

**Cal Poly Environmental Health and Safety
Electrical Safe Work Conditions/LOTO Attachment 9.2 Rev #1**

Date: _____

Name/Title

Signature

Performed by: _____
Supervisor _____
Shop/Department _____

Successful completion

1. Review appropriate operating procedures. Consult manufacturer's instructions, or machine operator or person responsible, if assigned. Yes No
2. Complete an electrical job hazard analysis (JHA). Review warning labels if present. Use NFPA 70E to select PPE if no label. Document your findings below.

Electrical Safe Work Condition/LOTO by Qualified Person (per NFPA 70E)						
Shock <i>(Circle boundary to be crossed)</i>				Arc Flash		
Boundary		Limited		Restricted	Anything 1.2 cal/cm ² or above requires an arc-rated face shield and clothing	
Phase-to Phase	Enter Voltage	Moveable	Fixed		Incident Energy	PPE Category
<input type="checkbox"/> 0-50		Not specified	Not specified	Not specified	<1.2 <input type="checkbox"/>	1 <input type="checkbox"/> 4cal/cm ²
<input type="checkbox"/> 51 - 150		10'	3' 6"	Avoid Contact	1.2 – 12 <input type="checkbox"/>	2 <input type="checkbox"/> 8cal/cm ²
<input type="checkbox"/> 151-750		10'	3' 6"	1' 0"	>12 <input type="checkbox"/>	3 <input type="checkbox"/> 25cal/cm ²
<input type="checkbox"/> 750 - 15KV		10"	5' 0"	2' 2"		4 <input type="checkbox"/> 40cal/cm ²
Check all that apply		Y	Y	Y	Arc flash cal/ cm ² or PPE cat. # _____	
LOTO		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Ladders (NON-CONDUCTIVE SIDERAILS)		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Arch flash boundary _____	
Signs/Barricades/Attendant		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Y	
EH rated shoes		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Safety Glasses	<input type="checkbox"/>
DI rubber boots		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Hearing Protection	<input type="checkbox"/>
Rubber gloves Class of gloves _____					Face Shield = > 1.2 cal/cm ²	<input type="checkbox"/>
Rubber sleeves					Balaclava AFB = >20	<input type="checkbox"/>
Rubber blanket					Flash suit hood > 12 cal/ cm ²	<input type="checkbox"/>
Insulated tools					Leather gloves	<input type="checkbox"/>
Hot sticks					Leather work shoes	<input type="checkbox"/>
Live work permit (not required for testing)					Rain or acid arc-rated PPE	<input type="checkbox"/>
AED/CPR/First-Aid training					Fire extinguisher/AED equip.	<input type="checkbox"/>
Stored electrical energy (capacitors, inductors, batteries, magnets)					<input type="checkbox"/> Yes	<input type="checkbox"/> No
Mechanical energy (gravity, air, hydraulic, springs)					<input type="checkbox"/> Yes	<input type="checkbox"/> No
Pinch points					<input type="checkbox"/> Yes	<input type="checkbox"/> No
Hot to touch					<input type="checkbox"/> Yes	<input type="checkbox"/> No
Chemical/ explosive/ environmental					<input type="checkbox"/> Yes	<input type="checkbox"/> No
Slips, trips, falls, moving equipment					<input type="checkbox"/> Yes	<input type="checkbox"/> No
Temporary / permanent					<input type="checkbox"/> Yes	<input type="checkbox"/> No
Unusual hazards					<input type="checkbox"/> Yes	<input type="checkbox"/> No

3. Complete pre-job briefing. Consider what might go wrong – human error If more than one person doing work, discuss the hazards present and the SOP/Job plan	<input type="checkbox"/> YES	<input type="checkbox"/> NO
4. Inspect and prepare PPE for used based on Worksheet #1 Inspect PPE, Tools and Test Equipment . If selecting PPE using NFPA 70E Tables from Section 130. <ul style="list-style-type: none"> For shock protection and boundaries, use Table 130.4(D)(a) To determine if arc flash protection is required, use Table 130.5 (C) If protection is required and using incident energy and cal/cm2 from equipment label, use Table 130.5(G) if A/C volts If protection is required and using PPE categories form equipment label, use Table 130.7(C)(15)(c) if A/C volts. If protection is required and no label is present, use Table 130.7 (C)(15)(a) in conjunction with Table 130.7(C)(15)(c) if A/C volts. 	<input type="checkbox"/> YES	<input type="checkbox"/> NO
5. Select and inspect test instrument and accessories <ul style="list-style-type: none"> Verify proper Voltage Rating Verify proper Category Rating Verify proper design for environment and manner test equipment is to be used Visually inspect for external defects or damage Identify any limitations of voltage detector Check meter battery; test meter functions per manufacturer's per-use recommendations 	<input type="checkbox"/> YES	<input type="checkbox"/> NO
6. Determine all possible sources of electrical supply to specific equipment <ul style="list-style-type: none"> Check up-to-date one-line drawings, diagrams, and equipment identification tags. 	<input type="checkbox"/> YES	<input type="checkbox"/> NO
7. Remove all conductive objects (jewelry, watches, cell phones, metal frames glasses, etc.). Appropriately don PPE as instructed in Worksheet #1 Inspect PPE, Tools & Equipment	<input type="checkbox"/> YES	<input type="checkbox"/> NO

