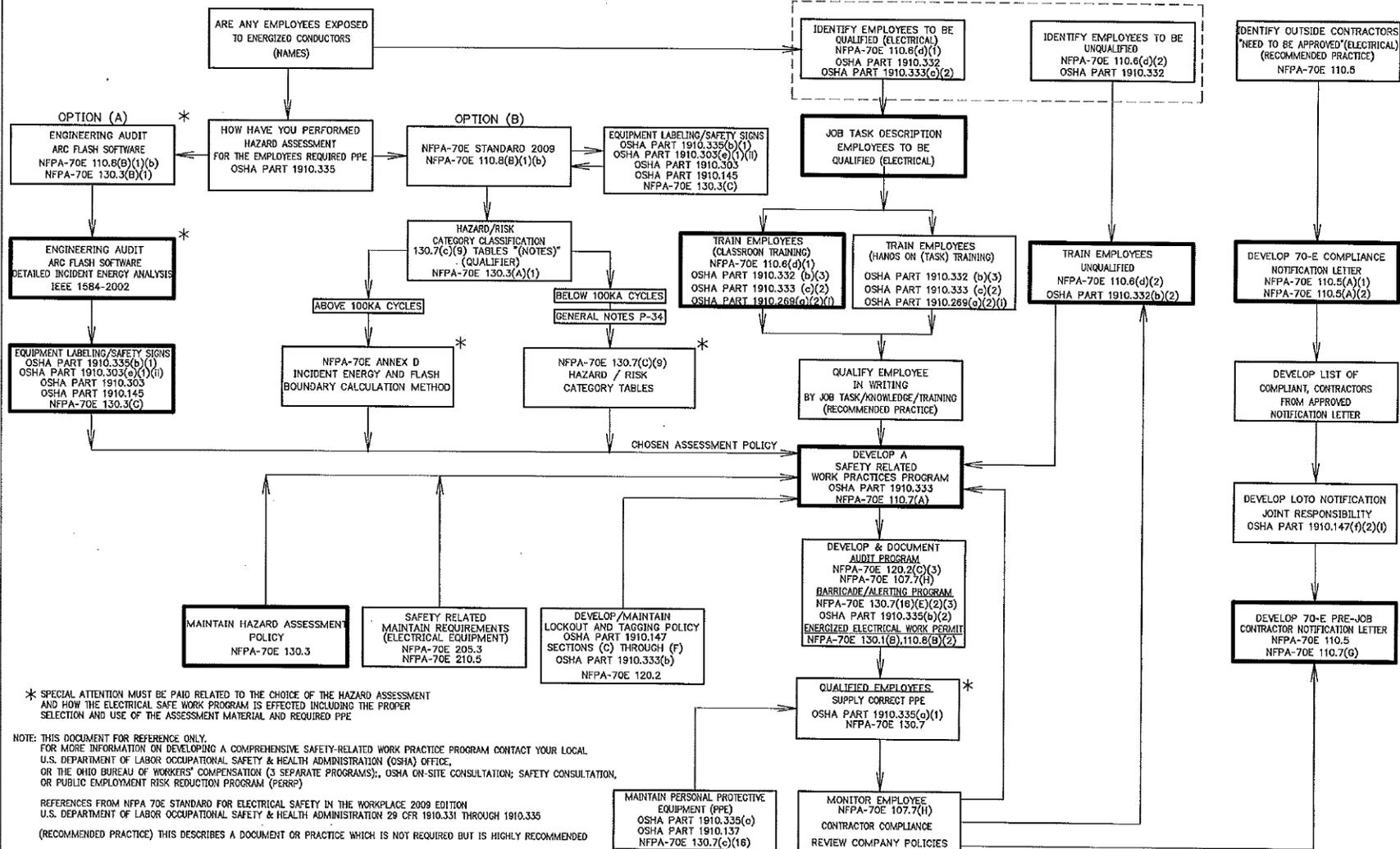


**EMPLOYEE PPE HAZARD ASSESSMENT**  
 OSHA 1910.335  
 NFPA-70E 130.3(B)

**FACILITY ELECTRICAL SAFETY RELATED WORK PRACTICES PROGRAM**  
 OSHA CFR 29 SUBPART S 1910.331-335  
 OHIO/PERRP 4167-3-01 (A)

**HOST EMPLOYER RESPONSIBILITIES**

**INTERNAL EMPLOYEES**



\* SPECIAL ATTENTION MUST BE PAID RELATED TO THE CHOICE OF THE HAZARD ASSESSMENT AND HOW THE ELECTRICAL SAFE WORK PROGRAM IS EFFECTED INCLUDING THE PROPER SELECTION AND USE OF THE ASSESSMENT MATERIAL AND REQUIRED PPE

NOTE: THIS DOCUMENT FOR REFERENCE ONLY.  
 FOR MORE INFORMATION ON DEVELOPING A COMPREHENSIVE SAFETY-RELATED WORK PRACTICE PROGRAM CONTACT YOUR LOCAL U.S. DEPARTMENT OF LABOR OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION (OSHA) OFFICE, OR THE OHIO BUREAU OF WORKERS' COMPENSATION (3 SEPARATE PROGRAMS), OSHA ON-SITE CONSULTATION, SAFETY CONSULTATION, OR PUBLIC EMPLOYMENT RISK REDUCTION PROGRAM (PERRP)

REFERENCES FROM NFPA 70E STANDARD FOR ELECTRICAL SAFETY IN THE WORKPLACE 2009 EDITION  
 U.S. DEPARTMENT OF LABOR OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION 29 CFR 1910.331 THROUGH 1910.335  
 (RECOMMENDED PRACTICE) THIS DESCRIBES A DOCUMENT OR PRACTICE WHICH IS NOT REQUIRED BUT IS HIGHLY RECOMMENDED

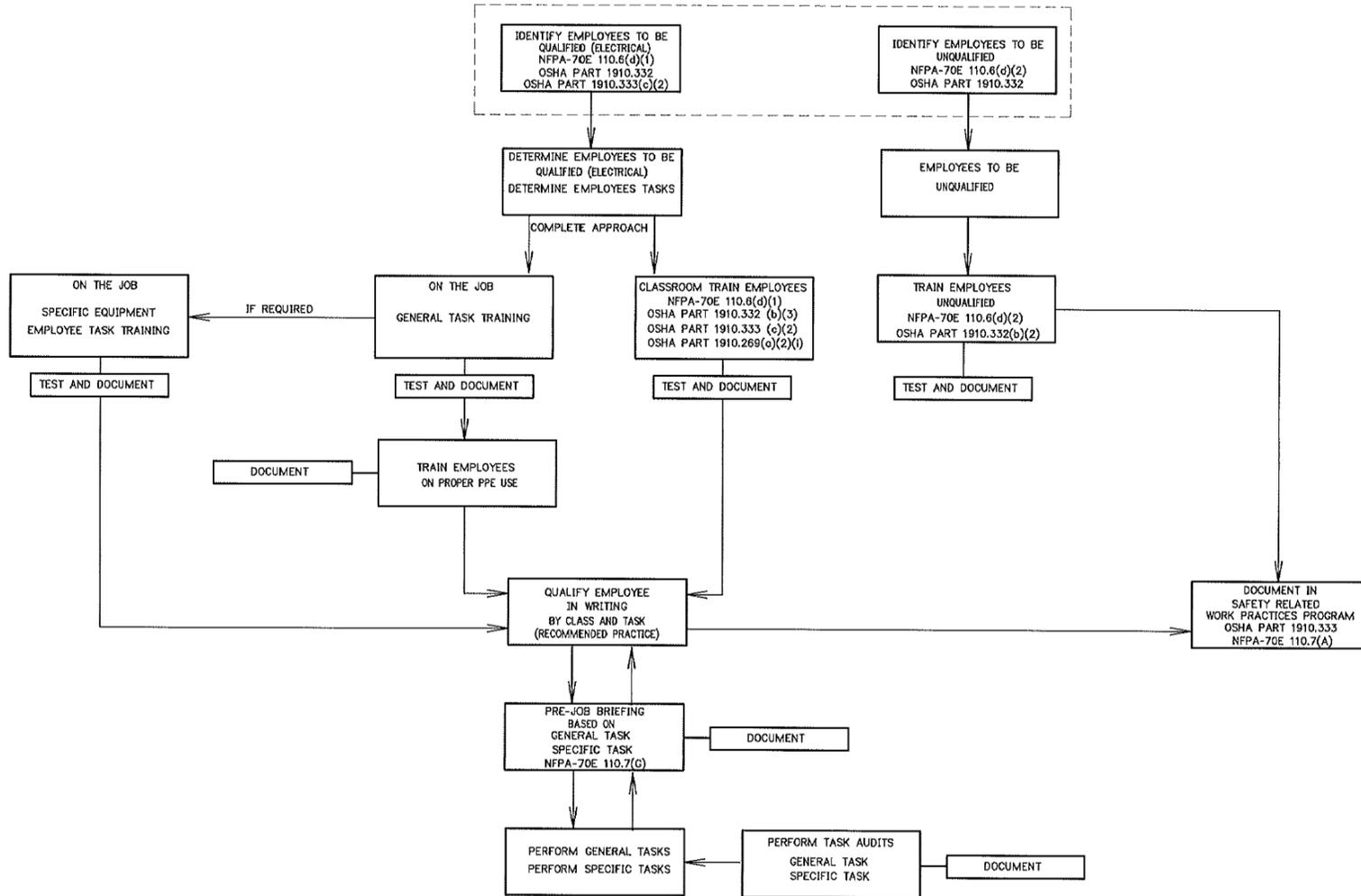
MAINTAIN PERSONAL PROTECTIVE EQUIPMENT (PPE)  
 OSHA PART 1910.335(c)  
 OSHA PART 1910.133  
 NFPA-70E 130.7(c)(16)

