



SAFETY DIRECTIVE

Title: Electrical Safety
Issuing Department: Human Resources Department
Effective Date: March 01, 2024
Approved: Curry C. Hale, Human Resources Director
Type of Action: Original

1.0 PURPOSE

The Town of Marana is committed to protect all employees from electrical hazards, including shock, electrocution, arc flash, arc blast, and fires. Electrical Safety shall follow all applicable federal, state and local regulatory requirements. If any federal, state or local regulatory requirements are, or at any time become, more stringent than the requirements set forth in this administrative directive, the more stringent requirements shall take precedence.

Employees shall be trained in and familiar with the safety-related work practices required by 29 CFR 1910.331 through 1910.335 that pertain to their respective job assignments. This safety directive describes the requirements and responsibilities for qualified electrical workers and establishes safe work practices for routine operations.

2.0 DEPARTMENTS AFFECTED

All Town of Marana departments and employees.

3.0 SCOPE

The Electrical Safety Directive covers electrical safe work practices for qualified electrical workers (i.e., persons trained to avoid the electrical hazards of working on or near exposed energized parts). It also covers unqualified electrical workers (i.e., persons with little or no training) who work on or near machines, equipment, or circuits that have not been placed in an electrically safe work condition (i.e., not locked/tagged out).

4.0 REFERENCES

4.1 29 CFR 1910.269 Electrical Power Generation, Transmission, and Distribution

4.2 29 CFR 1910 Subpart S – Electrical, 1910.331 – 1910.335

4.3 2024 NFPA 70E

5.0 DEFINITIONS

- 5.1 Authorized employee: An employee who normally operates the machine(s) or equipment on which service is performed under the Lock-out/Tag-out standard or who performs other job responsibilities in an area where such service is performed.
- 5.2 Circuit breaker (600 volts nominal, or less): A device designed to open and close a circuit by non-automatic means and to open the circuit automatically on a predetermined overcurrent without damage to itself when properly applied within its rating.
- 5.3 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.
- 5.4 Disconnecting means: A device, or group of devices, or other means by which the conductors of a circuit can be disconnected from their source of supply.
- 5.5 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 if determined necessary.
- 5.6 Electrician: An electrician is a tradesperson specializing in electrical wiring of buildings, transmission lines, stationary machines, and related equipment. Electricians may be employed in the installation of new electrical components or the maintenance and repair of existing electrical infrastructure.
- 5.7 Energized: Electrically connected to a source of potential difference.
- 5.8 Ground: A conducting connection, whether intentional or accidental, between an electric circuit or equipment and the earth, or to some conducting body that serves in place of the earth.
- 5.9 Grounded: Connected to the earth or to some conducting body that serves in place of the earth.
- 5.10 Ground-fault circuit-interrupter: A device intended for the protection of personnel that functions to de-energize a circuit or a portion of a circuit within an established period of time when a current to ground exceeds some predetermined value that is less than that required to operate the overcurrent protective device of the supply circuit.
- 5.11 Nominal Voltage: A nominal value assigned to a circuit or system for the purpose of conveniently designating its voltage class (≤ 50 volts, 120/208 volts, 120/240 volts, 277/480 volts, 600 volts). The actual voltage at which a circuit operates can vary from the nominal within a range that permits satisfactory operation of equipment.
- 5.12 Qualified Electrical Worker (QEW): One who has received training in and has demonstrated skills and knowledge in the construction and operation of electric equipment and installations and the hazards involved, and has training to avoid the electrical hazards of working on or near exposed energized parts. QEW must understand the proper application and the limitations of Personal Protective Equipment (PPE) and tools such as voltage testers.

Note 1: Whether an employee is considered to be a "qualified electrical worker" will depend upon various circumstances in the workplace. For example, it is possible and, in fact, likely for an individual to be considered "qualified" with regard to certain equipment in the workplace, but "unqualified" as to other equipment. (See 1910.332(b)(3) for training requirements that

specifically apply to qualified electrical workers.)

Note 2: An employee who is undergoing on-the-job training and who, in the course of such training, has demonstrated an ability to perform duties safely at his or her level of training and who is under the direct supervision of a qualified electrical worker is considered to be a qualified electrical worker for the performance of those duties.

Note 3: Part of being a qualified person is recognizing that energized electrical work is permitted only under the conditions specified in NFPA 70E [2024] 130.2(A).

- 5.13 Unqualified person: One who has no familiarization with or training in the construction and operation of the electrical equipment and hazards involved. Employees who are not directly working on electrical circuits but their job task requires that they be around or exposed indirectly to electrical hazards. Examples of job titles for those indirectly exposed to electrical hazards because of job tasks are: welders, operators, supervisors, management, millwrights, pipe fitters, carpenters, painters and others associated with construction and maintenance.

