O Install warning signs/tags	O Install protective barriers
Other Pre-job requirements:	

PART IV: CHECKLIST

Identify:	The Hazards The voltage levels involved Skills Required	Any “foreign” (secondary) voltage source The shock protection boundaries
Ask:	Can the equipment be de-energized? Are the backfeeds of the circuits possible?	Is a “standby person” required?
Check:	Job plans Single or One Line Diagrams Status board Up to date plant and vendor resource info	Safety procedures Vendor information Individuals are familiar with the facility
Know:	What the job is Who else needs to know - communication!	Who is in charge
Think :	About the unexpected event - What if? Lock-Tag-Test-Try Test for voltage - first Use the right tools and equipment + PPE	Install and remove grounds Install barriers and barricades What
Prepare:	Is the standby person CPR trained? Where is the nearest telephone? Where is the fire alarm? Is confined space rescue available? Are radio communications available?	What is the exact work location? Is the required emergency equipment available? Where?Are the emergency phone numbers available? Where is the fire extinguisher?

Note: Once the work is complete, forward this form to the site Safety Department for review and retention.

PART V: FLOW CHART



Plan prepared by: _____DATE:_____

Job Briefing - Before proceeding with this work, employee in charge shall conduct a job briefing with the employees involved. Discuss hazards, write out work procedures, special precautions, energy source controls, emergency communication numbers, and personal protective equipment requirements.
Date of briefing: All present sign: _____

_____ _____ _____

Turn in Energized work permit forms to the Safety Department after work is complete. The purpose of this permit is to raise awareness of the hazards of working on energized circuits to our customers/GCs and electricians and is considered to be a written plan. In signing this permit, a customer/GC is being made aware of the plan. According to OSHA's multi-employer work rule, a customer/GC can be cited for allowing energized work whether this permit is signed or not. Signing this permit does not add any more or any less legal obligations to Delta Services LLC and/or our customers.

Form Resources:

NFPA 70E 2018 Standard for Electrical Safety in the Workplace