



ELECTRICAL LOW VOLTAGE

Meets California OSHA Requirements
Integrated Water Services, Inc.
(the Company)



Purpose

The purpose of this program is to prevent injuries due to electrical exposure to low voltage (less than or equal to 600 volts) for employees and contractors when working in California.

Scope

This program is applicable at every California work area where low voltage electrical exposure may occur. When work is performed on a non-owned or operated site, the operator's program shall take precedence, however, this document covers Company employees and contractors and shall be used on owned premises, or when an operator's program doesn't exist or is less stringent.

Purpose

The purpose of this program is to set forth procedures for the safe use of low voltage electrical equipment, tools, and appliances at the Company.

Responsibilities

Managers/Supervisor

The Safety Manager will develop electrical safety programs and procedures in accordance with CAL/OSHA requirements and/or as indicated by events and circumstances.

Operations Managers and Supervisors are responsible for ensuring that only qualified employees and or qualified contractors perform electrical repairs or installations.

Operations Managers are also responsible for ensuring all applicable electrical safety programs are implemented and maintained at their locations.

Employees are responsible to use electrical equipment, tools, and appliances according to this program, for attending required training sessions when directed to do so and to report unsafe conditions to their supervisor immediately.

General Requirements for Low Voltage Systems

- Only qualified persons may work on electrical equipment or systems. Only qualified persons shall work on electrical equipment or systems. Only qualified persons shall be permitted to perform any function in proximity to energized overhead conductors unless means to prevent accidental contact have been provided.
- Maintenance of electrical installations is required to ensure their safe condition.
- Electrical equipment and wiring must be protected from mechanical damage and environmental deterioration.

Use of Barriers or Barricades

Covers or barriers must be installed on boxes, fittings and enclosures to prevent accidental contact with live parts. Suitable temporary barriers or barricades shall be installed when access to opened enclosures containing exposed energized equipment is not under the control of an authorized person. Energized parts of electric equipment



operating at 50 volts or more shall be guarded against accidental contact by use of approved cabinets or other forms of approved enclosures or by any of the following means:

- By location in a room, vault or similar enclosure that is accessible only to qualified persons.
- By suitable permanent, substantial partitions or screens so arranged that only qualified persons will have access to the space within reach of the energized parts. Any openings in such partitions or screens shall be so sized and located that persons are not likely to come into accidental contact with the energized parts or to bring conducting objects into contact with them.
- By location on a suitable balcony, gallery or platform so elevated and otherwise located as to prevent access by unqualified persons; or
- By elevation of 8.0 feet (2.44 m) or more above the floor or other working surface.

In locations where electric equipment is likely to be exposed to physical damage, enclosures or guards shall be so arranged and of such strength as to prevent such damage. Entrances to rooms and other guarded locations containing exposed live parts shall be marked with conspicuous warning signs forbidding unqualified persons to enter.

Use of barriers or barricades at access points - Suitable temporary barriers, or barricades shall be installed when access to opened enclosures containing exposed energized equipment is not under the control of an authorized person.

Reinstalling barriers or covers after work is completed - The authorized person shall be responsible for removing from the work area any temporary personnel protective equipment and reinstalling all permanent barriers or covers.

Procedures Used Prior to Work Being Performed on Exposed Energized Parts of Equipment or Systems

Work shall not be performed on exposed energized parts of equipment or systems until the following conditions are met:

- Responsible supervision has determined that the work is to be performed while the equipment or systems are energized.
- Involved personnel have received instructions on the work techniques and hazards involved in working on energized equipment.
- Suitable personal protective equipment and safe guards (i.e., approved insulated gloves or insulated tools) are provided and used.

Conductive measuring tapes, ropes or similar measuring devices and conductive fish tapes shall not be used when working on or near exposed energized conductors or parts of equipment. Conductive fish tapes shall not be used in raceways entering enclosures containing exposed energized parts unless such parts are isolated by suitable barriers.

Lock Out/Tag Out Procedures Are Used

- While any employee is exposed to contact with parts of fixed electric equipment or circuits which have been de-energized, the circuits energizing the parts shall be locked out or tagged or both. Locking and tagging will be accomplished before work is started.
- If any employee is exposed to contact with parts of fixed electric equipment or circuits which have been deenergized, the circuits energizing the parts shall be locked out or tagged or both.



