ELECTRICAL SAFE WORK PRACTICES PROGRAM
(Section 13)

PURPOSE:

Wagner-Meinert, Inc. will maintain a safe and healthy work environment in an ongoing effort to protect each employee from potentially hazardous or unsafe conditions. It is the goal of Wagner-Meinert, Inc. to insure that Personnel will at no time suffer any adverse health effects or injuries related to their work environment.

The purpose of this Electrical Safe Work Practice Program is to establish and maintain a program that will assure compliance with all federal and state regulations, and to limit the number of accidents and losses associated with the operation, maintenance and repair of electrical equipment.

Wagner-Meinert personnel will only work on low voltage wiring and wiring of 480 motor starters.

SCOPE:

In the ongoing control of personal injury associated with electrical equipment operation, repair, and maintenance. It is Wagner-Meinert, Inc. primary objective to operate, maintain and repair all electrically operated equipment in a safe and proper manner. Guidelines and procedures outlined in this manual have been developed to ensure that Personnel are properly trained in electrical safe work practices, have the proper equipment to safely work on electrical equipment and that unqualified Personnel are restricted from exposure to potentially dangerous electrical equipment.

Wagner-Meinert personnel will only work on low voltage wiring and wiring of 480 volt motor starters.

RELATED DOCUMENTS

Electrical Safe Work Practices Program

REFERENCES:

(A) Part 1926--Safety And Health Regulations For Construction

(B) Occupational Safety and Health Standards for General Industry (29 CFR 1910.269 and 1910.301 thorough 1910.399).

1.0 OBJECTIVES
2.0 QUALIFIED PERSONNEL
3.0 UNQUALIFIED PERSONNEL
4.0 RESPONSIBILITIES
5.0 TRAINING (QUALIFIED PERSONNEL)
6.0 TRAINING (UNQUALIFIED PERSONNEL)
7.0 TRAINING FREQUENCY
8.0 PROTECTIVE MEASURES/EQUIPMENT
9.0 (GFCI) GROUNG FAULT CIRCUIT INTERRUPTER

1.0 OBJECTIVES

1.1 The objectives of the Electrical Safe Work Practice Program include:

1.1.1 To ensure that electrical equipment is free from recognized hazards that are likely to cause death or serious injury.

1.1.2 To determine the required safety equipment to protect Personnel from electrical hazards and ensure that for this equipment is available and utilized. All tools, equipment, power cords, receptacles that are available for use by employees that are not part of the building or structure are properly grounded.

1.1.3 To ensure that electrical equipment is properly marked and labeled.

1.1.4 To ensure that disconnecting means and circuits are marked to indicate their purpose.

1.1.5 To ensure that proper working clearances are maintained around electrical equipment.

1.1.6 To determine and designate specific job classifications as qualified or unqualified with respect to potential electrical exposures.

1.1.7 To ensure that qualified and unqualified Personnel who face the risk of electrical shock (that is not reduced to a safe level by electrical installation requirements) are properly trained.

1.1.8 To ensure that whenever feasible, Personnel de-energize electrical equipment according to established procedures in the Electrical Safe Work Practices Program.

1.1.9 To ensure that qualified Personnel utilize safe work practices that prevent contact with energized circuits and live electrical parts when for reasons of increased hazard, additional hazards, or infeasibility the electrical equipment is not de-energized.

1.1.10 This program is to be on all job sites and can be found in service trucks and all job tool boxes on job site.

2.0 QUALIFIED PERSONNEL

2.1 Qualified Personnel are defined as individuals that are permitted to work on, or near exposed energized parts. The work conducted by Qualified Personnel may involve either direct contact, or contact by means of tools and materials. Training shall be of the classroom or on-the-job type, and will introduce and establish proficiency in the departmental Electrical Safe Work Practices. Training documents will be kept on file indefinitely in the Safety Director office.

2.2 Only qualified personnel are permitted to work on or around exposed energy sources.

3.0 UNQUALIFIED PERSONNEL

3.1 Unqualified Personnel are defined as individuals that are not permitted to physically work on exposed energized electrical parts, but may have this type of equipment in there work area.

