



## OSHA 1910.269 Revised

### Side-by-Side Comparison: Previous Final Rule with **Final Rule Issued April 11, 2014**

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1910.269 Previous Final Rule		1910.269 Final Rule, Published April 11, 2014	
<b>1910.269(a)</b>	“General.”	<b>(a)</b>	General
<b>(a)(1)</b>	“Application.”	<b>(1)</b>	Application.
<b>(a)(1)(i)</b>	This section covers the operation and maintenance of electric power generation, control, transformation, transmission, and distribution lines and equipment. These provisions apply to:	<b>(i)</b>	This section covers the operation and maintenance of electric power generation, control, transformation, transmission, and distribution lines and equipment. These provisions apply to:
<b>(a)(1)(i)(A)</b>	Power generation, transmission, and distribution installations, including related equipment for the purpose of communication or metering, which are accessible only to qualified employees;	<b>(A)</b>	Power generation, transmission, and distribution installations, including related equipment for the purpose of communication or metering that are accessible only to qualified employees;
	Note: The types of installations covered by this paragraph include the generation, transmission, and distribution installations of electric utilities, as well as equivalent installations of industrial establishments. Supplementary electric generating equipment that is used to supply a workplace for emergency, standby, or similar purposes only is covered under Subpart S of this Part. (See paragraph (a)(1)(ii)(B) of this section.)	<b>[Ø]</b>	Note to paragraph (a)(1)(i)(A): The types of installations covered by this paragraph include the generation, transmission, and distribution installations of electric utilities, as well as equivalent installations of industrial establishments. <b>Subpart S of this part covers supplementary electric generating equipment that is used to supply a workplace for emergency, standby, or similar purposes only. (See paragraph (a)(1)(i)(B) of this section.)</b>
<b>(a)(1)(i)(B)</b>	Other installations at an electric power generating station, as follows:	<b>(B)</b>	Other installations at an electric power generating station, as follows:
<b>(a)(1)(i)(B)(1)</b>	Fuel and ash handling and processing installations, such as coal conveyors,	<b>(1)</b>	Fuel and ash handling and processing installations, such as coal conveyors,
<b>(a)(1)(i)(B)(2)</b>	Water and steam installations, such as penstocks, pipelines, and tanks, providing a source of energy for electric generators, and	<b>(2)</b>	Water and steam installations, such as penstocks, pipelines, and tanks, providing a source of energy for electric generators, and
<b>(a)(1)(i)(B)(3)</b>	Chlorine and hydrogen systems:	<b>(3)</b>	Chlorine and hydrogen systems;
<b>(a)(1)(i)(C)</b>	Test sites where electrical testing involving temporary measurements associated with electric power generation, transmission, and distribution is performed in laboratories, in the field, in substations, and on lines, as opposed to metering, relaying, and routine line work;	<b>(C)</b>	Test sites where <b>employees perform</b> electrical testing involving temporary measurements associated with electric power generation, transmission, and distribution in laboratories, in the field, in substations, and on lines, as opposed to metering, relaying, and routine line work;
<b>(a)(1)(i)(D)</b>	Work on or directly associated with the installations covered in paragraphs (a)(1)(i)(A) through (a)(1)(i)(C) of this section; and	<b>(D)</b>	Work on, or directly associated with, the installations covered in paragraphs (a)(1)(i)(A) through (a)(1)(i)(C) of this section; and
<b>(a)(1)(i)(E)</b>	Line-clearance tree-trimming operations, as follows:	<b>(E)</b>	Line-clearance tree-trimming operations, as follows:

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(a)(1)(i)(E)(1) Entire of this Part, except paragraph (r)(1) of this section, applies to line-clearance tree-trimming operations performed by qualified employees (those who are knowledgeable in the construction and operation of electric power generation, transmission, or distribution equipment involved, along with the associated hazards).	(a) (1) (i) (E) (1) Entire § 1910.269 of this part, except paragraph (r)(1) of this section, applies to line-clearance tree-trimming operations performed by qualified employees (those who are knowledgeable in the construction and operation of the electric power generation, transmission, or distribution equipment involved, along with the associated hazards).
(a)(1)(i)(E)(2) Paragraphs (a)(2), (b), (c), (g), (k), (p), and (r) of this section apply to line-clearance tree-trimming operations performed by line-clearance tree trimmers who are not qualified employees.	(2) Paragraphs (a)(2), (a)(3), (b), (c), (g), (k), (p), and (r) of this section apply to line-clearance tree-trimming operations performed by line-clearance tree trimmers who are not qualified employees.
(a)(1)(ii) Notwithstanding paragraph (A)(1)(i) of this section, of this Part does not apply:	(ii) Notwithstanding paragraph (a)(1)(i) of this section, § 1910.269 of this part does not apply:
(a)(1)(ii)(A) To construction work, as defined in 1910.12 of this Part; or	(A) To construction work, as defined in § 1910.12 of this part, <b>except for line-clearance tree-trimming operations and work involving electric power generation installations as specified in § 1926.950(a)(3) of this chapter;</b> or
(a)(1)(ii)(B) To electrical installations, electrical safety-related work practices, or electrical maintenance considerations covered by Subpart S of this Part.	(B) To electrical installations, electrical safety-related work practices, or electrical maintenance considerations covered by Subpart S of this part.
<p>Note 1:</p> <p>Work practices conforming to 1910.332 through 1910.335 of this Part are considered as complying with the electrical safety-related work practice requirements of this section identified in Table 1 of Appendix A-2 to this section, provided the work is being performed on a generation or distribution installation meeting 1910.303 through 1910.308 of this Part. This table also identifies provisions in this section that apply to work by qualified persons directly on or associated with installations of electric power generation, transmission, and distribution lines or equipment, regardless of compliance with 1910.332 through 1910.335 of this Part.</p>	<p>[Ø] Note 1 to paragraph (a)(1)(ii)(B):</p> <p>The Occupational Safety and Health Administration considers work practices conforming to §§ 1910.332 through 1910.335 as complying with the electrical safety-related work-practice requirements of § 1910.269 identified in Table 1 of Appendix A-2 to this section, provided <b>that employers are performing the work</b> on a generation or distribution installation meeting §§ 1910.303 through 1910.308. This table also identifies provisions in § 1910.269 that apply to work by qualified persons directly on, or associated with, installations of electric power generation, transmission, and distribution lines or equipment, regardless of compliance with §§ 1910.332 through 1910.335.</p>
<p>Note 2:</p> <p>Work practices performed by qualified persons and conforming to of this Part are considered as complying with 1910.333(c) and 1910.335 of this Part.</p>	<p>[Ø] Note 2 to paragraph (a)(1)(ii)(B):</p> <p><b>The Occupational Safety and Health Administration considers work practices performed by qualified persons and conforming to § 1910.269 as complying with §§ 1910.333(c) and 1910.335.</b></p>