- All electrical equipment and systems shall be treated as energized. All electrical equipment and systems shall be treated as energized until tested or otherwise proven to be de-energized.
- Per Company policy all electrical will be performed only by qualified and licensed electrical contractors who are familiar with the use of special precautionary techniques, PPE, insulating and shielding materials and insulated tools. Any equipment being made ready for maintenance will be locked out using the Company's Control of Hazardous Energy – Lock Out/Tag Out Program. Lockouts are performed by the Safety Manager, Shop Foreman or Branch Manager. Designated employees in some branches may be trained by local management to lock out equipment. If live sources are to be worked it will only be performed with the knowledge of local management. Only certified electricians may work on electric circuit parts or equipment.
- Authorized Person duties after the required work on an energized system or equipment - The authorized person shall be responsible for removing from the work area any temporary personnel protective equipment and reinstalling all permanent barriers or covers.
- Authorized personnel will be trained in lock out/tag out procedures.
- Affected personnel will be notified when lock out/tag out activities are being performed in their work area.

Inspections

- Electrical equipment, tools, and appliances must be inspected prior to each use.
- The use of a hard fixed GFCI or a portable GFCI adapter shall be used with all portable hand tools, electric extension cords, drop lights and all 110 volt equipment.
- Faulty equipment, tools, or appliances shall be removed from service immediately and tagged "Out of Service", dated and signed by the employee applying the tag.

Repairs

- Only Qualified Personnel, who have been authorized by the department supervisor or manager, may make repairs to supply cords on electrical tools and to extension cords.
- The names of employees authorized to make repairs will be posted in the workplace.
- Only certified electricians shall be allowed to make repairs to electrical equipment and wiring systems.
- The supervisor obtaining the services of a certified electrician is responsible to verify the electrician's credentials.
- Employees shall not enter spaces containing exposed energized parts unless qualified and proper illumination exists to enable employees to work safely.
- Employees shall not wear conductive apparel such as rings, watches, jewelry, etc. (unless they are rendered non-conductive by covering, wrapping, or other insulating means) while working on or near open energized equipment this includes batteries on trucks, forklifts, phone backup systems or other such equipment.
- If employees are subject to handle long dimensional conductor objects (ducts or pipes), steps for safe work practices shall be employed to ensure the safety of workers.

Extension Cords

- Use only three-wire, grounded, extension cords and cables that conform to a hard service rating of 14 amperes or higher, and grounding of the tools or equipment being supplied.
- Only commercial or industrial rated-grounded extension cords may be used in shops and outdoors.
- Cords for use other than indoor appliances must have a rating of at least 14 amps.
- Cords must have suitable strain relief provisions at both the plug the receptacle ends.



- Work lamps (drop light) used to power electrical tools must have a 3 wire, grounded outlet, unless powering insulated tools.
- Adapters that allow three wire, grounded prongs, connected to two wire non-grounded outlets are strictly prohibited.
- Cords must have a service rating for hard or extra-hard service and have S, AJ, ST, SO, SJO, SJT, STO, or SJTO printed on the cord.
- Cords may not be run through doorways, under mats or carpets, across walkways or aisles, concealed behind walls, ceilings or floors, or run through holes in walls, or anywhere where they can become a tripping hazard.
- High current equipment or appliances should be plugged directly into a wall outlet whenever possible.
 - All extension cords shall be plugged into one of the following:
 - A GFCI outlet;
 - A GFCI built into the cord;
 - A GFCI adapter used between the wall outlet and cord plug.
- All extension cords and or electrical cords shall be inspected daily or before each use, for breaks, plug condition and ground lugs, possible internal breaks, and any other damage. If damage is found, the extension cord or electrical cord shall be remove from service and repaired or replaced.
- Extension cords shall not be used on compressor skid to operated heat tapes or any other type of equipment on a temporary basis. Heat tapes or other equipment shall be hard wired per applicable electrical codes.

Outlets

- Outlets connected to circuits with different voltages must use a design such that the attachment plugs on the circuits are not interchangeable.
- Multiple outlet boxes must be plugged into a wall receptacle.
- Multiple outlet boxes must not be used to provide power to microwave ovens, toasters, space heaters, hot plates, coffeepots, or other high-current loads.

Double Insulated Tools

- Double insulated tools must have the factory label intact indicating the tool has been approved to be used without a three wire grounded supply cord connection.
- Double insulated tools must not be altered in any way, which would negate the factory rating.