NFPA-70E/OSHA COMPLIANCE INFORMATION

**JDRM Engineering, Inc.**  
 ELECTRICAL & TELECOMMUNICATIONS CONSULTANTS  
 10000 W. 13th St., Suite 200  
 Overland Park, KS 66209  
 Phone: (913) 241-8888  
 Fax: (913) 241-8889  
 Email: info@jdrm.com

# QUALIFYING AND TRAINING EMPLOYEES

## INTERNAL EMPLOYEES



NOTE: THIS DOCUMENT FOR REFERENCE ONLY.  
 FOR MORE INFORMATION ON DEVELOPING A COMPREHENSIVE SAFETY-RELATED WORK PRACTICE PROGRAM CONTACT YOUR LOCAL  
 U.S. DEPARTMENT OF LABOR OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION (OSHA) OFFICE,  
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REFERENCES FROM NFPA 70E STANDARD FOR ELECTRICAL SAFETY IN THE WORKPLACE 2009 EDITION  
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(RECOMMENDED PRACTICE) THIS DESCRIBES A DOCUMENT OR PRACTICE WHICH IS NOT REQUIRED BUT IS HIGHLY RECOMMENDED

NFPA-70E/OSHA  
COMPLIANCE INFORMATION

**JDRM ENGINEERING, INC.**  
 10000 W. 12th St., Suite 200  
 Overland Park, KS 66213  
 Phone: (913) 241-2400  
 Fax: (913) 241-2408  
 Email: info@jdrm.com  
 Website: www.jdrm.com

## Standard Interpretations

### 05/20/1996 - Letter requesting interpretation of the OSHA electrical standards as they apply to employees using insulated hand tools.

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**This letter constitutes OSHA's interpretation only of the requirements discussed and may not be applicable to any situation not delineated within the original correspondence.**

May 20, 1996

Mr. Fred M. Fielding  
U. S. Composites Corp.  
Charles Park, Bldg. 1  
P.O. Box 536  
Guilderland, NY 12084-0536

Dear Mr. Fielding:

This is in response to your February 23 letter requesting interpretation of Occupational Safety and Health Administration (OSHA) electrical standards under paragraphs 1910.269, 1910.333 and 1910.335(a)(2) as they apply to employees using insulated hand tools. Please accept our apology for the delay in responding. Your questions and our response follow.

**Question 1:** If insulated hand tools (specifically, screwdrivers in conformance to the IEC 900 and ASTM F 1505 standards) are used, are rubber gloves required?

**Question 2:** If rubber gloves are required, what are the voltage thresholds for requiring them?

**Question 3:** If rubber gloves are required, what is the reason for them, that is, are they required because of a potential flaw in the insulation coating of the hand tool?

**Reply:** OSHA standards do not specifically require that an employee wear rubber insulating gloves when using insulated hand tools when working near exposed energized electrical conductors or circuit parts. When used however, rubber insulating gloves and rubber insulating sleeves must meet the requirements under 1910.137.

Under paragraph 1910.333(c)(2), only qualified persons may work on electric circuit parts or equipment that has not been deenergized under the procedures of paragraph 1910.333(b). These qualified persons shall be capable, as determined by their electrical knowledge and skills, of working safely on energized circuits. This capability includes familiarity with the proper use of special precautionary techniques, personal protective equipment, insulating and shielding materials and insulated tools.

Also, this capability includes familiarity with the construction and operation of the equipment and the electrical hazards involved, in accordance with the definition of qualified person in 1910.399.

Under paragraph 1910.335(a)(1), employees working in areas where there are potential electrical hazards must be provided with, and must use, electrical protective equipment. The electrical

protective equipment used by the qualified person must be appropriate for the specific parts of the body to be protected and for the work being performed. Paragraph 1910.335(a)(2)(i) requires employees working near exposed conductors or circuit parts to use insulated tools or handling equipment might make contact with such exposed conductors or parts. Wearing rubber insulating gloves when using an insulated hand tool may be appropriate for a particular work application. For example, if an employee's hand is exposed to contact with energized parts other than the one being manipulated with the tool, rubber insulating gloves would be required. Other personal protective equipment which provides for the electrical safety of the qualified person may also be used.

Insulated hand tools (which conform to International Electrotechnical Commission (IEC) 900 and American Society for Testing and Materials (ASTM) F 1505 standards) rated for the voltage involved would be considered insulation of the person from the energized part on which work is being performed. Generally, these tools which have a maximum rated voltage of 1000 volts for alternating current (a. c.) applications and 1500 volts for direct current (d. c.) applications would be suitable for work covered under the provisions of 29 CFR 1910 Subpart S.

When a qualified person is working on or near electric power generation, transmission, and distribution lines or equipment covered under 1910.269, the person may not approach or take any conductive object closer to exposed energized parts than set forth in Tables R-6 through Table R-10 under paragraph 1910.269(l), unless:

1. The person is insulated from the energized part (rubber insulating gloves or rubber insulating gloves and sleeves worn in accordance with paragraph 1910.269(l)(3) are considered insulation of the person only with regard to the energized part upon which work is being performed), or
2. The energized part is insulated from the employee and from any other conductive object at a different potential, or
3. The person is insulated from any other exposed conductive object, as during live-line bare-hand work.

Please note that rubber insulated gloves and sleeves are electrical protective equipment intended to protect the hands and arms of a person from exposure to hazardous electric energy conducted through a conductive object or otherwise by electric arc or direct contact.

We appreciate your interest in occupational safety and health. If we can be of further assistance, please contact the [Office of General Industry Compliance Assistance at (202) 693-1850].

Sincerely,

John B. Miles, Jr., Director  
Directorate of Compliance Programs

## Standard Interpretations

### 07/25/2003 - General Duty Clause (5(a)(1)) citations on multi-employer worksites; NFPA 70E electrical safety requirements and personal protective equipment.

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OSHA requirements are set by statute, standards and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. Also, from time to time we update our guidance in response to new information. To keep apprised of such developments, you can consult OSHA's website at <http://www.osha.gov>.

July 25, 2003

James H. Brown  
Director of Safety and Health  
Associated General Contractors of Indiana, Inc.  
1050 Market Tower, 10 West Market Street  
Indianapolis, IN 46204

Re: Relevance of NFPA 70E industry consensus standard to OSHA requirements; whether OSHA requirements apply to owners

Dear Mr. Brown:

This is in response to your March 15, 2002, letter asking for clarification of several issues concerning the Occupational Safety and Health Administration's (OSHA) multi-employer citation policy, owner responsibilities, National Fire Protection Association (NFPA) standard 70E, and several OSHA standards. We apologize for the long delay in providing this response.

All your questions involve the NFPA 70E standard, which is one of many industry consensus standards developed by the National Fire Protection Association. NFPA 70E, which is titled "Electrical Safety Requirements for Employee Workplaces," is the NFPA's consensus standard for workplace electrical safety. It covers employee protection from electrical hazards including shock, arc blasts, explosions initiated by electricity, outside conductors, etc.

We have paraphrased your questions as follows:

**Question (1):** *Is a general contractor who is engaged in construction work required to oversee a subcontractor's compliance with NFPA 70E under Section 5(a)(1) (General Duty Clause) of the OSHAct and OSHA's multi-employer citation policy?*

**Answer**

#### Summary of the Multi-employer Citation Policy

OSHA's multi-employer citation policy is described in compliance directive CPL 2-0.124.<sup>1</sup> Under the policy, there are circumstances where more than one employer may be cited for a violation of an OSHA standard, and where an employer may be held responsible for a hazard even

though none of its own employees were exposed to it.

Compliance officers must use a two-step analysis to determine if an employer should be cited for a hazardous condition. The first step is to determine if the employer has responsibilities with respect to OSHA requirements. This is evaluated based on the employer's role at the worksite. There are four employer role categories: (1) "exposing" - an employer whose own employees are exposed to the hazard; (2) "creating" - an employer that creates a hazard to which a different employer's employees are exposed; (3) "correcting" - an employer that has been brought in specifically to correct hazards; and (4) "controlling" - an employer with general supervisory authority over the worksite with the power to have safety and health violations corrected.

If an employer fits one or more of these categories, the compliance officer must go to step two: determining if the employer took sufficient steps to meet its obligations. Only if insufficient measures were taken, may a citation be issued. The directive emphasizes that the multi-employer citation policy is not one of strict liability. It also states that a lesser degree of care is required of a controlling employer than that of the other categories to prevent/discover hazards.

To help compliance officers determine if a controlling employer has met its responsibilities, the directive outlines specific factors to evaluate. For example, to assess whether periodic inspections of appropriate frequency were made, compliance officers are directed to consider factors such as the scale of the project, nature and pace of the work, and the subcontractors' safety history.

### **General Duty Clause and the Multi-employer Citation Policy**

Section 5(a)(1) of the Occupational Safety and Health Act requires an employer to furnish to its employees:

employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees...

However, as stated in the multi-employer citation policy compliance directive,

only exposing employers can be cited for General Duty Clause violations.

Therefore, citations based on a failure to meet a General Duty Clause requirement can only be issued to an "exposing" employer - an employer whose own employees were exposed to the hazard. So, for example, an employer cannot be cited in its role as a "controlling employer" for exposure of subcontractor employees to a General Duty Clause violation.