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(a)(1)(iii)	This section applies in addition to all other applicable standards contained in this Part 1910. Specific references in this section to other sections of Part 1910 are provided for emphasis only.	(a) (1) (iii)	This section applies in addition to all other applicable standards contained in this Part 1910. <b>Employers covered under this section are not exempt from complying with other applicable provisions in Part 1910 by the operation of § 1910.5(c).</b> Specific references in this section to other sections of Part 1910 are for emphasis only.
(a)(2)	"Training."	(2)	Training.
(a)(2)(i)	Employees shall be trained in and familiar with the safety-related work practices, safety procedures, and other safety requirements in this section that pertain to their respective job assignments. Employees shall also be trained in and familiar with any other safety practices, including applicable emergency procedures (such as pole top and manhole rescue), that are not specifically addressed by this section but that are related to their work and are necessary for their safety.	(i)	<b>All employees performing work covered by this section shall be trained as follows:</b>
		(A)	Each employee shall be trained in, and familiar with, the safety-related work practices, safety procedures, and other safety requirements in this section that pertain to his or her job assignments.
		(B)	Each employee shall also be trained in and familiar with any other safety practices, including applicable emergency procedures (such as pole-top and manhole rescue), that are not specifically addressed by this section but that are related to his or her work and are necessary for his or her safety.
		(C)	<b>The degree of training shall be determined by the risk to the employee for the hazard involved.</b>
(a)(2)(ii)	Qualified employees shall also be trained and competent in:	(ii)	Each qualified employee shall also be trained and competent in:
(a)(2)(ii)(A)	The skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment,	(A)	The skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment,
(a)(2)(ii)(B)	The skills and techniques necessary to determine the nominal voltage of exposed live parts,	(B)	The skills and techniques necessary to determine the nominal voltage of exposed live parts,
(a)(2)(ii)(C)	The minimum approach distances specified in this section corresponding to the voltages to which the qualified employee will be exposed, and	(C)	The minimum approach distances specified in this section corresponding to the voltages to which the qualified employee will be exposed and <b>the skills and techniques necessary to maintain those distances,</b>
(a)(2)(ii)(D)	The proper use of the special precautionary techniques, personal protective equipment, insulating and shielding materials, and insulated tools for working on or near exposed energized parts of electric equipment.	(D)	The proper use of the special precautionary techniques, personal protective equipment, insulating and shielding materials, and insulated tools for working on or near exposed energized parts of electric equipment, <b>and</b>
		(E)	<b>The recognition of electrical hazards to which the employee may be exposed and the skills and techniques necessary to control or avoid these hazards.</b>

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<p>Note: For the purposes of this section, a person must have this training in order to be considered a qualified person.</p>	<p>[Ø] Note to paragraph (a)(2)(ii): For the purposes of this section, a person must have the training required by paragraph (a)(2)(ii) of this section to be considered a qualified person.</p>
	<p>(a) (2) (iii) Each line-clearance tree trimmer who is not a qualified employee shall also be trained and competent in:</p>
	<p>(A) The skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment,</p>
	<p>(B) The skills and techniques necessary to determine the nominal voltage of exposed live parts, and</p>
	<p>(C) The minimum approach distances specified in this section corresponding to the voltages to which the employee will be exposed and the skills and techniques necessary to maintain those distances.</p>
<p>(a)(2)(iii) The employer shall determine, through regular supervision and through inspections conducted on at least an annual basis, that each employee is complying with the safety-related work practices required by this section.</p>	<p>(iv) The employer shall determine, through regular supervision and through inspections conducted on at least an annual basis, that each employee is complying with the safety-related work practices required by this section.</p>
<p>(a)(2)(iv) An employee shall receive additional training (or retraining) under any of the following conditions:</p>	<p>(v) An employee shall receive additional training (or retraining) under any of the following conditions:</p>
<p>(a)(2)(iv)(A) If the supervision and annual inspections required by paragraph (a)(2)(iii) of this section indicate that the employee is not complying with the safety-related work practices required by this section, or</p>	<p>(A) If the supervision or annual inspections required by paragraph (a)(2)(iv) of this section indicate that the employee is not complying with the safety-related work practices required by this section, or</p>
<p>(a)(2)(iv)(B) If new technology, new types of equipment, or changes in procedures necessitate the use of safety-related work practices that are different from those which the employee would normally use, or</p>	<p>(B) If new technology, new types of equipment, or changes in procedures necessitate the use of safety-related work practices that are different from those which the employee would normally use, or</p>
<p>(a)(2)(iv)(C) If he or she must employ safety-related work practices that are not normally used during his or her regular job duties.</p>	<p>(C) If he or she must employ safety-related work practices that are not normally used during his or her regular job duties.</p>
<p>Note: OSHA would consider tasks that are performed less often than once per year to necessitate retraining before the performance of the work practices involved.</p>	<p>[Ø] Note to paragraph (a)(2)(v)(C): The Occupational Safety and Health Administration considers tasks that are performed less often than once per year to necessitate retraining before the performance of the work practices involved.</p>
<p>(a)(2)(v) The training required by paragraph (a)(2) of this section shall be of the classroom or on-the-job type.</p>	<p>(vi) The training required by paragraph (a)(2) of this section shall be of the classroom or on-the-job type.</p>

