LOCKOUT/TAGOUT AND ZERO VOLTAGE VERIFICATION (50-600V)

0206500_CP_11_31_en_A1.3

CENTENNIAL
A BILFINGER COMPANY

Purpose:
This plan is intended to provide necessary information for effective site implementation of Safety Policies that apply to specific site conditions. This plan will be completed prior to starting any work on projects that involve exposed energized parts or Lock Out/Tag Out (LOTO).

Instructions:
1) This plan is intended to be used by an electrically qualified person and operating in conditions between 50 and 600 volts. If project is outside of this voltage range, then you will need to contact your HSEQ Safety Manager for assistance.
2) Page 1 is general site information, personnel qualifications, basic emergency procedures and LOTO statement.
3) Page 2 contains steps for LOTO and PPE requirements for Zero Voltage Verification on exposed parts for 50-240V and >240-600V.
4) Page 3 defines equipment to be used, communication with other trades, approach boundaries for qualified and unqualified personnel, additional training required and plan review/approval. The approach boundaries include the limited approach, restricted approach and arc flash protection boundaries for AC and DC voltage systems.
5) After LOTO and ZVV have been accomplished and verified, Centennial/JV personnel are now authorized to use a rated voltage test instrument on unprotected parts to re-verify the absence of current. If the presence of voltage is found during this re-verification process, all unqualified personnel will be removed from the exposed area until an electrically qualified person de-energizes and verifies the circuit(s).

General Site Information:

Company Name:_____ Project Start Date:_____

Point of Contact:_____ Phone#:_____

Lower Tier Subcontractor (if applicable):_____

Centennial/JV Project Name:_____

Project Description:_____

Qualified Electrician (print name):_____ *(Attach credentials to this plan)*

Emergency Response Training:
(1) Contact Release. Employees exposed to shock hazards and those responsible for the safe release of victims from contract with energized electrical conductors or circuit parts shall be trained in methods of safe release. Refresher training shall occur annually.

(2) First Aid, Emergency Response and Resuscitation.
(a) Employees responsible for responding to medical emergencies shall be trained in first aid and emergency procedures.
(b) Employees responsible for responding to medical emergencies shall be trained in cardiopulmonary resuscitation (CPR).
(c) Employees responsible for responding to medical emergencies shall be trained in the use of an automated external defibrillator (AED) if an employer's emergency response plan includes the use of this device.
(d) Training shall occur at a frequency that satisfies the requirements of the certifying body.
Informational Note: Employees responsible for responding to medical emergencies might not be first responders or medical professionals. Such employees could be a second person, a safety watch or a crafts person.

(3) Training Verifications. Employers shall verify at least annually that employee training required by 110.6(B) is current.

(4) Documentation. The employer shall document that the training required by 110.6(B) has occurred.

Lock Out & Tag Out (LOTO):

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

(1) The equipment is properly installed.
(2) The equipment is properly maintained.
(3) The equipment is used in accordance with instructions included in the listing and labeling and in accordance with the 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.

Informational Note: the phrase *properly installed* means that the equipment is instilled in accordance with applicable industry codes and standards and the manufacturer's recommendations. The phrase *properly maintained* means that the equipment has been maintained in accordance with the manufacturer's recommendations and applicable industry codes and standards. The phrase *evidence of impending failure* means that there is evidence such as arcing overheating, loose and bound equipment parts, visible damage or deterioration.

LOTO Steps:

1) Determine all sources of electrical supply to the specific equipment.
2) After properly interrupting the load current, open the disconnecting device(s) for each source.
3) Visually verify that all blades of the disconnecting devices are fully open or that draw-out type circuit breakers are withdrawn to the fully disconnected position.
4) Apply LOTO devices
5) Use an adequately rated voltage detector to test each phase conductor or circuit part to verify that they are de-energized. If verifying from an energized unprotected part, 50 v or greater, you will need to be in PPE for Hazard/Risk Category 1, please see following procedures on Zero Voltage Verification (ZVV).
6) Where the possibility of induced voltages or stored electrical energy exists, ground the phase conductors or circuit parts before touching them.