6.0 POLICIES AND PROCEDURES

6.1 General. Town of Marana Departments will ensure:

- 6.1.1 That employees who work or who may potentially work near exposed energized parts are trained and qualified as defined in section 5.12 of this directive.
- 6.1.2 Ensure that approved, maintained, and tested PPE and other electrical safety equipment are provided, available, and used properly.
- 6.1.3 Establish, implement, and maintain procedures that will ensure electrical safe work practices.
- 6.1.4 Establish and maintain records of skills demonstrated, who observed, and dates of observations.

6.2 Training. Qualified electrical worker will be trained and must demonstrate skills and knowledge in the construction and operation of electric equipment and installations and the hazards involved, and has training to avoid the electrical hazards of working on or near exposed energized parts before they are permitted to perform work on electrical utilization systems or equipment. Qualified employees will at a minimum, be trained in and familiar with the safety-related work practices, required by 29 CFR 1910.331 through 1910.335, that pertain to their respective job assignments. Electrical training for qualified electrical workers will include:

- 6.2.1 NFPA 70E: Standard for Electrical Safety in the Workplace
- 6.2.2 Safety-related work practices, including proper selection, use and care of PPE, that pertain to the relevant tasks, to include arc rated clothing and equipment
- 6.2.3 Skills and techniques necessary to distinguish exposed live parts from other parts of electrical equipment
- 6.2.4 Skills and techniques necessary to identify the nominal voltage of exposed live parts, clearance distances, and the corresponding voltages to which the qualified electrical worker will be exposed
- 6.2.5 Shall be familiar with the proper use of special precautionary techniques, personal protective equipment, insulating or shielding materials, and insulated tools

- 6.2.6 How to de-energize, lockout, tag-out and tryout any applicable energized electrical circuits and equipment safely
- 6.2.7 Use of testing equipment where applicable
- 6.2.8 Show understanding of concepts via a knowledge assessment quiz
 - 6.2.8.1 Establish passing score for competency
- 6.2.9 Skill assessment
 - 6.2.9.1 Performance demonstration demonstrating mastery of skills and an understanding of safety requirements
- 6.2.10 First-aid, CPR, and AED training as required by the NFPA 70E.
 - 6.2.10.1 Specific electricians and QEWs must be certified in CPR if they work on exposed lines or “equipment energized at 50 volts or more”

6.3 Refresher Training. Refresher training will be given to qualified electrical workers whenever:

- 6.3.1 New types of electrical utilization systems or equipment are introduced to the workplace
- 6.3.2 A new hazard is identified
- 6.3.3 New electrical tasks are created
- 6.3.4 Electrical injuries occur
- 6.3.5 Updates are introduced to the NFPA 70E standard
- 6.3.6 Periodic inspections reveal that there are deviations in Electrical Safety procedures
- 6.3.7 The employer believes that there are deviations from, or inadequacies in, the employee's knowledge or use of electrical safety procedures.

7.0 HAZARD ASSESSMENT

- 7.1 Arc Flash and Shock Hazard Assessments. Before work is started on or near equipment that exposes workers to an electrical hazard, the specific hazards will be identified, the risks or likelihood of exposure to arc flash and shock will be assessed, and the hierarchy of risk control methods will be implemented to protect workers, including the use of PPE.
- 7.2 Hierarchy of risk controls. The most effective single measure or combination of measures to eliminate or reduce risk of arc flash and shock will be implemented, in the order of most (1) to least (5) effective:
 - 7.2.1 Elimination of the hazard (e.g., electrically safe work condition)
 - 7.2.2 Substitution (e.g., replace control circuitry to reduce energy)
 - 7.2.3 Engineering controls (e.g., guard conductors)
 - 7.2.4 Administrative controls (e.g., job plans and procedures, hazard signs and other alerting techniques)
 - 7.2.5 Personal Protective Equipment