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(a)(2)(vi)	The training shall establish employee proficiency in the work practices required by this section and shall introduce the procedures necessary for compliance with this section.	(a) (2) (vii)	The training shall establish employee proficiency in the work practices required by this section and shall introduce the procedures necessary for compliance with this section.
(a)(2)(vii)	The employer shall certify that each employee has received the training required by paragraph (a)(2) of this section. This certification shall be made when the employee demonstrates proficiency in the work practices involved and shall be maintained for the duration of the employee's employment.	(viii)	The employer shall ensure that each employee has demonstrated proficiency in the work practices involved before that employee is considered as having completed the training required by paragraph (a)(2) of this section.
Note: Employment records that indicate that an employee has received the required training are an acceptable means of meeting this requirement.		[Ø]	Note 1 to paragraph (a)(2)(viii): Though they are not required by this paragraph, employment records that indicate that an employee has successfully completed the required training are one way of keeping track of when an employee has demonstrated proficiency.
		[Ø]	Note 2 to paragraph (a)(2)(viii): For an employee with previous training, an employer may determine that that employee has demonstrated the proficiency required by this paragraph using the following process:
		(1)	Confirm that the employee has the training required by paragraph (a)(2) of this section,
		(2)	Use an examination or interview to make an initial determination that the employee understands the relevant safety-related work practices before he or she performs any work covered by this section, and
		(3)	Supervise the employee closely until that employee has demonstrated proficiency as required by this paragraph.
		(3)	Information transfer.
		(i)	Before work begins, the host employer shall inform contract employers of:
		(A)	The characteristics of the host employer's installation that are related to the safety of the work to be performed and are listed in paragraphs (a)(4)(i) through (a)(4)(v) of this section;

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	<p><b>[Ø]</b> Note to paragraph (a)(3)(i)(A):  This paragraph requires the host employer to obtain information listed in paragraphs (a)(4)(i) through (a)(4)(v) of this section if it does not have this information in existing records.</p>
	<p><b>(a) (3) (i) (B)</b> Conditions that are related to the safety of the work to be performed, that are listed in paragraphs (a)(4)(vi) through (a)(4)(viii) of this section, and that are known to the host employer;</p>
	<p><b>[Ø]</b> Note to paragraph (a)(3)(i)(B):  For the purposes of this paragraph, the host employer need only provide information to contract employers that the host employer can obtain from its existing records through the exercise of reasonable diligence. This paragraph does not require the host employer to make inspections of worksite conditions to obtain this information.</p>
	<p><b>(C)</b> Information about the design and operation of the host employer's installation that the contract employer needs to make the assessments required by this section; and</p>
	<p><b>[Ø]</b> Note to paragraph (a)(3)(i)(C):  This paragraph requires the host employer to obtain information about the design and operation of its installation that contract employers need to make required assessments if it does not have this information in existing records.</p>
	<p><b>(D)</b> Any other information about the design and operation of the host employer's installation that is known by the host employer, that the contract employer requests, and that is related to the protection of the contract employer's employees.</p>
	<p><b>[Ø]</b> Note to paragraph (a)(3)(i)(D):  For the purposes of this paragraph, the host employer need only provide information to contract employers that the host employer can obtain from its existing records through the exercise of reasonable diligence. This paragraph does not require the host employer to make inspections of worksite conditions to obtain this information.</p>