4.0 RESPONSIBILITIES

4.1 Safety Director

4.1.1 The Safety Director is ultimately responsible for the Electrical Safe Work Practice Program.

4.1.2 The Safety Director is responsible for developing the written Electrical Safe Work Practice Program, with assistance from Wagner-Meinert, Inc. Safety Committee personnel. The Safety Committee will audit the entire

written program annually, and will ensure that required training is conducted for all affected Personnel.

4.2 Service Technician/Forman

4.2.1 Each Service Technician/Forman is responsible for the day to day implementation and enforcement of the Electrical Safe Work Practice Program.

4.2.2 All new changes must be approved by the Safety Committee before being implemented. The Safety Committee is responsible for the annual review of established work practices and procedures, and notifying the Safety Director when Personnel need initial and refresher safety training. Documentation of annual reviews should be forwarded to the Safety Director. Service Technician/Forman must ensure that required safety equipment is made available to Personnel required to perform electrical related duties.

4.3 Qualified Personnel

4.3.1 Qualified Personnel are responsible for following procedures established in the Electrical Safe Work Practice Program.

5.0 TRAINING (QUALIFIED PERSONNEL)

5.1 All Qualified Personnel shall be trained, and become familiar with the following information:

5.1.1 The skills and techniques necessary to distinguish exposed live parts from other parts of electrical equipment.

5.1.2 The skills and techniques necessary to determine the nominal voltage of exposed live parts.

5.1.3 The clearance distances specified for various voltages to which the qualified person will be exposed.

5.1.4 Lockout/Tagout procedures used to de-energize electrical equipment or other energy sources before work is conducted.

5.1.5 The safe and proper use of portable electrical equipment, including handling, visual inspection, grounding, conductive work locations, and extension cords.

5.1.6 Electrical test instruments and other equipment, including rating and visual inspection.

6.0 TRAINING (UNQUALIFIED PERSONNEL)

6.1 All unqualified Personnel shall be trained, and become familiar with the following information:

6.1.1 The risks associated with energized equipment.

6.1.2 The tasks that can be done only by Qualified workers.

6.1.3 How to protect themselves when working around electricity.

6.1.4 The importance of obeying electrical hazard signs and tags.

7.0 TRAINING FREQUENCY

7.1 Designated Qualified and Unqualified Personnel will receive training at least annually. The training consists of common sense training for working around high voltage power.

8.0 PROTECTIVE MEASURES/EQUIPMENT

8.1 Test Instruments and all Equipment

8.1.1 Only qualified employees may perform testing work on electrical circuits or equipment. Job site foreman will visually inspect all electrical tool, cords, and equipment daily.

8.1.2 All test instruments and equipment and associated leads, cables, power cords, probes, and connectors shall be visually inspected for external defects and damage every time the equipment is used. If any defect or damage is noted that may expose the employee to injury, the item tagged and removed from service, and no employee shall use the item until repairs and tests have been completed.

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

8.1.4 All equipment will be inspected before it is returned to service after any repair work has been done.

8.1.5 All electrical equipment is inspected and tested quarterly that is mobile and any cord sets and receptacles that are not exposed to damage are tested bi-annually.

8.1.6 Records for inspection and testing are logged by color coded with colored tape. Yellow is for January through March, Brown is for April through June, blue is for July through September, and Green is for October through December.

8.2 Protective Equipment

8.2.1. If it is not possible to engineer the electrical installations to eliminate exposure to live electrical circuits, employees exposed to and working with such circuits will wear appropriate personal protective equipment that is appropriate for the specific parts of the body and for the work to be performed:

8.2.1.1 Employees must wear nonconductive head protection near electrical hazards as well as ANSI rated face shields, eye protection, hearing protection, and non-conductive safety shoes to protect against arcs, flashes, or flying objects from electrical explosions.

8.2.1.2 The "appropriate" level of electrical PPE is dependent on the type of exposure and the voltage level. Table 1 following this section provides a listing of the minimum required electrical PPE classified by work being done.

8.2.1.3 Protective equipment will be maintained in a safe, reliable condition and be periodically inspected and tested. Wagner-Meinert has taken steps to ensure that sufficient quantities and sizes of electrical PPE and double insulated tools are available for employees to use.

