NORTH CAROLINA DEPARTMENT OF LABOR
OCCUPATIONAL SAFETY AND HEALTH DIVISION
RALEIGH, NORTH CAROLINA

Standards Notice - 49

TO: OSHA Staff, Consultants, Supervisors, Safety Officers, and Industrial Hygienists

SUBJECT: Ground-Fault Protection in Construction Operations 29 CFR 1910.309(c) and 29 CFR 1926.400(h)

I. Standards

A. 29 CFR 1910.309(c): Ground-fault protection

1. General. Notwithstanding the provisions of paragraphs (a) and (b) of this section, the requirement in section 210-7 of the 1971 National Electrical Code (NFPA 70-1971; ANSI C1-1971) that all 15-and 20-ampere receptacle outlets on single-phase circuits for construction sites have approved ground-fault circuit protection for personnel does not apply. In lieu thereof, the employer shall use either ground-fault circuit interrupters as specified in paragraph (c)(2) of this section or an assured equipment grounding conductor program as specified in paragraph (c)(3) of this section, to protect employees on construction sites. These requirements are in addition to any other requirements for equipment grounding conductors.
2. Ground-fault circuit interrupters. 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, shall have approved ground-fault circuit interrupters for personnel protection. Receptacles on a two-wire, single-phase portable or vehicle-mounted generator rated not more than 5kW, where the circuit conductors of the generator are insulated from the generator frame and all other grounded surfaces, need not be protected with ground-fault circuit interrupters.
3. Assured equipment grounding conductor program. The employer shall establish and implement an assured equipment grounding conductor program on construction sites covering 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. This program shall comply with the following minimum requirements:
    a. A written description of the program, including the specific procedures adopted by the employer, shall be available at the job site for inspection and copying by the Assistant Secretary and any affected employee.
    b. The employer shall designate one or more competent persons (as defined in 29 CFR 1926.32(f)), to implement the program.
    c. Each cord set, attachment cap, plug and receptacle of cord sets, and any equipment connected by cord and plug, except cord sets and receptacles which are fixed and not exposed to damage, shall be visually inspected before each day's use for external defects, such as deformed or missing pins or insulation damage, and for indication of possible internal damage. Equipment found damaged or defective may not be used until repaired.

d. The following tests shall be performed on all cord sets, receptacles which are not a part of the permanent wiring of the building or structure, and cord- and plug-connected equipment required to be grounded:
    i. All equipment grounding conductors shall be tested for continuity and shall be electrically continuous.
    ii. Each receptacle and attachment cap or plug shall be tested for correct attachment of the equipment grounding conductor. The equipment grounding conductor shall be connected to its proper terminal.
e. All required tests shall be performed.
    i. Before first use
    ii. Before equipment is returned to service following any repairs;
    iii. Before equipment is used after any incident which can be reasonably suspected to have caused damage (for example, when a cord set is run over); and
    iv. At intervals, not to exceed three months, except that cord sets and receptacles which are fixed and not exposed to damage shall be tested at intervals not exceeding 6 months.
f. The employer may not make available or permit the use by employees of any equipment which has not met the requirements of this paragraph (c)(3) of this section.
g. Tests performed as required in this paragraph shall be recorded. This test record shall identify each receptacle, cord set, and cord- and plug-connected equipment that passed the test, and shall indicate the last date it was tested or the interval for which it was tested. This record shall be kept by means of logs, color coding, or other effective means, and shall be maintained until replaced by a more current record. The record shall be made available on the job site for inspection by the Assistant Secretary and any affected employee.

B. 29 CFR 1926.400(h): Ground-fault protection.

1. General. Notwithstanding any other provision of this part, the requirement in section 210-7 of the 1971 National Electrical Code (NFPA 70-1971; ANSI C1-1971) that all 15- and 20-ampere receptacle outlets on single-phase circuits for construction sites have approved ground-fault circuit protection for personnel does not apply. In lieu thereof, the employer shall use either ground-fault circuit interrupters as specified in paragraph (h)(2) of this section or an assured equipment grounding conductor program as specified in paragraph (h)(3) of this section, to protect employees on construction sites. These requirements are in addition to any other requirements for equipment grounding conductors.
2. Ground-fault circuit interrupters. 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, shall have approved ground-fault circuit interrupters for personnel protection. Receptacles on a two-wire, single-phase portable or vehicle-mounted generator rated not more than 5kW, where the circuit conductors of the generator are insulated from the generator frame and all other grounded surfaces, need not be protected with ground-fault circuit interrupters.
3. Assured equipment grounding conductor program. The employer shall establish and implement an assured equipment grounding conductor program on construction sites covering 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. This program shall comply with the following minimum requirements:
    a. A written description of the program, including the specific procedures adopted by the employer, shall be available at the job site for inspection and copying by the Assistant Secretary and any affected employee.
    b. The employer shall designate one or more competent persons (as defined in 1926.32(f)) to implement the program.
    c. Each cord set, attachment cap, plug and receptacle of cord sets, and any equipment connected by cord and plug, except cord sets and receptacles which

are fixed and not exposed to damage, shall be visually inspected before each day's use for external defects, such as deformed or missing pins or insulation damage, and for indication of possible internal damage. Equipment found damaged or defective may not be used until repaired.