## 1910.269 Previous Final Rule

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	(a) (3) (ii)	Contract employers shall comply with the following requirements:
	(A)	The contract employer shall ensure that each of its employees is instructed in the hazardous conditions relevant to the employee's work that the contract employer is aware of as a result of information communicated to the contract employer by the host employer under paragraph (a)(3)(i) of this section.
	(B)	Before work begins, the contract employer shall advise the host employer of any unique hazardous conditions presented by the contract employer's work.
	(C)	The contract employer shall advise the host employer of any unanticipated hazardous conditions found during the contract employer's work that the host employer did not mention under paragraph (a)(3)(i) of this section. The contract employer shall provide this information to the host employer within 2 working days after discovering the hazardous condition.
	(iii)	The contract employer and the host employer shall coordinate their work rules and procedures so that each employee of the contract employer and the host employer is protected as required by this section.
(a)(3) "Existing conditions." Existing conditions related to the safety of the work to be performed shall be determined before work on or near electric lines or equipment is started. Such conditions include, but are not limited to, the nominal voltages of lines and equipment, the maximum switching transient voltages, the presence of hazardous induced voltages, the presence and condition of protective grounds and equipment grounding conductors, the condition of poles, environmental conditions relative to safety, and the locations of circuits and equipment, including power and communication lines and fire protective signaling circuits.	(4)	Existing characteristics and conditions. Existing characteristics and conditions of electric lines and equipment that are related to the safety of the work to be performed shall be determined before work on or near the lines or equipment is started. Such characteristics and conditions include, but are not limited to:
	(i)	The nominal voltages of lines and equipment,
	(ii)	The maximum switching-transient voltages,
	(iii)	The presence of hazardous induced voltages,
	(iv)	The presence of protective grounds and equipment grounding conductors,
	(v)	The locations of circuits and equipment, including electric supply lines, communication lines, and fire-protective signaling circuits,
	(vi)	The condition of protective grounds and equipment grounding conductors,



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(a) (4) (vii)	The condition of poles, and
(viii)	Environmental conditions relating to safety.

<b>1910.269(b)</b>	“Medical services and first aid.” The employer shall provide medical services and first aid as required in 1910.151 of this Part. In addition to the requirements of 1910.151 of this Part, the following requirements also apply:	<b>(b)</b>	Medical services and first aid. The employer shall provide medical services and first aid as required in § 1910.151. In addition to the requirements of § 1910.151, the following requirements also apply:
<b>(b)(1)</b>	“Cardiopulmonary resuscitation and first aid training.” When employees are performing work on or associated with exposed lines or equipment energized at 50 volts or more, persons trained in first aid including cardiopulmonary resuscitation (CPR) shall be available as follows:	<b>(1)</b>	First-aid training. When employees are performing work on, or associated with, exposed lines or equipment energized at 50 volts or more, persons with first-aid training shall be available as follows:
<b>(b)(1)(i)</b>	For field work involving two or more employees at a work location, at least two trained persons shall be available. However, only one trained person need be available if all new employees are trained in first aid, including CPR, within 3 months of their hiring dates.	<b>(i)</b>	For field work involving two or more employees at a work location, at least two trained persons shall be available. However, for line-clearance tree trimming operations performed by line-clearance tree trimmers who are not qualified employees, only one trained person need be available if all new employees are trained in first aid within 3 months of their hiring dates.
<b>(b)(1)(ii)</b>	For fixed work locations such as generating stations, the number of trained persons available shall be sufficient to ensure that each employee exposed to electric shock can be reached within 4 minutes by a trained person. However, where the existing number of employees is insufficient to meet this requirement (at a remote substation, for example), all employees at the work location shall be trained.	<b>(ii)</b>	For fixed work locations such as substations, the number of trained persons available shall be sufficient to ensure that each employee exposed to electric shock can be reached within 4 minutes by a trained person. However, where the existing number of employees is insufficient to meet this requirement (at a remote substation, for example), each employee at the work location shall be a trained employee.
<b>(b)(2)</b>	“First aid supplies.” First aid supplies required by 1910.151(b) of this Part shall be placed in weatherproof containers if the supplies could be exposed to the weather.	<b>(2)</b>	First-aid supplies. First-aid supplies required by § 1910.151(b) shall be placed in weatherproof containers if the supplies could be exposed to the weather.
<b>(b)(3)</b>	“First aid kits.” Each first aid kit shall be maintained, shall be readily available for use, and shall be inspected frequently enough to ensure that expended items are replaced but at least once per year.	<b>(3)</b>	First-aid kits. The employer shall maintain each first-aid kit, shall ensure that it is readily available for use, and shall inspect it frequently enough to ensure that expended items are replaced. The employer also shall inspect each first aid kit at least once per year.

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<p><b>1910.269(c)</b> “Job briefing.” The employer shall ensure that the employee in charge conducts a job briefing with the employees involved before they start each job. The briefing shall cover at least the following subjects: hazards associated with the job, work procedures involved, special precautions, energy source controls, and personal protective equipment requirements.</p>	<p><b>(c)</b> Job briefing.</p> <p><b>(1)</b> Before each job.</p> <p><b>(i)</b> In assigning an employee or a group of employees to perform a job, the employer shall provide the employee in charge of the job with all available information that relates to the determination of existing characteristics and conditions required by paragraph (a)(4) of this section.</p> <p><b>(ii)</b> The employer shall ensure that the employee in charge conducts a job briefing that meets paragraphs (c)(2), (c)(3), and (c)(4) of this section with the employees involved before they start each job.</p> <p><b>(2)</b> Subjects to be covered. The briefing shall cover at least the following subjects: hazards associated with the job, work procedures involved, special precautions, energy-source controls, and personal protective equipment requirements.</p>
<p><b>(c)(1)</b> “Number of briefings.” If the work or operations to be performed during the work day or shift are repetitive and similar, at least one job briefing shall be conducted before the start of the first job of each day or shift. Additional job briefings shall be held if significant changes, which might affect the safety of the employees, occur during the course of the work.</p>	<p><b>(3)</b> Number of briefings.</p> <p><b>(i)</b> If the work or operations to be performed during the work day or shift are repetitive and similar, at least one job briefing shall be conducted before the start of the first job of each day or shift.</p> <p><b>(ii)</b> Additional job briefings shall be held if significant changes, which might affect the safety of the employees, occur during the course of the work.</p>
<p><b>(c)(2)</b> “Extent of briefing.” A brief discussion is satisfactory if the work involved is routine and if the employee, by virtue of training and experience, can reasonably be expected to recognize and avoid the hazards involved in the job. A more extensive discussion shall be conducted:</p>	<p><b>(4)</b> Extent of briefing.</p> <p><b>(i)</b> A brief discussion is satisfactory if the work involved is routine and if the employees, by virtue of training and experience, can reasonably be expected to recognize and avoid the hazards involved in the job.</p> <p><b>(ii)</b> A more extensive discussion shall be conducted:</p>
<p><b>(c)(2)(i)</b> If the work is complicated or particularly hazardous, or</p>	<p><b>(A)</b> If the work is complicated or particularly hazardous, or</p>
<p><b>(c)(2)(ii)</b> If the employee cannot be expected to recognize and avoid the hazards involved in the job.</p>	<p><b>(B)</b> If the employee cannot be expected to recognize and avoid the hazards involved in the job.</p>
<p>Note: The briefing is always required to touch on all the subjects listed in the introductory text to paragraph (c) of this section.</p>	<p><b>[Ø]</b> Note to paragraph (c)(4): The briefing must address all the subjects listed in paragraph (c)(2) of this section.</p>