### **Industry Consensus Standard NFPA 70E**

With respect to the General Duty Clause, industry consensus standards may be evidence that a hazard is "recognized" and that there is a feasible means of correcting such a hazard. However, as explained above, NFPA 70E is not relevant to assessing a controlling employer's duties under OSHA's multi-employer citation policy, since controlling employers are not responsible for overseeing their subcontractors' compliance with General Duty Clause responsibilities.<sup>2</sup>

A controlling employer engaged in construction work does have obligations regarding 29 CFR Part 1926 Subpart K (Electrical) under the multi-employer citation policy.<sup>3</sup>

**Question (2):** *I note that OSHA has not incorporated the personal protective equipment*

*portions of NFPA 70E by reference in §1910.132 (personal protective equipment, general requirements) or §1910.335 (safeguards for personal protection). Does an employer have an obligation under the General Duty Clause to ensure that its own employees comply with personal protective equipment requirements in NFPA 70E?*

**Answer**

These provisions are written in general terms, requiring, for example, that personal protective equipment be provided "where necessary by reason of hazards..." (§1910.132(a)), and requiring the employer to select equipment "that will protect the affected employee from the hazards..." (§1910.132(d)(1)). Also, §1910.132(c) requires the equipment to "be of safe design and construction for the work performed."

Similarly, §1910.335 contains requirements such as the provision and use of "electrical protective equipment that is appropriate for the specific parts of the body to be protected and the work to be performed (§1910.335(a)(i)).

Industry consensus standards, such as NFPA 70E, can be used by employers as guides to making the assessments and equipment selections required by the standard. Similarly, in OSHA enforcement actions, they can be used as evidence of whether the employer acted reasonably.

Under §1910.135, the employer must ensure that affected employees wear a protective helmet that meets either the applicable ANSI Z89.1 standard or a helmet that the employer demonstrates "to be equally effective." If an employer demonstrated that NFPA 70E contains criteria for protective helmets regarding protection against falling objects and electrical shock that is equal to or more stringent than the applicable ANSI Z89.1 standard, and a helmet met the NFPA 70E criteria, the employer could use that to demonstrate that the helmet is "equally effective."

**Question (3)(a):** *Can an employer be cited for violating an OSHA requirement for personal fall protection (PPE) where a properly trained employee decides not to wear the PPE?*

**Answer**

Employee misconduct is an "affirmative defense" <sup>4</sup> to a failure to meet the requirements of an OSHA requirement. To establish the defense, the employer must be able to show that: (a) the violative condition was unknown to the employer; (b) the employer had a method of detecting violations and an effective enforcement policy when violations are discovered; and (c) the employee's action was in violation of an adequate employer work rule which was effectively communicated and uniformly enforced.

Therefore, if the employer can show that it did not know (and reasonably could not have known) that the employee was not wearing the PPE, that it had an adequate work rule requiring the employee to wear the PPE, and that the work rule was effectively communicated and uniformly enforced, the employer would not be responsible under OSHA requirements for the violation.

**Question (3)(b):** *Would the employer be liable in a private lawsuit in that situation?*

**Answer**

It is not within the purview of this office to provide guidance regarding tort, workers' compensation, or other private action legal liability.

**Question (4):** *Are there OSHA standards that state that an owner of a work facility must*

*identify and mark electrical hazards for contractors?*

**Answer**

OSHA requirements apply to employers; generally they do not apply to owners with no employees. Owners that also are employers are subject to OSHA requirements depending on the activities performed.

There are no OSHA standards that specifically require owners to post notice of electrical hazards for contractors performing construction work at the owners' facilities.<sup>5</sup> However, it is worth noting that both OSHA general industry and construction standards require the durable and legible marking of disconnecting means and circuits.

Section 29 CFR 1910.303(f) requires that:

...Each service, feeder, and branch circuit, at its disconnecting means or overcurrent device, shall be legibly marked to indicate its purpose, unless located and arranged so the purpose is evident. These markings shall be of sufficient durability to withstand the environment involved.

Section 29 CFR 1926.403(h) contains an identical provision.

**Question (5):** *How can I distinguish between electrical work that is considered "construction work" and electrical work that is considered "general industry work"?*

**Answer**

29 CFR 1910.12 sets out the scope of OSHA construction standards. Section 1910.12(a) provides that:

The standards prescribed in part 1926 of this chapter ... shall apply ... to every employment and place of employment of every employee engaged in construction work.

Section 1910.12(b) defines construction work as follows:

Construction work means work for construction, alteration, and/or repair, including painting and decorating.

Section 1910.12(d) adds that:

'construction work' includes the erection of new electric transmission and distribution lines and equipment, and the alteration, conversion, and improvement of the existing transmission and distribution lines and equipment.

In our February 1, 1999, letter to Mr. Randall A. Tindell, we discussed in detail, and gave specific examples of, the distinction between general industry and construction work. The Tindell letter can be viewed on the Internet at <http://www.osha.gov> (We have also enclosed a copy of the Tindell letter for your reference.)

If the work falls within OSHA's jurisdiction and is considered construction work, then 29 CFR Part 1926 Subparts K (Electrical) or V (Power Transmission and Distribution) might apply. However, since you have not specified the type of "electrical work" involved, we cannot advise you on whether one of these standards would apply in your situation.

If you need any additional information, please contact us by fax at: U.S. Department of Labor, OSHA, Directorate of Construction, Office of Construction Standards and Guidance, fax # 202-693-1689. You can also contact us by mail at the above office, Room N3468, 200 Constitution Avenue, N.W., Washington, D.C. 20210, although there will be a delay in our receiving correspondence by mail.

Sincerely,

Russell B. Swanson, Director  
Directorate of Construction

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<sup>1</sup>The policy can be viewed on OSHA's website at:  
[http://www.osha.gov/OshDoc/Directive\\_pdf/CPL\\_2-0\\_124.pdf](http://www.osha.gov/OshDoc/Directive_pdf/CPL_2-0_124.pdf)

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<sup>2</sup>However, if a controlling employer's own employees were exposed to a hazard, it would also be in the role of an exposing employer and would have General Duty Clause obligations with respect to its own employees.

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<sup>3</sup>Note that in §1926.402(a) there is the following statement:

If the electrical installation is made in accordance with the National Electrical Code ANSI/NFPA 70-1984 . . . it will be deemed to be in compliance with §§1926.403 through 1926.408, except for §§1926.404(b)(1) and 1926.405(a)(2)(ii)(E), (F), (G) and (J).

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<sup>4</sup>An affirmative defense is a defense which, if established by the employer, will excuse the employer from a violation.

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<sup>5</sup>Note, though, that §1926.21(b)(2) requires the employer to "Instruct each employee in the recognition and avoidance of unsafe conditions. . . ."

## Standard Interpretations

### 07/28/2006 - Clarification about 29 CFR 1910.333 and 29 CFR 1910.147 as they relate to work inside an electrical panel and on related equipment.

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**This letter constitutes OSHA's interpretation only of the requirements discussed and may not be applicable to any situation not delineated within the original correspondence.**

July 28, 2006

Mr. Rick Kante  
Safety Director  
Briggs & Stratton Corporation  
P.O. Box 702  
Milwaukee, WI 53201

Dear Mr. Kante:

Thank you for your February 8, 2005 letter to the Occupational Safety and Health Administration's (OSHA) Directorate of Enforcement Programs. You had questions regarding OSHA's *Safety-Related Work Practices* standard, 29 CFR 1910.333, and OSHA's *Control of Hazardous Energy (Lockout/Tagout)* standard, 29 CFR 1910.147, as they relate to work inside an electrical panel and on related equipment. Your paraphrased scenario, questions, and our responses follow.

**Scenario:** An employee is to perform work inside an electrical panel. The electrical disconnect is open and has been properly locked out. The electrical circuitry below the disconnect has been confirmed to be in a zero energy state by a qualified person using test equipment.

**Question 1:** Is the panel considered de-energized even though there is voltage to one side of the open disconnect? If the panel is not de-energized, would an employee be required to not only disconnect and lockout the power at the electrical panel, in this case a panel at floor level [Location B], but also to disconnect electrical service on-leg or panel upstream in the electrical system [Location A]?

**Response:** Section 1910.333(a)(1) establishes prerequisite criteria that live parts to which an employee may be exposed must be de-energized before an employee works on or near them, unless it is infeasible to do so.<sup>1</sup> If locking and tagging out the circuit at the point of work (i.e., the panel to be worked on) does not de-energize the live parts an employee may contact, the employer needs to assess, on a case-by-case basis, the feasibility of locking and tagging out the circuit further upstream since doing so would de-energize the live parts. If upstream de-energization is infeasible, then the employer is required to use other safety-related work practices, such as the use of electrical protective equipment (e.g., barriers, rubber insulation blankets, gloves, sleeves, covers, insulated tools or handling equipment, in accordance with §1910.137 and §1910.335). Also, if upstream de-energization creates additional or increased hazards, per §1910.333(a)(1) de-energization is not required, and the employer must use other safety-related work practices. In any event, an employee is not required to lockout more than one panel governing the same circuit, if all exposed electrical components in a panel can be de-energized by locking/tagging out a single energy isolation device (at Location A or

Location B) that is upstream from where the work is being performed.

The panel in your scenario may be considered de-energized depending on the design of the equipment and the work to be performed. In your scenario, the panel, while not technically de-energized as there is still power to the supply side of the disconnect, provides adequate employee protection if the design and installation of the panelboard is of dead-front construction — i.e., it prevents, through guarding, accidental contact of the employee or conductive objects with energized parts (e.g., the contact points on the fixed side of the switch designed to receive the contact points on the movable portion of the switch, conductor attachment points, conductors with compromised insulation, etc.). If the panel is not of dead-front construction or if the employee removes the panelboard guard, thus exposing live parts, the panel would be considered energized and thus be subject to the requirements of §1910.333(a)(2) (which requires the use of other safety-related work practices) and §1910.333(c)(2) (which allows only qualified persons to work on energized parts).<sup>2</sup>

**Question 2:** Does the employee need to wear full flame-resistant (FR) clothing, head and face protection, and rubber insulating gloves when working on a panel that has been completely de-energized, either disconnecting and locking out the panel itself or by disconnecting and locking out a panel upstream from the panel where the work is being performed?