8.0 SAFE WORK PRACTICES

- 8.1 Electrically Safe Work Condition

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- 8.1.1 Exposed energized equipment and parts will first be de-energized, locked/tagged out, tested to verify that there is no voltage, and grounded if necessary to protect workers, before any maintenance or repair work is performed. Only a qualified and authorized employee will de-energize, lock/tag out, and test electrical parts and equipment.
- 8.2 Energized Electrical Work Permit
 - 8.2.1 If it is not feasible to de-energize, a written energized electrical work permit is required that establish the safe work practices that must be followed. Only a qualified electrician will work on or near exposed live parts following the requirements of the work permit.
- 8.3 General Safe Work Practices. All employees working on or near electrical equipment will follow general safe work practices, including:
 - 8.3.1 Maintain good housekeeping procedures
 - 8.3.2 Plan and analyze for safety in each step of a project
 - 8.3.3 Document work
 - 8.3.4 Use properly rated test equipment and verify its condition and operation before and after use
 - 8.3.5 Practice applicable emergency procedures
 - 8.3.6 Qualified in cardiopulmonary resuscitation (CPR) and first aid and maintain current certifications – Electricians and QEWS that work on exposed lines or “equipment energized at 50 volts or more”
 - 8.3.7 Always wear appropriate PPE when working on or near electrical equipment
 - 8.3.8 Maintain electrical equipment in accordance with the manufacturer’s instructions
 - 8.3.9 Plan work projects through an approved work control process
- 8.4 Portable ladders. Portable ladders will have nonconductive side rails if they are used where the employee or the ladder could contact exposed energized parts.
- 8.5 Flammable or Ignitable Materials
 - 8.5.1 Where flammable materials are present only occasionally, electric equipment capable of igniting them will not be used, unless measures are taken to prevent hazardous conditions from developing. Such materials include, but are not limited to: flammable gases, vapors, or liquids; combustible dust; and ignitable fibers.
- 8.6 Alerting Techniques
 - 8.6.1 Safety signs and tags. Safety signs, safety symbols, or accident prevention tags will be used where necessary to warn employees about electrical hazards which may endanger them. Such signs and tags will be designed and used in accordance with regulations (29 CFR 1910.145).
 - 8.6.2 Barricades. Barricades will be used in conjunction with safety signs where it is necessary to prevent or limit employee access to work areas exposing employees to uninsulated energized conductors or circuit parts. Conductive barricades may not be used where they might cause an electrical contact hazard.

8.6.3 Attendants. If signs and barricades do not provide sufficient warning and protection from electrical hazards, an attendant will warn and protect employees.

8.6.4 Conductive work locations. Portable electric equipment and flexible cords used in highly conductive work locations (such as those inundated with water or other conductive liquids), or in job locations where employees are likely to contact water or conductive liquids, will be approved for those locations.

8.7 Test Instruments and Equipment

8.7.1 Only qualified electrical workers may perform testing work on electric circuits or equipment.

8.7.2 Visual inspection. Test instruments and equipment and all associated test leads, cables, power cords, probes, and connectors will be visually inspected for external defects and damage before the equipment is used.

8.7.3 If there is a defect or evidence of damage that might expose an employee to injury, the defective or damaged item will be removed from service, and no employee may use it until repairs and tests necessary to render the equipment safe have been made.

8.7.4 Rating of equipment. Test instruments and equipment and their accessories will be rated for the circuits and equipment to which they will be connected and will be designed for the environment in which they will be used.

8.8 Electric Power and Lighting Circuits

8.8.1 Routine opening and closing of circuits. Load rated switches, circuit breakers, or other devices specifically designed as disconnecting means will be used for the opening, reversing, or closing of circuits under load conditions. Cable connectors not of the load break type, fuses, terminal lugs, and cable splice connections may not be used for such purposes, except in an emergency.

8.8.2 Reclosing circuits after protective device operation. After a circuit is de-energized by a circuit protective device, the circuit may not be manually reenergized until it has been determined that the equipment and circuit can be safely energized. The repetitive manual reclosing of circuit breakers or reenergizing circuits through replaced fuses is prohibited.

Note: When it can be determined from the design of the circuit and the overcurrent devices involved that the automatic operation of a device was caused by an overload rather than a fault condition, no examination of the circuit or connected equipment is needed before the circuit is reenergized.

8.9 Overhead Lines

8.9.1 If work will be performed near energized overhead lines, either adequate clearance distance must be maintained, the lines must be de-energized and grounded, or other safety measures must be taken to protect all employees from electrical hazards. Protective measures may include:

8.9.2 Keep vehicles, mechanical equipment, and workers at least 10 feet from overhead lines, adding 4 inches for every additional 10,000 volts. Qualified electrical worker must maintain approach distances as per OSHA Table S-5 (located in 29 CFR1910.333(c)(3)).

9.0 RESPONSIBILITIES

9.1 Human Resources shall be primarily responsible for implementing, developing and maintaining the Town of Marana Electrical Safety Program according to this directive and federal, state and local regulations.

9.2 Human Resources shall:

9.2.1 Facilitate the administration of the Electrical Safety Program, including performing periodic program audits

9.2.2 Facilitate and oversee electrical safety training, including any site-specific electrical safety training, as required

9.2.3 Assist with interpreting electrical codes and regulations

9.3 Supervisors will:

9.3.1 Ensure that all applicable employees receive required training

9.3.2 Ensure that applicable employees follow all electrical safety practices and procedures

9.4 Employees will:

9.4.1 All employees are responsible to comply with all safety rules and policies as set forth in this directive.

10.0 ATTACHMENTS

10.1 None

REVISION HISTORY

<i>REV</i>	<i>DESCRIPTION OF CHANGE</i>	<i>DATE</i>
OR	Original Release	03/01/2024

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