8.2.1.4 Engineers who regularly work with electrical equipment or who perform hot work (eg. cutting and welding) must wear 100% cotton clothing. Cotton-polyester blends have the potential to melt into an employee's flesh in the event of a flash or bum. Production employees who are not regularly exposed to these conditions are not required to wear 100% cotton clothing.

8.2.1.5 All jewelry, rings and metal wristwatches will be removed when working on energized circuits.

8.3 Protective Practices

The following is a list of electrical safe work practices that will be followed.

8.3.1 Whenever feasible, Lockout/Tagout procedures shall be used to de-energize electrical equipment before work is conducted.

8.3.2 When normally enclosed live parts are exposed for maintenance or repair, they shall be guarded to protect unqualified persons from contact with live parts. Barricades may be used if necessary. If barricades are not sufficient, then attendants shall be used.

8.3.3 Safety signs and tags shall be used to warn employees of electrical hazards which may endanger them.

8.3.4 When an unqualified or qualified person is working in an elevated position to include vehicular and mechanical lifts near overhead lines, the location shall be such that the person and the longest conductive object he or she may contact cannot come closer than 10 feet to any unguarded, energized overhead line.

8.3.5 When an unqualified or qualified person is working above overhead lines, the location shall be such that the person and the longest conductive object he or she may contact cannot come closer than 10 feet to any unguarded, energized overhead line.

8.3.6 When an unqualified or qualified person is working within 10 of the overhead lines, the line will be grounded or de-energized before any work will be done.

8.3.7 Conductive items, such as jewelry, watch bands, bracelets, rings, key chains, necklaces, may not be worn if they might contact exposed energized parts.

8.3.8 Spaces that have exposed energy parts must have proper illumination before the qualified person(s) may enter.

9.0 (GFCI) GROUNG FAULT CIRCUIT INTERRUPTER

9.1 INSULATION AND GROUNDING

9.1.1 Insulation and grounding are two recognized means of preventing injury during electrical equipment operation. Conductor insulation may be provided by placing nonconductive material such as plastic around the

conductor. Grounding may be achieved through the use of a direct connection to a known ground such as a metal cold water pipe.

9.1.2 Consider, for example, the metal housing or enclosure around a motor or the metal box in which electrical switches, circuit breakers, and controls are placed. Such enclosures protect the equipment from dirt and moisture and prevent accidental contact with exposed wiring. However, there is a hazard associated with housings and enclosures. A malfunction within the equipment—such as deteriorated insulation—may create an electrical shock hazard. Many metal enclosures are connected to a ground to eliminate the hazard. If a "hot" wire contacts a grounded enclosure, a ground fault results which normally will trip a circuit breaker or blow a fuse. Metal enclosures and containers are usually grounded by connecting them with a wire going to ground. This wire is called an equipment grounding conductor. Most portable electric tools and appliances are grounded by this means. There is one disadvantage to grounding: a break in the grounding system may occur without the user's knowledge.

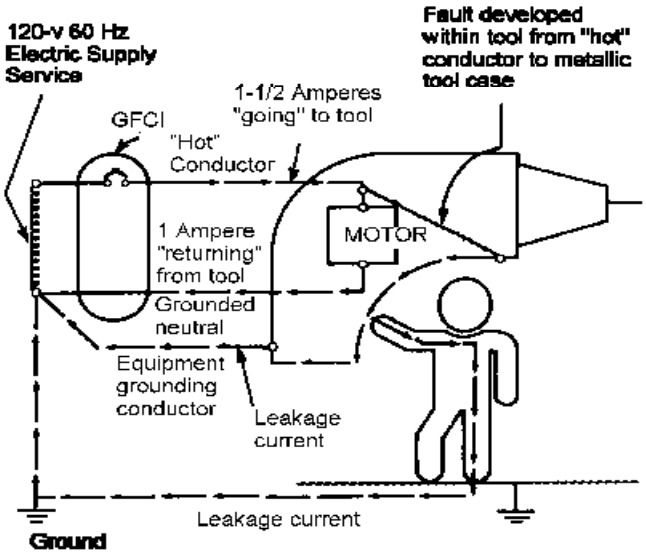
9.1.3 Insulation may be damaged by hard usage on the job or simply by aging. If this damage causes the conductors to become exposed, the hazards of shocks, burns, and fire will exist. Double insulation may be used as additional protection on the live parts of a tool, but double insulation does not provide protection against defective cords and plugs or against heavy moisture conditions.