**Answer:** No. If there are no exposed energized electrical components after a person has locked and tagged out the disconnect, and verified de-energization, per the requirements of §1910.333(b)(2), then there would be no potential for electric shock or arc flash. The protective equipment that you mentioned would not be required.<sup>3</sup> However, personal protective equipment may be required by another condition independent of electrical hazards. For example, if an employee is working in the panel box and using a drill or saw that is creating flying particles, or if the employee is using a chemical that presents a splash hazard to the eyes, the eye and/or face protection may be required.

**Question 3:** Would the protocol of disconnecting and locking out the electrical energy one "leg" upstream from the panel to be worked on be required for the unqualified worker who is servicing the machine supplied by the panel, but not the panel itself?

**Answer:** You have not provided sufficient information for us to be able to answer your question. For example, we cannot determine whether the unqualified employee will be exposed to hazardous energy sources besides the exposed electric circuit parts. If you desire an answer to this question, we need the following information: (1) Will the disconnecting means be opened by a qualified person? (2) Will the unqualified employee be exposed to hazardous energy sources besides the exposed electric circuit parts? (3) Will the opening of the downstream disconnecting means completely isolate the machine and its circuits from hazardous energy?

**Question 4:** If the upstream disconnect [Location A] is higher than eight (8) feet off the ground, is lockout required to control that energy source as well, or can one just shut off power using a switch stick, provided that this disconnecting switch is clearly visible to him or her and the work does not go beyond an employee's shift?

**Answer:** If it is necessary to open a disconnect upstream to de-energize electric equipment as required by §1910.333(b), then the employee would not need to follow complete lockout/tagout procedures on the upstream disconnect [Location A]. Neither the location of the disconnecting switch, nor the duration of the project, obviates the need for proper lockout/tagout procedures. The fact that the lockout period does not exceed the employee's shift only allows the employee to place a lock *without* an accompanying tag if only one piece of equipment or machinery is de-energized and the employees exposed to the hazards associated with the re-energizing the circuit of equipment or familiar with this procedure. This exception is

noted at §1910.333(b)(2)(iii)(E).

Thank you for your interest in occupational safety and health. We hope you find this information helpful. OSHA requirements are set by statute, standards, and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employee obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. Also, from time to time we update our guidance in response to new information. To keep apprised of such developments, you can consult OSHA's website at <http://www.osha.gov>. If you have any further questions, please feel free to contact the Office of General Industry Enforcement at (202) 693-1850.

Sincerely,

Richard E. Fairfax, Director  
Directorate of Enforcement Programs

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<sup>1</sup> Note 2 under 1910.333(a)(1) recognizes that the integration of the circuit to be repaired with other circuits in a continuous industrial process is a consideration when assessing infeasibility of de-energizing a circuit.

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<sup>2</sup> A "qualified person" is defined at 1910.399 as "one familiar with the construction and operation of the equipment and hazards involved." The definition is accompanied by two notes, the first of which discusses the concept that whether or person is "qualified" will depend on the circumstances and the equipment involved. The second note discusses that an employee undergoing on-the-job training that has demonstrated an ability to perform duties safely at his or her level, and that is under the direct supervision of a qualified person is considered to be qualified for the purposes of those duties.

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<sup>3</sup> This answer pertains only to exposure to de-energized parts and not to employee exposure to any circuit parts that have not been de-energized.

## Standard Interpretations

### 10/18/2006 - Incorporation of NFPA 70E-2000 into OSHA standards.

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**This letter constitutes OSHA's interpretation only of the requirements discussed and may not be applicable to any situation not delineated within the original correspondence.**

October 18, 2006

Mr. Michael C. Botts  
3645 37<sup>th</sup> Ave.  
Minneapolis, MN 55406

Dear Mr. Botts:

Thank you for your November 8, 2004 e-mail to the Occupational Safety and Health Administration's (OSHA) Directorate of Enforcement Programs. You had questions regarding the relationship between OSHA standards and the February, 2000 update of *National Fire Protection Association (NFPA) 70E, Standard for Electrical Safety Requirements for Employee Workplaces*. Your paraphrased inquiries and our responses follow.

**Question:** Has OSHA promulgated or changed any standards to directly incorporate NFPA 70E-2000 at this time?

**Response:** No. The electrical installation requirements and the electrical safety-related work practices in OSHA's general industry standards in Subpart S--Electrical Work, are based on previous editions of 70E. However, OSHA has proposed to update the installation requirements in Subpart S based on Part I of the 2000 edition of NFPA 70E. See 69 *Federal Register* 17773 (April 5, 2004). Later stages of this rulemaking project will also be based on other parts of NFPA 70E. Also, it should be noted that the latest edition of the NFPA standard is NFPA 70E-2004.

Because OSHA has not adopted through rulemaking the requirements of a more recent edition of NFPA 70E, those requirements have not become OSHA standards. A national consensus standard, however, can sometimes be relevant to a general duty clause citation in the sense that the consensus standard may be used as evidence of hazard recognition and the availability of feasible means of abatement. The general duty clause, Section 5(a)(1) of the OSH Act, is violated if an employer has failed to furnish a workplace that is free from recognized hazards causing or likely to cause death or serious physical harm. The general duty clause is used where there is no standard that applies to the particular hazards involved.

As you may know, the State of Minnesota administers its own occupational safety and health program, with approval and monitoring by federal OSHA. States that administer their own OSH plans must promulgate regulations that are "at least as effective" as the federal regulations, although they may be more stringent. As a result, Minnesota may have safety and health laws that are more restrictive than the federal laws. For more information specific to the State of Minnesota, you may contact the Minnesota Department of Labor and Industry at:

Minnesota Department of Labor and Industry  
443 Lafayette Road North  
St. Paul, Minnesota 55155-4307  
(651) 284-5050  
(651) 282-5405 FAX

Thank you for your interest in occupational safety and health. We hope you find this information helpful. OSHA requirements are set by statute, standards, and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employee obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. Also, from time to time we update our guidance in response to new information. To keep apprised of such developments, you can consult OSHA's website at <http://www.osha.gov>. If you have any further questions, please feel free to contact the Office of General Industry Enforcement at (202) 693-1850.

Sincerely,

Richard E. Fairfax, Director  
Directorate of Enforcement Programs

cc: Scott Brener, Commissioner

## Standard Interpretations

# 11/14/2006 - OSHA requirements for warning signs and protection from electric-arc-flash hazards and compliance with NFPA 70E-2004.

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**This letter constitutes OSHA's interpretation only of the requirements discussed and may not be applicable to any situation not delineated within the original correspondence.**

November 14, 2006

Ms. Joanne B. Linhard  
ORC Worldwide  
1910 Sunderland Place, NW  
Washington, DC 20036

Dear Ms. Linhard:

Thank you for your e-mail to the Occupational Safety and Health Administration's (OSHA's) Directorate of Enforcement Programs (DEP) for an interpretation regarding OSHA's requirements and the National Fire Protection Association's (NFPA) 70E-2004, *Standard for Electrical Safety in the Workplace*. Your questions have been restated below for clarity. We apologize for the delay in our response.

**Question 1:** When work must be performed on energized electric equipment that is capable of exposing employees to arc-flash hazards, does OSHA require the marking of the electric equipment to warn qualified persons of potential electric arc-flash hazards — i.e., as required by NFPA 70E-2004?<sup>1</sup>

**Reply:** OSHA has no specific requirement for such marking. A requirement to mark equipment with flash hazard warnings was not included in the 1981 Subpart S revision. However, paragraph (e) of §1910.303 requires employers to mark electrical equipment with descriptive markings, including the equipment's voltage, current, wattage, or other ratings as necessary. OSHA believes that this information, along with the training requirements for qualified persons, will provide employees the necessary information to protect themselves from arc-flash hazards.

Additionally, in §1910.335(b), OSHA requires employers to use alerting techniques (safety signs and tags, barricades, and attendants) . . . *to warn and protect employees from hazards which could cause injury due to electric shock, burns or failure of electric equipment parts*. Although these Subpart S electrical provisions do not specifically require that electric equipment be marked to warn qualified persons of arc-flash hazards, §1910.335(b)(1) requires the use of safety signs, safety symbols, or accident prevention tags to **warn** employees about electrical hazards (e.g., electric-arc-flash hazards) which may endanger them as required by §1910.145.

**Question 2:** Is flame-resistant clothing required for employees working on electrical installations covered by Subpart S?

**Reply:** OSHA's present requirements in Subpart S, *Safety-Related Work Practices*, are based on NFPA 70E-1983, which did not at that time include specific provisions for flame-resistant (FR) clothing [protective equipment]. Although more recent versions of NFPA 70E have included such

body protection provisions, OSHA has not conducted rulemaking proceedings to update Subpart S by adopting comparable provisions specifically related to the use of FR clothing to protect against arc-flash hazards. OSHA's existing Subpart S, therefore, does not include a specific requirement for the use of FR clothing.

However, arc-flash hazards are addressed in the OSHA electrical safety-related work practices standards. For example, with respect to arc-flash burn hazard prevention, the general provisions for the *Selection and use of work practices* contained in §1910.333(a)(1) generally require deenergization of live parts before an employee works on or near them — i.e., employees must first render electric equipment safe by completely deenergizing it by means of lockout and tagging procedures. This single safe work practice significantly reduces the likelihood of arc-flash burn injury by reducing employee exposure to electrical hazards — i.e., exposure is limited to when the equipment is shut down and when the qualified employee verifies, by use of a test instrument, a deenergized state.

When employees perform work on energized circuits, as permitted by §1910.333(a)(1), tools and handling equipment that might make contact with exposed energized parts must be insulated in accordance with §1910.335(a)(2)(i). This work practice also reduces the likelihood of employee injury caused by an arc blast.