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<p>(c)(3) “Working alone.” An employee working alone need not conduct a job briefing. However, the employer shall ensure that the tasks to be performed are planned as if a briefing were required.</p>	<p><b>(c) (5)</b> Working alone. An employee working alone need not conduct a job briefing. However, the employer shall ensure that the tasks to be performed are planned as if a briefing were required.</p>
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<p><b>1910.269(d)</b> “Hazardous energy control (lockout/tagout) procedures.”</p>	<p><b>(d)</b> Hazardous energy control (lockout/tagout) procedures.</p>
<p>(d)(1) “Application.” The provisions of paragraph (d) of this section apply to the use of lockout/tagout procedures for the control of energy sources in installations for the purpose of electric power generation, including related equipment for communication or metering. Locking and tagging procedures for the deenergizing of electric energy sources which are used exclusively for purposes of transmission and distribution are addressed by paragraph (m) of this section.</p>	<p><b>(1)</b> Application. The provisions of paragraph (d) of this section apply to the use of lockout/tagout procedures for the control of energy sources in installations for the purpose of electric power generation, including related equipment for communication or metering. Locking and tagging procedures for the deenergizing of electric energy sources which are used exclusively for purposes of transmission and distribution are addressed by paragraph (m) of this section.</p>
<p>Note 1: Installations in electric power generation facilities that are not an integral part of, or inextricably commingled with, power generation processes or equipment are covered under 1910.147 and Subpart S of this Part.</p>	<p><b>[Ø]</b> Note to paragraph (d)(1): Installations in electric power generation facilities that are not an integral part of, or inextricably commingled with, power generation processes or equipment are covered under § 1910.147 and Subpart S of this part.</p>
<p>Note 2: Lockout and tagging procedures that comply with paragraphs (c) through (f) of 1910.147 of this Part will also be deemed to comply with paragraph (d) of this section if the procedures address the hazards covered by paragraph (d) of this section.</p>	<p><b>[Moved to end of (d)]</b></p>
<p>(d)(2) “General.”</p>	<p><b>(2)</b> General.</p>
<p>(d)(2)(i) The employer shall establish a program consisting of energy control procedures, employee training, and periodic inspections to ensure that, before any employee performs any servicing or maintenance on a machine or equipment where the unexpected energizing, start up, or release of stored energy could occur and cause injury, the machine or equipment is isolated from the energy source and rendered inoperative.</p>	<p><b>(i)</b> The employer shall establish a program consisting of energy control procedures, employee training, and periodic inspections to ensure that, before any employee performs any servicing or maintenance on a machine or equipment where the unexpected energizing, start up, or release of stored energy could occur and cause injury, the machine or equipment is isolated from the energy source and rendered inoperative.</p>
<p>(d)(2)(ii) The employer’s energy control program under paragraph (d)(2) of this section shall meet the following requirements:</p>	<p><b>(ii)</b> The employer's energy control program under paragraph (d)(2) of this section shall meet the following requirements:</p>