d. The following tests shall be performed on all cord sets, receptacles which are not a part of the permanent wiring of the building or structure, and cord- and plug-connected equipment required to be grounded:
   i. All equipment grounding conductors shall be tested for continuity and shall be electrically continuous.
   ii. Each receptacle and attachment cap or plug shall be tested for correct attachment of the equipment grounding conductor. The equipment grounding conductor shall be connected to its proper terminal.

e. All required tests shall be performed:
   i. Before first use
   ii. Before equipment is returned to service following any repairs;
   iii. Before equipment is used after any incident which can be reasonably suspected to have caused damage (for example, when a cord set is run over); and
   iv. At intervals not to exceed 3 months, except that cord sets and receptacles which are fixed and not exposed to damage shall be tested at intervals not exceeding 6 months.

f. The employer may not make available or permit the use by employees of any equipment which has not met the requirements of this paragraph (h)(5) of this section.

g. Tests performed as required in this paragraph shall be recorded. This test record shall identify each receptacle, cord set, and cord- and plug-connected equipment that passed the test, and shall indicate the last date it was tested or the interval for which it was tested. This record shall be kept by means of logs, color coding, or other effective means, and shall be maintained until replaced by a more current record. The record shall be made available on the job site for inspection by the Assistant Secretary and any affected employee.

II. Discussion:

Since the initiation of enforcement of the ground-fault protection requirements of the OSHA standards, several questions have repeatedly occurred. They are:

A. What is a construction site?
B. Who is responsible for providing ground-fault protection?
C. What is the difference between temporary and permanent wiring as they apply to ground-fault protection?
D. What ground-fault protection must be provided where double-insulated tools are used?
E. What testing and evaluation methods should be used when inspecting ground-fault circuit interrupting devices.
F. What effect does the presence of ground-fault circuit interrupting devices have on the requirement for electrical grounding of tools and extension cords?
G. What items must be evaluated in determining an acceptable "assured grounding program"?

III. Interpretation:

Note: For the purpose of this standards notice and the referenced sections of the OSHA regulations, the term "ground-fault protection" refers to a device or program intended to minimize the likelihood of employee injury from electrical faults (unintentional paths) to ground. The protection may be provided by a ground-fault circuit interrupting device (GFCI) or by an assured equipment grounding conductor program.

A. A construction site, for the purpose of ground-fault protection requirements, is any location where construction, alteration, and/or repair, including painting and decorating takes place, as set forth in 1910.12 and 1926.13. The term "alteration" includes demolition. This site may be on or within an existing structure, or a completely new location. Regular manufacturing and production line operations are not included, such as mobile home manufacturing.

B. Ground-fault protection in the form of GFCI or an assured grounding program shall be provided by each employer of employees required to use 120 volt, 15- and 20-ampere receptacles on construction sites. In some cases, contractors may make their own arrangements on a given job site for provision of ground-fault protection, thereby relieving some of them of the physical operation of installing the protection. This arrangement, however, does not relieve these contractors of the legal responsibility for providing the ground-fault protection to their employees. In cases where no GFCI or assured grounding program is present, the employers of all employees exposed shall be cited. In a situation where a contractor has been required by the job contract to provide temporary power and other general utilities on the construction site, his responsibility for providing ground-fault protection under the OSHA regulations only applies to the protection of his employees. Each contractor on the site is still legally responsible for protecting his own employees by some form of ground-fault protection. The contractor responsible for providing the temporary power on the site should notify each of the other contractors on the site of the existence or nonexistence of ground-fault protection at the 120 volt, 15- and 20-ampere receptacles on the construction site.