Arc-flash hazards are also addressed in §1910.335(a)(1)(v), *Safeguards for personnel protection*, which requires that personal protective Equipment (PPE) for the eyes and face be worn whenever there is danger of injury to the eyes or face from electric arcs or flashes or from flying objects resulting from an electrical explosion. In addition, paragraph (a)(2)(ii) of §1910.335 requires, in pertinent part, the use of protective shields, barriers, or insulating equipment "to protect each employee from shocks, burns, or other electrically related injuries while that employee is working . . . where dangerous electric heating or arcing might occur" (emphasis added). The §1910.335(a)(2)(ii) safeguard selected — shield, barrier, or insulating material — must fully protect employees from electric shock, the blast, and arc-flash burn hazards associated with the incident energy exposure for the specific task to be performed. However, in situations where a fully protective safeguard could be used as an alternative, OSHA will, under its policy for *de minimis* violations, allow employers to use, instead, safeguards that are not fully protective, provided that the employer implement additional measures.<sup>2</sup> The supplemental measures, which could include the use of arc-rated FR clothing appropriate to the specific task, **must fully protect** the employee from all residual hazardous energy (e.g., the resultant thermal effects<sup>3</sup> from the electric arc) that passes the initial safeguard.

Where there is no §1910.335(a)(2)(ii) safeguard that would fully protect against the hazards, an employer is still obligated under the Occupational Safety and Health Act of 1970 to take reasonable steps that will protect the employee to the degree possible.<sup>4</sup> As noted in the previous paragraph, the protection provided by a safeguard that is not fully effective can be augmented through use of other safety measures such as FR clothing and other appropriate PPE.

OSHA recommends that employers consult consensus standards such as NFPA 70E-2004 to identify safety measures that can be used to comply with or supplement the requirements of OSHA's standards for preventing or protecting against arc-flash hazards. For example, Section 130.3 of the NFPA standard establishes its own mandatory provisions for flash-hazard-analysis<sup>5</sup>, which sets forth the criteria to define a flash-protection boundary and the personal protective equipment for use by employees within the flash-protection boundary. The goal of this provision is to reduce the possibility of being injured by an arc-flash. The analysis is task specific and determines the worker's incident-energy exposure (in calories per square centimeter). Where it has been determined that work will be performed within the flash-protection boundary, NFPA 70E specifies that flame-resistant clothing and PPE use either be based on the pre-determined incident-energy exposure data or be in accordance with the *Hazard/Risk Category Classifications and Protective Clothing and Personal Protective equipment (PPE) Matrix* tables contained in Sections 130.7(C)(9) and (C)(10), respectively.

Other NFPA 70E, Article 130 provisions, such as the justification for work through the use of an energized electrical work authorization permit, and the completion of a job briefing with employees before they start each job, additionally decrease the likelihood that exposure to electrical hazards would occur.

**Question 3:** How is OSHA enforcing §1910.132 and Subpart S with regard to the latest edition of NFPA 70E requirements?

**Reply:** As noted above, OSHA has not conducted a rulemaking to adopt the requirements of the latest edition of NFPA 70E and, therefore, does not "enforce" those requirements. However, industry consensus standards, such as NFPA 70E, can be used by OSHA and employers as guides in making hazard analyses and selecting control measures.

With regards to enforcing §1910.132 and the Subpart S standards, the PPE requirements contained in Subpart S would prevail over the general requirements contained in §1910.132 where both standards would apply to the same condition, practice, control method, etc. See §1910.5(c)(1).

**Question 4:** Does OSHA issue Section 5(a)(1) General Duty Clause violations to companies who do not follow the new NFPA 70E requirements?

**Reply:** A violation of the General Duty Clause, Section 5(a)(1) of the Act, exists if an employer has failed to furnish a workplace that is free from recognized hazards causing or likely to cause death or serious physical injury. The General Duty Clause is not used to enforce the provisions of consensus standards, although such standards are sometimes used as evidence of hazard recognition and the availability of feasible means of abatement. In addition, the General Duty Clause usually should not be used if there is a standard that applies to the particular condition, practice, means, operation, or process involved. See §1910.5(f).

Thank you for your interest in occupational safety and health. We hope you find this information helpful. OSHA requirements are set by statute, standards, and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. In addition, from time to time we update our guidance in response to new information. To keep apprised of such developments, you can consult OSHA's website at <http://www.osha.gov>. If you have any further questions, please feel free to contact the Office of General Industry Enforcement at (202) 693-1850.

Sincerely,

Edwin G. Foulke, Jr.

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<sup>1</sup> Section 400.11 of NFPA 70E-2004 states: *Switchboards, panelboards, industrial control panels, and motor control centers that are in other than dwelling occupancies and are likely to require examination, adjustment, servicing, or maintenance while energized shall be field marked to warn qualified persons of potential electric arc flash hazards. The marking shall be located so as to be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment.*

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<sup>2</sup> OSHA has not formally compared each provision of the NFPA 70E-2004 standard with the parallel provision in Subpart S but generally believes that the NFPA standard offers useful guidance for employers and employees attempting to control electrical hazards. The Agency notes, however, that the face and head protection requirements contained in the Section 130.7(c)(10) Table do not require face and head area protection for Hazard Risk Category 1, even when serious face and head injury from the thermal effects of the arc could result.

Therefore, this particular NFPA provision may not provide equivalent or greater employee protection with respect to the corresponding OSHA standards on eye, face, and head protection — i.e., §§1910.335(a)(1)(iv) and 1910.335(a)(1)(v). In addition, the Individual Qualified Employee Control Procedure conditionally permits certain work activities to be performed without the placement of lockout/tagout devices on the disconnecting means. See Section 130.7(D)(1). This work practice provides less employee protection than that afforded by compliance with the OSHA lockout and tagging requirements contained in §1910.333(b)(2) and is, therefore, not acceptable.

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<sup>3</sup> When an employee is working within the flash-protection boundary, Section 130.7 of the NFPA 70E-2004 standard requires the employee to wear protective clothing wherever there is possible exposure to an electric arc flash above the threshold incident-energy level for a second-degree burn, 5 J/cm<sup>2</sup> (1.2) cal/cm<sup>2</sup>. In other words, the protective clothing system is designed to protect the employee from receiving second- or third-degree burns to his or her body. The typical characteristics, degree of protection, and required minimum arc ratings for typical protective clothing systems may be found in Table 130.7(c)(11). The NFPA standard requires the protective clothing selected for the corresponding hazard/risk category number to have an arc rating of at least the minimum value listed.

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<sup>4</sup> To establish all of the elements of the affirmative defense of impossibility, an employer who can show that compliance with the terms of a standard is impossible under the circumstances must also show that it used alternative measures to protect employees, or that there were no such control measures.

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<sup>5</sup> This flash hazard analysis information represents recognized good engineering practice and can be useful guidance for both OSHA personnel and employers applying the provisions contained in the electrical safety-related work practice standards contained in 29 CFR §§1910.331 through 1910.335.

## Standard Interpretations

# 12/19/2006 - "Continuous industrial processes" and the infeasibility of de-energizing equipment under 29 CFR 1910.333.

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**This letter constitutes OSHA's interpretation only of the requirements discussed and may not be applicable to any situation not delineated within the original correspondence.**

December 19, 2006

Mr. Alan E. Scales  
Safety Department  
Fairchild Semiconductor International  
333 Western Avenue  
MS 01-31  
Portland, ME 04106

Dear Mr. Scales:

Thank you for your June 6, 2006, letter to the Occupational Safety and Health Administration's (OSHA's) Directorate of Enforcement Programs. You had questions regarding OSHA's *Selection and use of work practices* standard, 29 CFR 1910.333, as it relates to "continuous industrial processes" and the infeasibility of de-energizing equipment under certain circumstances. Your paraphrased scenario, question, and our response follow.

**Scenario:** The manufacturing of our products involves many discrete pieces of equipment whose individual processes are part of the overall manufacture of integrated circuit components. For example, we have ten pieces of manufacturing equipment fed out of a 480-volt three-phase panel. A new project requires that additional feeders and a 225-ampere circuit breaker be added to the panel to supply a new piece of equipment. To perform the work in a de-energized state, it requires the power to the panel must be disconnected and appropriate LOTO devices applied. This activity would result in the shutdown of the ten pieces of equipment, causing a significant interruption to our ability to manufacture integrated circuits.

**Question:** Is the panel considered part of a "continuous industrial process," thus allowing the work to be performed while the panel was energized using electrical safe work practices, as per Note 2 in §1910.333(a)(1)?

**Response:** It appears that your panel is not part of a "continuous industrial process." The term "continuous industrial process" was derived from its use in the National Electrical Code (NEC). In the NEC "continuous industrial process" is used in the context of situations where the orderly shut down of integrated processes and equipment would introduce additional or increased hazards.<sup>1</sup> Therefore, to qualify for the exception found in Note 2 of §1910.333(a)(1), the employer must, on a case-by-case basis, determine if the orderly shutdown of the related equipment (including the panel) and processes would introduce additional or increased hazards. If so, then the employer may perform the work using the electrical safe work practices found in §§1910.331-1910.335, including, but not limited to, insulated tools, shields, barrier, and personal protective equipment. If the orderly shutdown of the related equipment and processes would not introduce additional or increased hazards, but merely alter or interrupt production, then the de-energization of the equipment would be considered feasible,

and the exception found in Note 2 of §1910.333(a)(1) would not apply. Based on the limited information you provided, it does not appear that de-energization of the panel in question would introduce additional or increased hazards.