9.1.4 The use of a ground-fault circuit interrupter (GFCI) is one method used to overcome grounding and insulation deficiencies.

9.2 WHAT IS A GFCI?

9.2.1 The ground-fault circuit interrupter (GFCI) is a fast-acting circuit breaker which senses small imbalances in the circuit caused by current leakage to ground and, in a fraction of a second, shuts off the electricity. The GFCI continually matches the amount of current going to an electrical device against the amount of current returning from the device along the electrical path. Whenever the amount "going" differs from the amount "returning" by approximately 5 milliamps, the GFCI interrupts the electric power within as little as 1/40 of a second. (See diagram.)

Ground-Fault Circuit Interrupter



GFCI monitors the difference in current flowing into the "hot" and out to the grounded neutral conductors. The difference (1/2 ampere in this case) will flow back through any available path, such as the equipment grounding conductor, and through a person holding the tool, if the person is in contact with a grounded object.

However, the GFCI will not protect the employee from line-to-line contact hazards (such as a person holding two "hot" wires or a hot and a neutral wire in each hand). It does provide protection against the most common form of electrical shock hazard--the ground fault. It also provides protection against fires, overheating, and destruction of insulation on wiring.

9.3 WHAT ARE THE HAZARDS?

9.3.1 With the wide use of portable tools on construction sites, the use of flexible cords often becomes necessary. Hazards are created when cords, cord connectors, receptacles, and cord- and plug-connected equipment are improperly used and maintained.

9.3.2 Generally, flexible cords are more vulnerable to damage than is fixed wiring. Flexible cords must be connected to devices and to fittings so as to prevent tension at joints and terminal screws. Because a cord is exposed, flexible, and unsecured, joints and terminals become more vulnerable. Flexible cord conductors are finely stranded for flexibility, but the strands of one conductor may loosen from under terminal screws and touch another conductor, especially if the cord is subjected to stress or strain.

9.3.3 A flexible cord may be damaged by activities on the job, by door or window edges, by staples or fastenings, by abrasion from adjacent materials, or simply by aging. If the electrical conductors become exposed, there is a danger of shocks, burns, or fire. A frequent hazard on a construction site is a cord assembly with improperly connected terminals.

9.3.4 When a cord connector is wet, hazardous leakage can occur to the equipment grounding conductor and to humans who pick up that connector if they also provide a path to ground. Such leakage is not limited to the face of the connector but also develops at any wetted portion of it.

9.3.5 When the leakage current of tools is below 1 ampere, and the grounding conductor has a low resistance, no shock should be perceived. However, should the resistance of the equipment grounding conductor increase, the current through the body also will increase. Thus, if the resistance of the equipment grounding conductor is significantly greater than 1 ohm, tools with even small leakages become hazardous.

9.4 PREVENTING AND ELIMINATING HAZARDS

9.4.1 GFCIs can be used successfully to reduce electrical hazards on construction sites. Tripping of GFCIs—interruption of current flow—is sometimes caused by wet connectors and tools. It is good practice to limit exposure of connectors and tools to excessive moisture by using watertight or sealable connectors. Providing more GFCIs or shorter circuits can prevent tripping caused by the cumulative leakage from several tools or by leakages from extremely long circuits.

9.5 RESPONSIBILITY

9.5.1 OSHA ground-fault protection rules and regulations have been determined necessary and appropriate for employee safety and health. Therefore, it is the employer's responsibility to provide either: (a) ground-fault circuit interrupters on construction sites for receptacle outlets in use and not part of the permanent wiring of the building or structure; or (b) a scheduled and recorded equipment grounding conductor program on construction sites, covering all cord sets, receptacles which are not part of the permanent wiring of the building or structure, and equipment connected by cord and plug which are available for use or used by employees.