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(d)(2)(ii)(A) If an energy isolating device is not capable of being locked out, the employer's program shall use a tagout system.	(d) (2) (ii) (A) If an energy isolating device is not capable of being locked out, the employer's program shall use a tagout system.
(d)(2)(ii)(B) If an energy isolating device is capable of being locked out, the employer's program shall use lockout, unless the employer can demonstrate that the use of a tagout system will provide full employee protection as follows:	(B) If an energy isolating device is capable of being locked out, the employer's program shall use lockout, unless the employer can demonstrate that the use of a tagout system will provide full employee protection as follows:
(d)(2)(ii)(B)(1) When a tagout device is used on an energy isolating device which is capable of being locked out, the tagout device shall be attached at the same location that the lockout device would have been attached, and the employer shall demonstrate that the tagout program will provide a level of safety equivalent to that obtained by the use of a lockout program.	(1) When a tagout device is used on an energy isolating device which is capable of being locked out, the tagout device shall be attached at the same location that the lockout device would have been attached, and the employer shall demonstrate that the tagout program will provide a level of safety equivalent to that obtained by the use of a lockout program.
(d)(2)(ii)(B)(2) In demonstrating that a level of safety is achieved in the tagout program equivalent to the level of safety obtained by the use of a lockout program, the employer shall demonstrate full compliance with all tagout-related provisions of this standard together with such additional elements as are necessary to provide the equivalent safety available from the use of a lockout device. Additional means to be considered as part of the demonstration of full employee protection shall include the implementation of additional safety measures such as the removal of an isolating circuit element, blocking of a controlling switch, opening of an extra disconnecting device, or the removal of a valve handle to reduce the likelihood of inadvertent energizing.	(2) In demonstrating that a level of safety is achieved in the tagout program equivalent to the level of safety obtained by the use of a lockout program, the employer shall demonstrate full compliance with all tagout-related provisions of this standard together with such additional elements as are necessary to provide the equivalent safety available from the use of a lockout device. Additional means to be considered as part of the demonstration of full employee protection shall include the implementation of additional safety measures such as the removal of an isolating circuit element, blocking of a controlling switch, opening of an extra disconnecting device, or the removal of a valve handle to reduce the likelihood of inadvertent energizing.
(d)(2)(ii)(C) After November 1, 1994, whenever replacement or major repair, renovation, or modification of a machine or equipment is performed, and whenever new machines or equipment are installed, energy isolating devices for such machines or equipment shall be designed to accept a lockout device.	(C) After November 1, 1994, whenever replacement or major repair, renovation, or modification of a machine or equipment is performed, and whenever new machines or equipment are installed, energy isolating devices for such machines or equipment shall be designed to accept a lockout device.
(d)(2)(iii) Procedures shall be developed, documented, and used for the control of potentially hazardous energy covered by paragraph (d) of this section.	(iii) Procedures shall be developed, documented, and used for the control of potentially hazardous energy covered by paragraph (d) of this section.

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(d)(2)(iv)	The procedure shall clearly and specifically outline the scope, purpose, responsibility, authorization, rules, and techniques to be applied to the control of hazardous energy, and the measures to enforce compliance including, but not limited to, the following:	(d) (2) (iv)	The procedure shall clearly and specifically outline the scope, purpose, responsibility, authorization, rules, and techniques to be applied to the control of hazardous energy, and the measures to enforce compliance including, but not limited to, the following:
(d)(2)(iv)(A)	A specific statement of the intended use of this procedure;	(A)	A specific statement of the intended use of this procedure;
(d)(2)(iv)(B)	Specific procedural steps for shutting down, isolating, blocking and securing machines or equipment to control hazardous energy;	(B)	Specific procedural steps for shutting down, isolating, blocking and securing machines or equipment to control hazardous energy;
(d)(2)(iv)(C)	Specific procedural steps for the placement, removal, and transfer of lockout devices or tagout devices and the responsibility for them; and	(C)	Specific procedural steps for the placement, removal, and transfer of lockout devices or tagout devices and the responsibility for them; and
(d)(2)(iv)(D)	Specific requirements for testing a machine or equipment to determine and verify the effectiveness of lockout devices, tagout devices, and other energy control measures.	(D)	Specific requirements for testing a machine or equipment to determine and verify the effectiveness of lockout devices, tagout devices, and other energy control measures.
(d)(2)(v)	The employer shall conduct a periodic inspection of the energy control procedure at least annually to ensure that the procedure and the provisions of paragraph (d) of this section are being followed.	(v)	The employer shall conduct a periodic inspection of the energy control procedure at least annually to ensure that the procedure and the provisions of paragraph (d) of this section are being followed.
(d)(2)(v)(A)	The periodic inspection shall be performed by an authorized employee who is not using the energy control procedure being inspected.	(A)	The periodic inspection shall be performed by an authorized employee who is not using the energy control procedure being inspected.
(d)(2)(v)(B)	The periodic inspection shall be designed to identify and correct any deviations or inadequacies.	(B)	The periodic inspection shall be designed to identify and correct any deviations or inadequacies.
(d)(2)(v)(C)	If lockout is used for energy control, the periodic inspection shall include a review, between the inspector and each authorized employee, of that employee's responsibilities under the energy control procedure being inspected.	(C)	If lockout is used for energy control, the periodic inspection shall include a review, between the inspector and each authorized employee, of that employee's responsibilities under the energy control procedure being inspected.
(d)(2)(v)(D)	Where tagout is used for energy control, the periodic inspection shall include a review, between the inspector and each authorized and affected employee, of that employee's responsibilities under the energy control procedure being inspected, and the elements set forth in paragraph (d)(2)(vii) of this section.	(D)	Where tagout is used for energy control, the periodic inspection shall include a review, between the inspector and each authorized and affected employee, of that employee's responsibilities under the energy control procedure being inspected, and the elements set forth in paragraph (d)(2)(vii) of this section.