Thank you for your interest in occupational safety and health. We hope you find this information helpful. OSHA requirements are set by statute, standards, and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. Also, from time to time we update our guidance in response to new information. To keep apprised of such developments, you can consult OSHA's website at <http://www.osha.gov>. If you have any further questions, please feel free to contact the Office of General Industry Enforcement at (202) 693-1850.

Sincerely,

Richard E. Fairfax, Director  
Directorate of Enforcement Programs

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<sup>1</sup> While the term "continuous industrial process" is used only once in the body of the NEC, the index directs the reader to four locations where the provisions are applicable to "continuous industrial processes." See NEC 2003, Sections 240-12, 230-95 Ex. 1, 430-44, and 240-3(a)

## Standard Interpretations

# 02/29/2008 - Whether employees who are verifying that an electrical system is de-energized or are turning off circuit breakers are required to use personal protective equipment.

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**OSHA requirements are set by statute, standards and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. Also, from time to time we update our guidance in response to new information. To keep apprised of such developments, you can consult OSHA's website at <http://www.osha.gov>.**

February 29, 2008

Mr. Brian Dolin, MS, CSP  
Safety Consultant  
Fortier Loss Control Consultants, Inc.  
1947 Saint Gregorys Court  
Knoxville, TN 37931

Re: Whether employees who are verifying that an electrical system is de-energized or are turning off circuit breakers are required to use personal protective equipment.

Dear Mr. Dolin:

This is in response to your letter dated October 4, 2005, to the Occupational Safety and Health Administration (OSHA). You ask about requirements relative to the use of personal protective equipment in construction under the electrical standard, 29 CFR 1926 Subpart K and the applicability of the National Fire Protection Association (NFPA) industry consensus standard, NFPA 70E (the "Standard for Electrical Safety in the Workplace" (2004).

Your letter was transferred to this office on November 14, 2005 because your questions relate to OSHA's construction safety requirements. We apologize for the long delay in processing your request.<sup>1</sup>

Your questions have been paraphrased as follows:

**Question (1):** *Scenario:* Employees will be using an insulated device to verify that an electrical circuit that has been "turned off, locked, and tagged" is de-energized. Are these employees required to use Personal Protective Equipment (PPE) under OSHA's construction standard 1926.416(a)(1) and/or NFPA 70E?

**Answer:** Section 1926.416(a)(1) provides:

No employer shall permit an employee to work in such proximity to any part of an electric power circuit that the employee could contact the electric power circuit in the course of work, unless the employee is protected against **electric shock** by de-energizing the circuit and grounding it or by guarding it effectively by insulation or other means. [Emphasis added]

In your scenario, the employees are exposed to the hazard of electric shock since, at the time they are doing the work, a determination that the circuit has been de-energized has not yet occurred. Therefore, under this provision, these employees must be protected against electric shock "by guarding [the part] by insulation or other means." When so guarded, under this provision, PPE would not be required to protect against the electric shock hazard.

An additional hazard that may be associated with the work described in your scenario is that of arc flash. While Subpart K requirements have the effect of reducing the likelihood of an arc flash, Subpart K does not address the hazard that an arc flash poses to employees if it were to occur.<sup>2</sup> However, 29 CFR 1926.95(a) provides that:

Protective equipment, including personal protective equipment for eyes, face, head, and the extremities, protective clothing, respiratory devices, and protective shields and barriers, shall be provided, used, and maintained in a sanitary and reliable condition wherever it is **necessary** by reason of hazards of processes or environment, chemical hazards, radiological hazards, or mechanical irritants encountered in a manner capable of causing injury or impairment in the function of any part of the body through absorption, inhalation, or physical contact. [Emphasis added].

Industry consensus standards can be evidence that there is a hazard for which that PPE is "necessary." While the NFPA 70E consensus standard has not been adopted as an OSHA standard, it is relevant as evidence that arc flash is a recognized hazard and that PPE is necessary to protect against that hazard.

NFPA 70E Article 130 sets out alternative approaches for protecting against arc flash. One approach is to use an arc flash analysis to determine the Flash Protection Boundary; it calls for PPE to be used within that boundary.

An alternative approach is to follow a table that lists specific tasks and the PPE that is needed for each task. This approach is set out in Article 130.7(C):

(9) Selection of Personal Protective Equipment.

(a) When required for Various Tasks. When selected in lieu of the **flash hazard** analysis of 130.3(A), Table 130.7(C)(9) shall be used to determine the hazard/risk category for a task.

\* \* \*

(10) Protective Clothing and Personal Protective Equipment Matrix. Once the Hazard/Risk Category has been identified, Table 130.7(C)(10) shall be used to determine the required personal protective equipment (PPE) for the task.

\* \* \*

NFPA 70E's Table 130.7(C)(9)(a), Hazard/Risk Category Classifications, referenced above, lists the task, "Work on energized parts, **including voltage testing**" and assigns it a "Hazard/Risk Category" of "1" or higher. Under Table 130.7(C)(10), that categorization triggers various PPE provisions, including non-melting clothing, flame-resistant clothing, and other protective equipment.<sup>3</sup> Thus, NFPA 70E is evidence that the industry recognizes the hazard of arc flash, that this hazard is present when testing voltage, and that, when present, it is necessary for PPE to be used to protect the employee from it.

Because the arc flash hazard varies with site-specific factors, we cannot determine from the information you provided the extent of the arc flash hazard in your scenario or the appropriate PPE. One way of ensuring that an employee is adequately protected is to use the NFPA 70E for assessing the factors in a specific situation and determining what protection to use.

**Question (2): Scenario:** Construction employees will be turning off circuit breakers. These circuit breakers, some of which are rated in excess of 240 volts (but not greater than 600 volts) and others less than 240 volts, are installed in three-phase panel boards contained within an approved enclosure with a bolt-on cover trim. The enclosure and cover trim prevent live parts from being exposed. Would the circuit breaker be considered an exposed electrical part when it has a closed cover trim installed such that PPE would be required to protect against electric shock when someone turns the breaker on or off? Would PPE be required to protect against arc flash?

**Answer:** The requirement in 1926.416(a)(1) to provide protection is triggered where an employee "could contact the electric power circuit." The circuit breaker you refer to is contained within an approved enclosure and has no exposed live parts. The enclosure and closed cover trim is a type of dead front design that does not expose employees to live parts. Therefore, electric shock protection is not required when simply turning the switch on or off.

Arc flash, however, may occur if the switch is defective. Employees in the scenario you describe may be exposed to risk when they are fixing the breaker or turning it on or off. While the chances of serious injury from arc flash may be remote in certain circumstances, NFPA 70E calls for a flash hazard analysis (or use of PPE under its table of tasks) to be performed in order to determine the risk level and the appropriate PPE. NFPA 70E 130.3 states:

A flash hazard analysis shall be done in order to protect personnel from the possibility of being injured by an arc flash. The analysis shall determine the Flash Protection Boundary and the personal protective equipment that people within the Flash Protection Boundary shall use.

(A) Flash Protection Boundary. For systems that are 600 volts or less, the Flash Protection Boundary shall be 4.0 ft, based on the product of the clearing times of 6 cycles (0.1 second) and the available bolted fault current of 50 kA or any combination not exceeding 300 kA cycles (5000 ampere seconds). For clearing times and bolted fault currents other than 300 kA cycles, or under engineering supervision, the Flash Protection Boundary shall alternatively be permitted to be calculated in accordance with the following general formula:

$$D_c = [2.65 \times MVA_{bf} \times t]^{1/2}$$

or

$$D_c = [53 \times MVA \times t]^{1/2}$$

Where:

$D_c$  = distance in feet from an arc source for a second-degree burn

$MVA_{bf}$  = bolted fault capacity available at point involved (in mega volt-amperes)

MVA = capacity rating of transformer (mega volt-amperes). For transformers with MVA ratings below 0.75 MVA, multiply the MVA transformer rating by 1.25

$t$  = time of arc exposure (in seconds)

Once the risk of exposure is assessed, the employer must then provide PPE in accordance with the results of the analysis. NFPA 70E §130.3(B) states,

. . . The flash hazard analysis shall determine, and the employer shall document, the incident energy exposure of the worker (in calories per centimeter). . . Flame-resistant (FR) clothing and personal protective equipment (PPE) shall be used by the employee based on the incident energy exposure associated with the specific task. . . As an alternative, the PPE requirements of 130.7(C)(9) shall be permitted to be used in lieu of the detailed flash analysis approach described in 130.3(A).

As provided in the last sentence of section 130.3(B), NFPA 70E also provides an alternative analysis to determine PPE requirements. If the task to be performed has a high probability of arc flash occurrence, the charts under 130.7(C)(9) and (10) can be used to determine the appropriate PPE. Section 130.7(C)(9)(a) states in part,

When selected in lieu of the flash hazard analysis of 130.3(A), Table 130.7(C)(9)(a) shall be used to determine the hazard/risk category for a task. The assumed short-circuit current capacities and fault clearing times for various tasks are listed in the text and notes to Table 130.7(C)(9)(a). For tasks not listed, or for power systems with greater than the assumed short-circuit current capacity or with longer than the assumed fault clearing times, a flash hazard analysis shall be required in accordance with 130.3.

Although this analysis uses a worst case scenario to determine the need for PPE, if the breaker has more than the assumed short-circuit current capacity or longer than the assumed fault clearing times, the charts will be of no use, and the flash hazard analysis under 130.3 would need to be done.

The employer must consider several factors in determining which analysis to perform. The risk of injury largely depends on the amount of energy available to the breaker, how old it is, how well it was maintained, and the task that is to be performed, among other factors. For example, a house with 240-volt service and a well-maintained breaker may typically have 10,000 amps available; in most such situations, there will be little arc flash risk when simply turning the switch on or off. In contrast, a commercial building with an equally well-maintained breaker typically will have 40,000 amps, which poses greater risk. In addition, switching a breaker on may carry more risk than turning a breaker off.