Ladders

- Only approved, non-conductive ladders, may be used when working near or with electrical equipment, which includes changing light bulbs.
- Ladders must be either constructed of wood, fiberglass, or have non-conductive side rails.
- Wood ladders should not be painted, which can hide defects, except with clear lacquer.
- When using ladders they shall be free from any moisture, oils, and greases.

Confined or Enclosed Work Spaces

- When an employee works in a confined or enclosed space that contains exposed energized parts, the employee shall isolate the energy source and turn off the source and lock and tag out the energy source (Only qualified electricians can work on an exposed energy source).
- Protective shields, protective barriers or insulating materials as necessary shall be provided.



Switches, Circuit Breakers and Disconnects

- All electrical equipment and tools must have an on and off switch and may not be turned on or off by plugging or unplugging the supply cord at the power outlet.
- Circuit breaker panel boxes and disconnects must be labeled with the voltage rating.
- Each breaker within a breaker panel must be labeled for the service it provides.
- Disconnect switches providing power for individual equipment must be labeled accordingly.

Enclosures, Breaker Panels, and Distribution Rooms

- A clear working space must be maintained in the front, back and on each side of all electrical enclosures and around electrical equipment for a safe operation and to permit access for maintenance and alteration.
- A minimum two-foot working floor space in front of panels and enclosures shall be painted yellow.
- Employees may not enter spaces containing exposed energized parts unless illumination is provided that enables the employees to work safely.
- Housekeeping in distribution rooms must receive high priority to provide a safe working and walking area in front of panels and to keep combustible materials to the minimum required to perform maintenance operations.
- All enclosures and distribution rooms must have "Danger: High Voltage – Authorized Personnel Only" posted on the front panel and on entrance doors.
- Flammable materials are strictly prohibited inside distribution rooms (Boxes, rags, cleaning fluids, etc.)

Contractors

- Only approved, certified, electrical contractors may perform construction and service work on Company or client property.
- It is the Manager/Supervisors responsibility to verify the contractor's certification.

Fire Extinguishers

- Approved fire extinguishers must be provided near electrical breaker panels and distribution centers.
- Water type extinguishers shall not be located closer than 50 feet from electrical equipment.

Electric Welders

- A disconnecting means shall be provided in the supply circuit for each motor-generator arc welder, and for each AC transformer and DC rectifier arc welder which is not equipped with a disconnect mounted as an integral part of the welder.
- A switch or circuit breaker shall be provided by which each resistance welder and its control equipment can be isolated from the supply circuit. The ampere rating of this disconnecting means may not be less than the supply conductor ampacity.

Equipment Grounding

- All gas compressors, air compressors, separators, vessels, etc. shall be grounded by means of using a lug and ground strap, nominal in size to a ½" bolt or larger, attached to a ground rod six feet or longer.
- Equipment bonding jumpers shall be of copper or other corrosion-resistance material.
- The transfer of hazardous or flammable material from a metal or plastic container with a flash point of 100 degrees F or less shall have a ground strap from the container and attached to the skid or a ground rod placed in the ground.



Ground Fault Circuit Interrupters

All 120-volt, single-phase 15 and 20 ampere receptacle outlets on construction or maintenance sites, which are not part of the permanent wiring of the building or structure and which are in use by employees, shall have approved ground fault circuit interrupters for personnel protection.

- All hand portable electric tools and extension cords shall use a GFCI.
- Additionally, approved GFCI's shall be used for 240-Volt circuits in the same service as described above.
- GFCI's must be used on all 120 volt, single-phase 15 amp and 20 amp receptacles within 6 feet of a sink, damp areas or on installed outdoor equipment.
- The GFCI must be the first device plugged into a permanent receptacle.
- The GFCI must be tested before each use.

Training

All regular full time and temporary employees will be trained in low voltage electrical safety requirements and the training shall be documented.

Safe work practices shall be employed to prevent electric shock or other injuries resulting for either direct or indirect electrical contacts when work is performed near or on equipment or circuits which are or may be energized.

Electric Shock-CPR

- If someone is discovered that has received an electric shock and is unconscious, first check to see if their body is in contact with an electrical circuit. Do not touch a person until you are sure there is no contact with an electrical circuit.
- When it is safe to make contact with the victim, begin CPR if the person's heart has stopped or they are not breathing.
- Call for help immediately.