9.6 GROUND-FAULT CIRCUIT INTERRUPTERS

9.6.1 The employer is required to provide approved ground-fault circuit interrupters for all 120-volt, single-phase, 15- and 20-ampere receptacle outlets on construction sites which are not a part of the permanent wiring of the building or structure and which are in use by employees. Receptacles on the ends of extension cords are not part of the permanent wiring and, therefore, must be protected by GFCIs whether or not the extension cord is plugged into permanent wiring. These GFCIs monitor the current-to-the-load for leakage to ground. When this leakage exceeds 5 mA ± 1 mA, the GFCI interrupts the current. They are rated to trip quickly enough to prevent electrocution. This protection is required in addition to, not as a substitute for, the grounding requirements of OSHA safety and health rules and regulations, 29 CFR 1926. The requirements which employers must meet, if they choose the GFCI option, are stated in 29 CFR 1926.404(b)(1)(ii).

9.7 EQUIPMENT GROUNDING CONDUCTOR PROGRAM

9.7.1 The equipment grounding conductor program covers all cord sets, receptacles which are not a part of the permanent wiring of the building or

structure, and equipment connected by cord and plug which are available for use or used by employees. The requirements which the program must meet are stated in 29 CFR 1926.404(b)(1)(iii), but employers may provide additional tests or procedures. (See appendix.) OSHA requires that a written description of the employer's equipment grounding conductor program, including the specific procedures adopted, be kept at the jobsite. This program should outline the employer's specific procedures for the required equipment inspections, tests, and test schedule

9.7.2 The required tests must be recorded, and the record maintained until replaced by a more current record. The written program description and the recorded tests must be made available, at the jobsite, to OSHA and to any affected employee upon request. The employer is required to designate one or more **competent persons** to implement the program. The Safety Director is responsible for implementing this program.

9.7.3 Electrical equipment noted in the equipment grounding conductor program must be visually inspected for damage or defects before each day's use. Any damaged or defective equipment must not be used by the employee until repaired.

9.7.4 Two tests are required by OSHA. One is a continuity test to ensure that the equipment grounding conductor is electrically continuous. It must be performed on all cord sets, receptacles which are not part of the permanent wiring of the building or structure, and on cord- and plug-connected equipment which is required to be grounded. This test may be performed using a simple continuity tester, such as a lamp and battery, a bell and battery, an ohmmeter, or a receptacle tester.

9.7.5 The other test must be performed on receptacles and plugs to ensure that the equipment grounding conductor is connected to its proper terminal. This test can be performed with the same equipment used in the first test.

9.7.6 These tests are required before first use, after any repairs, after damage is suspected to have occurred, and at 3-month intervals. Cord sets and receptacles which are essentially fixed and not exposed to damage must be tested at regular intervals not to exceed 6 months. Any equipment which fails to pass the required tests shall not be made available or used by employees.

DOCUMENT MANAGEMENT:

The Safety Director is responsible for developing and maintaining the program. Employees may review a copy of the plan by requesting one from the Safety Director. In

addition, the Safety Director is responsible for maintaining any records related to the Electrical Safe Work Practices Program.

If after reading this program, you find that improvements can be made, please contact the Safety Director. We encourage all suggestions because we are committed to the success of our written Electrical Safe Work Practices Program. We strive for clear understanding, safe behavior, and involvement from every level of the company.

CHANGE CONTROL:

All management system changes are reviewed, approved or disapproved by the Safety Committee.

This program was initially developed on September 30, 2001, replacing the former Electrical Safe Work Practices Program entirely.

Revision No. 1 (September 30, 2001)
Revision or Review No. 2 (January 15, 2001)
Revision or Review No. 3 (January 10, 2002)
Revision or Review No. 4 (January 11, 2003)
Revision or Review No. 5 (January 15, 2004)
Revision or Review No. 6 (October 27, 2004)
Revision or Review No. 7 (January 10, 2005)
Revision or Review No. 8 (January 3, 2006)
Revision or Review No. 9 (June 23, 2006)
Revision or Review No. 10 (December 4, 2006)
Revision or Review No. 11 (September 6, 2007)

PERSONNEL:

The Owners of Wagner-Meinert, Inc. have the ultimate responsibility for the Electrical Safe Work Practices Program. They have designated the Safety Director to manage the Electrical Safe Work Practices Program.