In sum, arc flash can be a significant danger under certain circumstances, and the provisions above are evidence of its recognition by the industry. One way for an employer to meet its obligations under 1926.95(a)<sup>4</sup> would be to use the NFPA 70E method of measuring the risk and determining the appropriate PPE. When using the arc flash hazard analysis approach, the employer may determine in some circumstances that, when turning off a breaker, there is little risk and no PPE is needed. However, all the relevant factors, including those referred to above, need to be considered. Alternatively, the employer may use the NFPA table instead of conducting the analysis, in which case some PPE would be required, even for the voltages below 240 V.

If you need additional information, please contact us by fax at: U.S. Department of Labor, OSHA, Directorate of Construction, Office of Construction Standards and Guidance, fax # 202-693-1689. You can also contact us by mail at the above office, Room N3468, 200 Constitution Avenue, N.W., Washington, D.C. 20210, although there will be a delay in our receiving correspondence by mail.

Sincerely,

Steven F. Witt, Director  
Directorate of Construction

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<sup>1</sup> Our understanding is that your question relates to federal OSHA requirements. Please note that there are States that administer their own OSHA-approved State plan. Such States are required by law to have a program of standards and enforcement that is at least as effective as the Federal OSHA requirements. However, those States may enact more stringent requirements. An employer in such a State is required to follow the State's more stringent requirements. If you are interested in information on this issue as it pertains to a State that administers its own OSHA-approved State plan (such as Tennessee), please contact that State for specific information on its interpretation and enforcement policy with regard to this issue.

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<sup>2</sup> Although the Preamble for Subpart K mentions (at volume 51 of the *Federal Register*, page 25294) that fire is a hazard associated with arc flashing, no provision in Subpart K addresses the hazard of arc flash.

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<sup>3</sup> Note: NFPA Section 130.3(B) indicates that the use of these tables is an acceptable alternative to the use of the calculation in Section 130.3(A) to determine the appropriate PPE for employees potentially exposed to flash hazards.

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<sup>4</sup> Even if 1926.95(a) were inapplicable, we would come to the same conclusion with respect to an employer's obligations under Section 5(a)(1) of the Occupational Safety and Health Act.

**[Corrected 5/5/2007]**

**Directives**

**STD 01-16-007 - STD 1-16.7 - Electrical Safety-Related Work Practices -- Inspection Procedures and Interpretation Guidelines**

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● <b>Record Type:</b>	Instruction
● <b>Directive Number:</b>	STD 01-16-007
● <b>Old Directive Number:</b>	STD 1-16.7
● <b>Title:</b>	Electrical Safety-Related Work Practices -- Inspection Procedures and Interpretation Guidelines
● <b>Information Date:</b>	07/01/1991

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U.S. Department of Labor Assistant Secretary for Occupational Safety and Health  
Washington D.C. 20210

OSHA Instruction STD 1-16.7 JUL 1, 1991 Directorate of Compliance Programs

Subject: Electrical Safety-Related Work Practices--Inspection Procedures and Interpretive Guidelines

A. Purpose. This instruction establishes policies and provides interpretive guidelines to ensure uniform enforcement of the standard for Electrical Safety-Related Work Practices, 29 CFR 1910.331 through .335.

B. Scope. This instruction applies OSHA-wide.

C. References:

1. OSHA Instruction STD 1-7.3, September 11, 1990, 29 CFR 1910.147, the Control of Hazardous Energy (Lockout/Tagout)--Inspection Procedures and Interpretive Guidance.
2. General Industry Standards, 29 CFR 1910, Subpart S.
3. OSHA Instruction CPL 2.45B, June 15, 1989, the Revised Field Operations Manual (FOM).
4. NFPA 70E, 1983, Electrical Safety Requirements for Employee Workplaces.

D. Effective Dates of Requirements. All requirements of the standard for Electrical Safety-Related Work Practices have an effective date of December 4, 1990, except for 29 CFR 1910.332 (training), which will become effective on August 6, 1991.

E. Action. Regional Administrators and Area Directors shall ensure that the policies and interpretive guidelines in this instruction are followed as to the enforcement of the standard.

F. Federal Program Change. This instruction describes a Federal program change

which affects State programs. Each Regional Administrator shall:

1. Ensure that this change is promptly forwarded to each State designee using a format consistent with the Plan Change Two-Way Memorandum in Appendix P, OSHA Instruction STP 2.22A, Ch-3.
2. Explain the technical content of this change to the State designee as required.
3. Ensure that State designees are asked to acknowledge receipt of this Federal program change in writing to the Regional Administrator as soon as the State's intention is known, but not later than 70 calendar days after the date of issuance (10 days for mailing and 60 days for response).

This acknowledgment must include a description either of the State's plan to follow the guidelines in paragraphs H., Inspection guidelines, I., Interpretive Guidance, and J., Enforcement/Citation Guidance, to implement the change, or of the reasons why this change should not apply to that State.

4. Review policies, instructions and guidelines issued by the State to determine that this change has been communicated to State compliance personnel.

G. Background. The standard for Electrical Safety-Related Work Practices was promulgated on August 6, 1990, at Federal Register, Vol. 55, No. 151 (pages 31984-32020), and became effective December 4, 1990, except for 29 CFR 1910.332, which becomes effective on August 6, 1991.

1. The current electrical standards in Subpart S of the General Industry Standards cover electrical equipment and installations rather than work practices. The electrical safety-related work practice standards that do exist are distributed in other subparts of 29 CFR 1910. Although unsafe work practices appear to be involved in most workplace electrocutions, OSHA has very few regulations addressing work practices necessary for electrical safety. Because of this, OSHA determined that standards were needed to minimize these hazards.
2. The new rule addresses practices and procedures that are necessary to protect employees working on or near exposed energized and deenergized parts of electric OSHA Instruction STD 1-16.7 JUL 1, 1991 Directorate of Compliance Programs equipment. The new rule also promotes uniformity and reduces redundancy among the general industry standards. The new rule is based largely on NFPA 70E, Part II.
3. On September 1, 1989, OSHA promulgated a generic standard on the control of hazardous energy, 29 CFR 1910.147 (lockout/tagout).

a. That standard addresses practices and procedures that are necessary to deenergize machinery or equipment and to prevent the release of potentially hazardous energy while maintenance and servicing activities are being performed.

b. Although that rule is related to electrical energy, it specifically excludes "exposure to electrical hazards from work on, near, or with conductors or equipment in electric utilization installations, which is covered by Subpart S of 29 CFR 1910." Therefore, the lockout/tagout standard does not cover electrical hazards.

c. The final electrical safety-related work practices standard has provisions to achieve maximum safety by deenergizing energized parts and, secondly, when lockout/tagout is used, it is done to ensure that the deenergized state is maintained.

H. Inspection Guidelines. In so far as possible the compliance officer shall integrate inspection procedures for this standard with those of 29 CFR 1910.147 (lockout/tagout standard).

1. The following guidance provides a general framework to assist the compliance officer during all inspections:

a. The employer's written procedures required under 29 CFR 1910.333(b)(2)(i) shall be reviewed to determine if they cover the hazards likely to be encountered.

(1) A copy of paragraph (b) of 1910.333 maintained by the employer will fulfill this requirement.

(2) A copy of the written procedures for locking and tagging required by 29 CFR 1910.147 will also comply with this requirement, provided those procedures address the electrical safety hazards covered by Subpart S and provided the procedures conform to 1910.333 (b).

(3) If the employer has chosen to utilize procedures developed to comply with 1910.147 for electrical as well as other hazards, the written procedures must include steps corresponding to requirements in Section 1910.333 for application of locks and tags and verification of deenergized conditions (29 CFR 1910.333(b)(2)(iii)(D) and (b)(2)(iv)(B)).

b. Beginning August 6, 1991, the training practices of the employer for qualified and unqualified employees shall be evaluated to assess whether the training provided is appropriate to the tasks being performed

or to be performed.

(1) All employees who face a risk of electric shock, burns or other related injuries, not reduced to a safe level by the installation safety requirements of Subpart S, must be trained in safety-related work practices required by 29 CFR 1910.331-.335.

(2) In addition to being trained in and familiar with safety related work practices, unqualified employees must be trained in the inherent hazards of electricity, such as high voltages, electric current, arcing, grounding, and lack of guarding. Any electrically related safety practices not specifically addressed by Sections 1910.331 through 1910.335 but necessary for safety in specific workplace conditions shall be included.

(3) The training of qualified employees must include at the minimum the following: OSHA Instruction STD 1-16.7 JUL 1, 1991 Directorate of Compliance Programs

(a) The ability to distinguish exposed live parts from other parts of electric equipment.

(b) The ability to determine the nominal voltage of live parts.

(c) The knowledge of clearance and/or approach distances specified in 1910.333(c).

(4) During walkaround inspections, compliance officers shall evaluate any electrical-related work being performed to ascertain conformance with the employer's written procedures as required by 1910.333(b)(2)(i) and all safety-related work practices in Sections 1910.333 through 1910.335. (See J. of this instruction for clarification.)

(5) Any violations found must be documented adequately, including the actual voltage level.

I. Interpretive Guidance. The following guidance is provided relative to specific provisions of the standard for Electrical Safety-Related Work Practices:

1. Definitions: Qualified/Unqualified Persons.

a. The standard defines a qualified person as one familiar with the construction and operation of the equipment and the hazards involved. "Qualified Persons" are intended to be only those who are well acquainted with and thoroughly conversant in the electric equipment and

electrical hazards involved with the work being performed.

(1) Whether an employee is considered to be a "qualified person" will depend on various circumstances in the workplace. 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 29 CFR 1910.332(b)(3) for training requirements that specifically apply to qualified persons.) Only qualified persons may place and remove locks and tags.