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(d)(2)(v)(E) The employer shall certify that the inspections required by paragraph (d)(2)(v) of this section have been accomplished. The certification shall identify the machine or equipment on which the energy control procedure was being used, the date of the inspection, the employees included in the inspection, and the person performing the inspection.	(d) (2) (v) (E) The employer shall certify that the inspections required by paragraph (d)(2)(v) of this section have been accomplished. The certification shall identify the machine or equipment on which the energy control procedure was being used, the date of the inspection, the employees included in the inspection, and the person performing the inspection.
Note: If normal work schedule and operation records demonstrate adequate inspection activity and contain the required information, no additional certification is required.	[Ø] Note to paragraph (d)(2)(v)(E): If normal work schedule and operation records demonstrate adequate inspection activity and contain the required information, no additional certification is required.
(d)(2)(vi) The employer shall provide training to ensure that the purpose and function of the energy control program are understood by employees and that the knowledge and skills required for the safe application, usage, and removal of energy controls are acquired by employees. The training shall include the following:	(vi) The employer shall provide training to ensure that the purpose and function of the energy control program are understood by employees and that the knowledge and skills required for the safe application, usage, and removal of energy controls are acquired by employees. The training shall include the following:
(d)(2)(vi)(A) Each authorized employee shall receive training in the recognition of applicable hazardous energy sources, the type and magnitude of energy available in the workplace, and in the methods and means necessary for energy isolation and control.	(A) Each authorized employee shall receive training in the recognition of applicable hazardous energy sources, the type and magnitude of energy available in the workplace, and in the methods and means necessary for energy isolation and control.
(d)(2)(vi)(B) Each affected employee shall be instructed in the purpose and use of the energy control procedure.	(B) Each affected employee shall be instructed in the purpose and use of the energy control procedure.
(d)(2)(vi)(C) All other employees whose work operations are or may be in an area where energy control procedures may be used shall be instructed about the procedures and about the prohibition relating to attempts to restart or reenergize machines or equipment that are locked out or tagged out.	(C) All other employees whose work operations are or may be in an area where energy control procedures may be used shall be instructed about the procedures and about the prohibition relating to attempts to restart or reenergize machines or equipment that are locked out or tagged out.
(d)(2)(vii) When tagout systems are used, employees shall also be trained in the following limitations of tags:	(vii) When tagout systems are used, employees shall also be trained in the following limitations of tags:
(d)(2)(vii)(A) Tags are essentially warning devices affixed to energy isolating devices and do not provide the physical restraint on those devices that is provided by a lock.	(A) Tags are essentially warning devices affixed to energy isolating devices and do not provide the physical restraint on those devices that is provided by a lock.
(d)(2)(vii)(B) When a tag is attached to an energy isolating means, it is not to be removed without authorization of the authorized person responsible for it, and it is never to be bypassed, ignored, or otherwise defeated.	(B) When a tag is attached to an energy isolating means, it is not to be removed without authorization of the authorized person responsible for it, and it is never to be bypassed, ignored, or otherwise defeated.

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(d)(2)(vii)(C) Tags must be legible and understandable by all authorized employees, affected employees, and all other employees whose work operations are or may be in the area, in order to be effective.	(d) (2) (vii) (C) Tags must be legible and understandable by all authorized employees, affected employees, and all other employees whose work operations are or may be in the area, in order to be effective.
(d)(2)(vii)(D) Tags and their means of attachment must be made of materials which will withstand the environmental conditions encountered in the workplace.	(D) Tags and their means of attachment must be made of materials which will withstand the environmental conditions encountered in the workplace.
(d)(2)(vii)(E) Tags may evoke a false sense of security, and their meaning needs to be understood as part of the overall energy control program.	(E) Tags may evoke a false sense of security, and their meaning needs to be understood as part of the overall energy control program.
(d)(2)(vii)(F) Tags must be securely attached to energy isolating devices so that they cannot be inadvertently or accidentally detached during use.	(F) Tags must be securely attached to energy isolating devices so that they cannot be inadvertently or accidentally detached during use.
(d)(2)(viii) Retraining shall be provided by the employer as follows:	(viii) Retraining shall be provided by the employer as follows:
(d)(2)(viii)(A) Retraining shall be provided for all authorized and affected employees whenever there is a change in their job assignments, a change in machines, equipment, or processes that present a new hazard or whenever there is a change in the energy control procedures.	(A) Retraining shall be provided for all authorized and affected employees whenever there is a change in their job assignments, a change in machines, equipment, or processes that present a new hazard or whenever there is a change in the energy control procedures.
(d)(2)(viii)(B) Retraining shall also be conducted whenever a periodic inspection under paragraph (d)(2)(v) of this section reveals, or whenever the employer has reason to believe, that there are deviations from or inadequacies in an employee's knowledge or use of the energy control procedures.	(B) Retraining shall also be conducted whenever a periodic inspection under paragraph (d)(2)(v) of this section reveals, or whenever the employer has reason to believe, that there are deviations from or inadequacies in an employee's knowledge or use of the energy control procedures.
(d)(2)(viii)(C) The retraining shall reestablish employee proficiency and shall introduce new or revised control methods and procedures, as necessary.	(C) The retraining shall reestablish employee proficiency and shall introduce new or revised control methods and procedures, as necessary.
(d)(2)(ix) The employer shall certify that employee training has been accomplished and is being kept up to date. The certification shall contain each employee's name and dates of training.	(ix) The employer shall certify that employee training has been accomplished and is being kept up to date. The certification shall contain each employee's name and dates of training.
(d)(3) "Protective materials and hardware."	(3) Protective materials and hardware.
(d)(3)(i) Locks, tags, chains, wedges, key blocks, adapter pins, self-locking fasteners, or other hardware shall be provided by the employer for isolating, securing, or blocking of machines or equipment from energy sources.	(i) Locks, tags, chains, wedges, key blocks, adapter pins, self-locking fasteners, or other hardware shall be provided by the employer for isolating, securing, or blocking of machines or equipment from energy sources.