Zero Voltage Verification (ZVV):

Hazard/Risk Category 1 (*240V and below*) [NFPA 70E - Table 130.7 (C)(15)(a)]
This process is designed for 240V, and below, for voltage testing on exposed parts. While zero voltage verification is being performed, the qualified person will communicate the hazards of potentially energized parts. Signs and barricades will be required. At no time will an unqualified person be allowed to enter the Limited Approach Boundary.

PPE Requirements of the NFPA 70-E Table 130.7(C)(15)(c)
(1) Arc-rated clothing (min arc rating of 4 CAL/cm^2)
(2) Arc-rated face shield or arc-flash suit hood (min arc rating of 4)
(3) ANSI Z87.1 Safety glasses or goggles
(4) Hearing Protection (ear canal inserts)
(5) Leather gloves (ASTM F 696) over rubber insulating gloves (ASTM D120)
(6) Hard hat (electrically rated)
(7) Leather footwear

Hazard/Risk Category 2 (*>240V to 600V*) [NFPA 70E - Table 130.7(C)(15)(a)]
This process is designed for >240V to 600V, for voltage testing of exposed parts. While zero voltage verification is being performed, the qualified person will communicate the hazards of potentially energized parts. Signs and barricades will be required. At no time will an unqualified person be allowed to enter the Limited Approach Boundary.

PPE Requirements of the NFPA 70-E Table 130.7(C)(15)(c)
(1) Arc-rated clothing (min arc rating of 8 CAL/cm^2)
(2) Arc-rated flash suit hood or Face shield (arc rating of 8) and balaclava (sock hood, arc rating of 8)
(3) ANSI Z87.1 Safety glasses or safety goggles if face shield is utilized.
(4) Hearing protection (ear canal inserts)
(5) Leather gloves (ASTM F 696) over rubber insulating gloves (ASTM D120)
(6) Hard hat (electrically rated)
(7) Leather footwear

Note: Arc rated protective clothing shall be non-melting or untreated natural fiber (i.e., untreated cotton, wool, rayon, silk, or blends of these materials) with a fabric weight of at least 4.5 oz. per square yard.

Equipment Used for Testing:
Test equipment must be selected based on the intended use and expected voltage or current rating. Leads and probes must be rated at least as much as the instrument.

Make/Model:_____ Voltage Rating:_____

Note: Verify the test instruments operation before and after zero voltage verification.

Communication With Other Trades:
Once an electrically safe work condition is achieved and verified, the electrical subcontractor will place a de-energized tag on all exposed de-energized circuits or a sign designating the room/area is in an electrically safe working condition. This will allow un-qualified workers to perform work around circuits that have been placed in an electrically safe condition.

Approach Boundaries:

Limited Approach Boundary (Determined by NFPA70E Table 130.4(E)(a) or 130.4 (E)(b))		Restricted Approach Boundary	Arc Flash Protection Boundary (Determined by NFPA70E Table 130.7(C)(15)(a) or 130.7(C)(15)(b))
Exposed Moveable Conductor - 10'0"	Exposed Fixed Conductor - 3'6"	1'0"	4'0"

Additional Required Training:
Employees will be trained to understand the specific hazards associated with electrical energy and the relationship between electrical hazards and possible injury. Employees must have received specific training on:

- What electrical hazards are presented by the specific job
- How electrical hazards affect body tissues
- How to avoid exposure to hazards
- How to minimize risk by body positioning
- What PPE is needed for the employee to perform his or her work assignment
- How to select and inspect PPE
- What employer-provided procedures, including specific work practices, the employee must implement
- How increased duration of exposure increases the opportunity of injury
- How to perform a hazard/risk analysis
- How to determine limited, restricted, and prohibited approach boundaries

Affected Panel: _____

Breakers to be locked out: _____

Provide wire diagram or sketch of work to be performed:

Initials:_____

Plan Approval:

Qualified Electrician (sign):_____ Date:_____

Review

Competent Person(sign):_____ Date:_____

Centennial Rep (sign):_____ Date:_____