(2) An employee who is undergoing on-the-job training, 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 person is considered to be a qualified person for the performance of those duties.

b. Where the term "may not" is used in these standards, the term bears the same meaning as "shall not".

c. Training requirements apply to all employees in occupations that carry a risk of injury due to electrical hazards that are not sufficiently controlled under 29 CFR 1910.303 through 1910.308.

## 2. Scope/Coverage of the Standard.

a. The provisions of the standard cover all employees working on, near or with premises wiring, wiring for connection to supply, other wiring, such as outside conductors on the premises and optical fiber cable, where the fiber cable installations are made along with electric conductors and the optical fiber cable types are those that contain noncurrent-carrying conductive members such as metallic strength members and metallic vapor barriers.

b. The standard does not cover qualified workers (but does cover unqualified workers) performing work on the following:

(1) Electric power generation, transmission, and distribution installations located in buildings used for such purposes or located outdoors. OSHA Instruction STD 1-16.7 JUL 1, 1991 Directorate of Compliance Programs NOTE: Work on the specified electrical installations is excluded, but work on other electric equipment in the buildings is not excluded.

(2) Communications installations covered under 29 CFR 1910.268.

(3) Installations in ships, watercraft, railway rolling stock, aircraft, or automotive vehicles other than mobile homes and recreational vehicles.

(4) Installations of railways for generation, transformation, transmission, or distribution of electric power used exclusively for operation of rolling stock or installations of railways used exclusively for signaling and communication purposes.

c. The standard for Electrical Safety-Related Work Practices was developed to complement the existing electrical standards. The new standard includes requirements for work performed on or near exposed energized and deenergized parts of electric equipment, use of electrical protective equipment, and the safe use of electrical equipment.

d. Exposure to unexpected electrical energy release that could result in electric shock or burns or in an explosion caused by an electric arc is covered by the standard for Electrical Safety-Related Work Practices. Safeguarding workers from other hazards related to the unexpected release of hazardous energy during servicing and maintenance operations is covered by 29 CFR 1910.147, the lockout/tagout standard.

(1) 1910.333(a)(1) requires that live parts be deenergized before a potentially exposed employee works on or near them. OSHA believes that this is the preferred method for protecting employees from electrical hazards. The employer is permitted to allow employees to work on or near exposed live parts only:

(a) If the employer can demonstrate that deenergizing introduces additional or increased hazards, or

(b) If the employer can demonstrate that deenergizing is infeasible due to equipment design or operational limitations.

(2) Under 1910.333(a)(2) if the employer does not deenergize (under the conditions permitted in 1910.333(a)(1)), then suitable safe work practices for the conditions under which the work is to be performed shall be included in the written procedures and strictly enforced. These work practices are given in 1910.333(c) and 1910.335.

(3) Only qualified persons shall be allowed to work on energized parts or equipment.

### 3. Working on Deenergized Parts.

a. Circuit parts that cannot be deenergized using the procedures outlined in 1910.333(b)(2) must be treated as energized (as specified in 1910.333(b)(1)), regardless of whether the parts are, in fact, deenergized.

b. Deenergized parts are required to be locked and tagged unless exempted under 1910.333(b)(2)(iii)(C) or 1910.333(b)(2)(iii)(E), as discussed below. If so exempted, either a lock or a tag is required.

(1) If a tag is used without a lock, it shall be supplemented by at least one additional safety measure that provides a level of safety equivalent to that obtained by the use of a lock. Examples of additional safety measures include the removal of an isolating circuit element, blocking of a controlling switch, or opening of an extra disconnecting device.

(2) A lock may be placed without a tag only under the following conditions:

(a) Only one circuit or piece of equipment is deenergized, and

(b) The lockout period does not extend beyond the work shift, and

(c) Employees exposed to the hazards associated with reenergizing the circuit or equipment are familiar with this procedure.

4. Verification of Deenergization Is Mandatory. This verification must be done by a qualified person.

a. The qualified person shall activate the equipment operating controls or otherwise verify that the equipment cannot be restarted.

b. Test equipment shall be used to ensure that electrical parts and circuit elements have been deenergized.

c. Testing instruments and equipment shall be visually inspected for external defects or damage before being used to determine deenergization (29 CFR 1910.334(c)(2)).

d. For circuits over 600 volts nominal, the test equipment shall be checked for proper operation immediately before and immediately after the test.

5. Reenergization. The following requirements shall be met, in the order given, before circuits or equipment are reenergized, even temporarily.

a. A qualified person shall conduct tests and visual inspections, as necessary, to verify that all tools, electrical jumpers, shorts, grounds, and other such devices have been removed so that the circuits and equipment can be safely energized.

b. Potentially exposed employees shall be warned to stay clear of circuits and equipment prior to reenergizing.

c. Each lock and tag shall be removed by the employee who applied it. However, if the employee is absent from the workplace, then the lock or tag may be removed by a qualified person designated to perform this task provided that the employer ensures:

(1) That the employee who applied the lock or tag is not available at the workplace, and

(2) That the employee is informed that the lock or tag has been removed before he or she resumes work at the workplace.

(3) That there is to be a visual determination that all employees are clear of the circuits and equipment prior to lock and tag removal.

6. Working On or Near Overhead Power Lines, 29 CFR 1910.333(c)(3).

a. OSHA believes that the preferred method of protecting employees working near overhead power lines is to deenergize and ground the lines when work is to be performed near them.

b. In addition to other operations, this standard also applies to tree trimming operations performed by tree workers who are not "qualified persons". In this respect the exclusion in 1910.331(c)(1) applies only to "qualified persons" performing line-clearance tree trimming (trimming trees that are closer than 10 feet to overhead power lines).

c. The standard does not prohibit workers who are not "qualified persons" from working in a tree that is closer than 10 feet to power lines so long as that person or any object he or she may be using, does not come within 10 feet of a power line. However, it would require "qualified persons" to perform the work if the worker or any object he or she may be using will come within 10 feet of an exposed energized part or if a branch being cut may be expected to come within 10 feet of an exposed energized part while falling from the tree. (See 29 CFR 1910.333(c)(3)(ii).)

d. The purpose for the approach distance requirements is to prevent contact with, and/or arcing, from energized overhead power lines. The

approach distance applies to tools used by employees as well as the employees themselves. Table S-5 calls for the following approach distances for qualified employees only:

<b>Voltage range (phase to phase)</b>	<b>Minimum approach distance</b>
300V and less	Avoid Contact
Over 300V, not over 750V	1 ft. 0 in. (30.5 cm)
Over 750V, not over 2kV	1 ft. 6 in. (46 cm)
Over 2kV, not over 15kV	2 ft. 0 in. (61 cm)
Over 15kV, not over 37kV	3 ft. 0 in. (91 cm)
Over 37kV, not over 87.5kV	3 ft. 6 in. (107 cm)
Over 87.5kV, not over 121kV	4 ft. 0 in. (122 cm)
Over 121kV, not over 140kV	4 ft. 6 in. (137 cm)

NOTE: Unqualified employees are required to adhere to the 10 ft. minimum.

e. Employees working on or around vehicles and mechanical equipment, such as gin-pole trucks, forklifts, cherry pickers, garbage trucks, cranes and elevating platforms, who are potentially exposed to hazards related to equipment component contact with overhead lines, shall have been trained by their employers in the inherent hazards of electricity and means of avoiding exposure to such hazards.

f. The standard for Electrical Safety-Related Work Practices can be applied with respect to electrical hazards related to any size, utilization or configuration of overhead power lines in general industry; e.g., residential power lines, remotely located overhead power lines, temporarily rigged overhead power lines, and overhead power lines along streets and alleys.

7. Portable Ladders. Such ladders may not have conductive siderails in situations where the employee or the ladder could contact exposed energized parts. All ladders shall be in compliance with requirements of the standards found elsewhere in Part 1910.

8. Conductive Apparel. Articles of jewelry and clothing such as watch bands, bracelets, rings, key chains, necklaces, metalized aprons, cloth with conductive thread, or metal headgear shall not be worn if there is a possibility of contacting exposed energized parts. However, such articles may be worn if they are rendered nonconductive by covering, wrapping, or other insulating means (29

CFR 1910.333(c)(8)).

9. Housekeeping Duties. The employer has the burden to provide adequate safeguards (such as insulating equipment or barriers) where live parts present an electrical contact hazard to employees who are performing housekeeping duties. Electrically conductive cleaning materials (such as steel wool, metalized cloth, and silicon carbide, as well as conductive liquid solutions) may not be used in proximity to energized parts unless procedures are followed which will prevent electrical contact.

10. Electrical Safety Interlocks. Interlocks found on panels, covers and guards are designed to deenergize circuits to prevent electric shock to persons using equipment or performing minor maintenance or adjustments and shall not be defeated or bypassed by an unqualified person.

11. Cord- and Plug-Connected Equipment. Energized equipment here means either the equipment being plugged or the receptacle into which it is being plugged, or both (29 CFR 1910.334(a)(5)(i)).

12. Eye and Face Protection. 29 CFR 1910.335(a)(1)(v) requires employees to wear protective equipment for the eyes or face wherever there is danger of injury to the eyes or face from electric arcs or flashes or from flying objects resulting from electrical explosion.

13. Insulated Tool. This means a tool encased within material of composition and thickness that is recognized as electrical insulation.

#### J. Enforcement/Citation Guidance.

1. A deficiency in the employer's program that could contribute to a potential exposure capable of producing serious physical harm or death shall be cited as a serious violation.

2. The failure to train "qualified" and "unqualified" employees as required for their respective classifications shall normally be cited as a serious violation.

3. Paperwork deficiencies in the safe work practice program where effective safe work practice procedures are in place shall be cited as other-than-serious.

Gerard F. Scannell Assistant Secretary

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