C. Temporary wiring is a class or method of wiring which is specifically permitted by the National Electrical Code (ANSI/NFPA No. 70) for use during periods of construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment of similar items. Permanent wiring is a complete system or portion thereof, which has been accepted by the customer, owner, and electrical inspector. Such a permanent system would require covers, conduits, conductors, grounds, bonds, anchors, etc. Where extension cords or any similar nonpermanent wiring is used with permanent wiring, the extension cord and all nonpermanent wiring shall be considered temporary wiring and 29 CFR 1926.400(h) or 29 CFR 1910.309(c) shall be cited accordingly. Where tools or appliances are equipped with a cord and plug, such wiring shall not be considered temporary for the purposes of 29 CFR 1910.309(c) and 29 CFR 1926.400(h) if the cord and plug are considered a part of the tool or appliance.

   Where GFCI Devices are chosen to comply with 29 CFR 1910.309(c) or 29 CFR 1926.400(h), a GFCI breaker, a fixed GFCI receptacle, or a portable GFCI receptacle may be used. All receptacles on the same circuit and "down stream" from a GFCI device are normally protected by that device.

   The alternative method of complying with 29 CFR 1910.309(c) or 29 CFR 1926.400(h) is an assured equipment grounding program.

D. When double insulated tools are encountered on a construction site, professional judgement must be exercised in evaluating the presence of a violation and the level of hazard. The National Electrical Code exempts tools protected by an approved system of double insulation from the requirements for electrical grounding. There is no such exemption from the ground-fault protection requirements under 29 CFR 1926.400(h). If an inspector encounters double insulated tools on a construction site, he or she must determine if these are the only tools likely to be used by the employees on the site. Where double insulated tools are the only type present, the level of hazard may be low and the issuance of a citation may not be necessary. If employees are subject to using power tools of the non-double insulated type, the hazard to employees is greater and some form of ground-fault protection must be required.

E. In testing and evaluating ground-fault circuit interrupting devices on a construction site, the specific instruction on the GFCI unit being used should be followed. All GFCI devices are required to have a test button which places a leakage of greater than 6 milliamperes on the circuit which is supposed to trip the device. A reset button or switch is also provided. The normal

procedure shall be to ask the employer's representative to push the test button after warning anyone using that circuit.

Another testing method is to use any one of several portable, plug-in test devices. Most of these test units are a "go, no-go" type device which places a greater than 6 milliampere "leak" in the circuit which should trip any GCFI device. Some units also have a 4 to 5 milliampere leak setting which a GFCI device should permit without tripping. A few test devices are equipped with a meter and variable leakage control which will show exactly what current level trips the GFCI device being tested. The instructions for each testing device must be followed closely. Any GFCI device which fails to trip, or trips at a level of greater than 6 milliamperes, shall be cited as "failure to provide an approved GFCI device to protect the employees from hazards of electrical ground-faults". All GFCI devices and circuits should also be tested for ground using the Woodhead 1750 tester or an equivalent device.

F. As indicated above, the use of GFCI devices does not remove the requirement for electrical grounding of handheld, cord- and plug-connected equipment on job sites. The level of hazard is greatly reduced by the use of approved GFCI devices, and this fact should be taken into consideration when determining what citation or penalty should be proposed.

G. In evaluating an "assured equipment grounding conductor program" method of ground-fault protection on a construction site, at least the items listed below shall be considered. All of these items are necessary for an effective "assured equipment grounding conductor program", and the weakness or absence of any specific item may make the program ineffective and unacceptable. The inspecting officer must exercise professional judgement in evaluating the effectiveness of such a program and the level of protection provided to employees.

1. The program must cover all cord sets, receptacles (not part of permanent wiring), and cord- and plug-connected equipment available for use by the employees.
2. There must be a written description of the program, including specific details, present at the job site. This program must represent what is actually being carried out by the employer on that particular site.
3. A competent person or persons must be responsible for implementing the program. One person may have the overall responsibility for the program and the actual cord and equipment testing and recording for several sites, while other competent individuals may conduct daily visual inspections and remove questionable or unsafe equipment from service on each individual site.
4. A competent individual must conduct visual inspections and carry out procedures intended to prevent the use of damaged or defective tools.
5. Appropriate test equipment and procedures must be used in conducting the continuity tests and the wiring and attachment evaluations of the equipment grounding conductors on cords, plugs, and temporary receptacles.
6. Appropriate test intervals must be established in accordance with the provisions of the standards and additional tests made following suspected damage before returning repaired cords or equipment to service and before first use of a new cord or tool.
7. Effective procedures or policies shall be instituted by the employer to prevent the use of untested cords and equipment on the site.
8. An effective method of record keeping and identification of equipment and test intervals shall be established on the site. The methods may range from detailed records to simple color coding system with the code being included in the written program.

IV. Inquiries

Any questions regarding the content or application of this standards notice should be directed to:

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Filing Date: March 7, 1979

Number: 13 NCAC 7D.1604