Lockout/Tagout Written Procedures

Exceptions – A tag without a locking device may be used if **all conditions exist:**

The isolation point cannot be locked or is not readily adaptable to lockable controls.	<input type="checkbox"/> YES	<input type="checkbox"/> NO
The tagout device attachments are of a non-reusable type, attachable by hand, and self-locking, with a minimum unlocking strength of no less than 50 lbs.	<input type="checkbox"/> YES	<input type="checkbox"/> NO
The tag provides a reason for placement.	<input type="checkbox"/> YES	<input type="checkbox"/> NO
The tag provides the name and contact Information of person placing the tag.	<input type="checkbox"/> YES	<input type="checkbox"/> NO
The tag provides the date of placement.	<input type="checkbox"/> YES	<input type="checkbox"/> NO

PROCEDURES

1. Properly interrupt load current as applicable Turn off machine or equipment using stop button or standard shutdown method or procedure Avoid standing in front of a switch or breaker if possible, during operation Demonstrate proper body positioning and technique for operating a disconnect or breaker Open the disconnect for each source of supply Where possible <ul style="list-style-type: none"> Visually verify all disconnect and knife blades open, or Drawout-type circuit breakers are withdrawn to the fully disconnected position Note: Ensure all drawout-type circuit breaker position and/or condition indications installed locally and/or remotely are in agreement and functioning properly. <ul style="list-style-type: none"> Mechanical flags on breaker. Local/remote ammeters. Mechanical position indicators Activate controls to "Try", to close circuit breaker/starter 	<input type="checkbox"/> YES	<input type="checkbox"/> NO
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<p>2. Demonstrate Lockout and Tagout (LOTO) process per training.</p> <ul style="list-style-type: none"> • Verify Cal Poly safety training requirements satisfied. • Discuss Cal Poly LOTO procedures on equipment used for training. • Apply lock to proper place on permanently installed breaker/fuse protected equipment <p>Alternately as applicable</p> <ul style="list-style-type: none"> • Apply lock to drawout-type circuit breaker in proper place to lock breaker into cubicle or • If breaker is to be removed for maintenance/cleaning during work task, apply lock to appropriate place on cubicle (cubicle rails, door, etc.) to ensure safety <p>Lock ID # _____</p> <p>Tag ID # _____</p>	<input type="checkbox"/> YES	<input type="checkbox"/> NO
<p>3. Use adequately rated voltmeter (or voltage detector on >600 volts) to test for absence of voltage</p> <ul style="list-style-type: none"> • Verify meter (detector) has been selected and inspected for use (see previous step for procedure) • Verify meter (detector) works correctly by testing on a known source of voltage • Test each phase conductor or circuit part and verify zero energy state. When using voltmeter test both phase-to-phase and phase-to-ground and verify zero energy state on meter <p>Minimum of 6 tests:</p> <p>a) 3 - ■ to ■</p> <p>b) 3 - ■ to G</p> <ul style="list-style-type: none"> • Verify meter (detector) continues to work correctly by testing on a known source of voltage. 	<input type="checkbox"/> YES	<input type="checkbox"/> NO
<p>4. Determine need to apply personnel protective grounding devices to phase conductors or circuit parts before touching them if any of the following conditions are met:</p> <ul style="list-style-type: none"> • Cal Poly policy requires installation of ground devices • Possibility of induced voltage present • Possibility of stored electrical energy exists • Possibility of equipment becoming re-energized • A contact voltage detector (multimeter) has not been used to verify the absence of voltage (non-contact pressure) 	<input type="checkbox"/> YES	<input type="checkbox"/> NO
<p>5. Install personnel protective ground cable sets as applicable installing per <i>Worksheet#1 Personal Protective Grounds</i></p>	<input type="checkbox"/> YES	<input type="checkbox"/> NO
<p>6. Prepare to restore system to normal</p> <ul style="list-style-type: none"> • Remove all tools and test equipment from enclosure • Inspect/clean work area (floor trips, falling objects, flying parts) • Remove personnel protective grounds per <i>Worksheet#8 Personal Protective Grounds</i> • Secure enclosure doors properly • Follow Lockout/Tagout procedure for re-energizing equipment and restoring system to normal • Warn other personnel as applicable • Demonstrate proper technique for closing disconnect or circuit breaker as applicable 	<input type="checkbox"/> YES	<input type="checkbox"/> NO
<p>7. Re-energize equipment and test for proper operation and safety. Remove barriers, warning signs, etc. clean-up work area</p>	<input type="checkbox"/> YES	<input type="checkbox"/> NO