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(d)(3)(ii) Lockout devices and tagout devices shall be singularly identified; shall be the only devices used for controlling energy; may not be used for other purposes; and shall meet the following requirements:	(d) (3) (ii) Lockout devices and tagout devices shall be singularly identified; shall be the only devices used for controlling energy; may not be used for other purposes; and shall meet the following requirements:
(d)(3)(ii)(A) Lockout devices and tagout devices shall be capable of withstanding the environment to which they are exposed for the maximum period of time that exposure is expected.	(A) Lockout devices and tagout devices shall be capable of withstanding the environment to which they are exposed for the maximum period of time that exposure is expected.
(d)(3)(ii)(A)(1) Tagout devices shall be constructed and printed so that exposure to weather conditions or wet and damp locations will not cause the tag to deteriorate or the message on the tag to become illegible.	(1) Tagout devices shall be constructed and printed so that exposure to weather conditions or wet and damp locations will not cause the tag to deteriorate or the message on the tag to become illegible.
(d)(3)(ii)(A)(2) Tagout devices shall be so constructed as not to deteriorate when used in corrosive environments.	(2) Tagout devices shall be so constructed as not to deteriorate when used in corrosive environments.
(d)(3)(ii)(B) Lockout devices and tagout devices shall be standardized within the facility in at least one of the following criteria: color, shape, size. Additionally, in the case of tagout devices, print and format shall be standardized.	(B) Lockout devices and tagout devices shall be standardized within the facility in at least one of the following criteria: color, shape, size. Additionally, in the case of tagout devices, print and format shall be standardized.
(d)(3)(ii)(C) Lockout devices shall be substantial enough to prevent removal without the use of excessive force or unusual techniques, such as with the use of bolt cutters or metal cutting tools.	(C) Lockout devices shall be substantial enough to prevent removal without the use of excessive force or unusual techniques, such as with the use of bolt cutters or metal cutting tools.
(d)(3)(ii)(D) Tagout devices, including their means of attachment, shall be substantial enough to prevent inadvertent or accidental removal. Tagout device attachment means shall be of a non-reusable type, attachable by hand, self-locking, and non-releasable with a minimum unlocking strength of no less than 50 pounds and shall have the general design and basic characteristics of being at least equivalent to a one-piece, all-environment-tolerant nylon cable tie.	(D) Tagout devices, including their means of attachment, shall be substantial enough to prevent inadvertent or accidental removal. Tagout device attachment means shall be of a non-reusable type, attachable by hand, self-locking, and nonreleasable with a minimum unlocking strength of no less than 50 pounds and shall have the general design and basic characteristics of being at least equivalent to a one-piece, all-environment-tolerant nylon cable tie.
(d)(3)(ii)(E) Each lockout device or tagout device shall include provisions for the identification of the employee applying the device.	(E) Each lockout device or tagout device shall include provisions for the identification of the employee applying the device.
(d)(3)(ii)(F) Tagout devices shall warn against hazardous conditions if the machine or equipment is energized and shall include a legend such as the following: Do Not Start, Do Not Open, Do Not Close, Do Not Energize, Do Not Operate.	(F) Tagout devices shall warn against hazardous conditions if the machine or equipment is energized and shall include a legend such as the following: Do Not Start, Do Not Open, Do Not Close, Do Not Energize, Do Not Operate.
Note: For specific provisions covering accident prevention tags, see 1910.145 of this Part.	[Ø] Note to paragraph (d)(3)(ii)(F): For specific provisions covering accident prevention tags, see § 1910.145.

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(d)(4) “Energy isolation.” Lockout and tagout device application and removal may only be performed by the authorized employees who are performing the servicing or maintenance.	(d) (4) Energy isolation. Lockout and tagout device application and removal may only be performed by the authorized employees who are performing the servicing or maintenance.
(d)(5) “Notification.” Affected employees shall be notified by the employer or authorized employee of the application and removal of lockout or tagout devices. Notification shall be given before the controls are applied and after they are removed from the machine or equipment.	(5) Notification. Affected employees shall be notified by the employer or authorized employee of the application and removal of lockout or tagout devices. Notification shall be given before the controls are applied and after they are removed from the machine or equipment.
Note: See also paragraph (d)(7) of this section, which requires that the second notification take place before the machine or equipment is reenergized.	[Ø] Note to paragraph (d)(5): See also paragraph (d)(7) of this section, which requires that the second notification take place before the machine or equipment is reenergized.
(d)(6) “Lockout/tagout application.” The established procedures for the application of energy control (the lockout or tagout procedures) shall include the following elements and actions, and these procedures shall be performed in the following sequence:	(6) Lockout/tagout application. The established procedures for the application of energy control (the lockout or tagout procedures) shall include the following elements and actions, and these procedures shall be performed in the following sequence:
(d)(6)(i) Before an authorized or affected employee turns off a machine or equipment, the authorized employee shall have knowledge of the type and magnitude of the energy, the hazards of the energy to be controlled, and the method or means to control the energy.	(i) Before an authorized or affected employee turns off a machine or equipment, the authorized employee shall have knowledge of the type and magnitude of the energy, the hazards of the energy to be controlled, and the method or means to control the energy.
(d)(6)(ii) The machine or equipment shall be turned off or shut down using the procedures established for the machine or equipment. An orderly shutdown shall be used to avoid any additional or increased hazards to employees as a result of the equipment stoppage.	(ii) The machine or equipment shall be turned off or shut down using the procedures established for the machine or equipment. An orderly shutdown shall be used to avoid any additional or increased hazards to employees as a result of the equipment stoppage.
(d)(6)(iii) All energy isolating devices that are needed to control the energy to the machine or equipment shall be physically located and operated in such a manner as to isolate the machine or equipment from energy sources.	(iii) All energy isolating devices that are needed to control the energy to the machine or equipment shall be physically located and operated in such a manner as to isolate the machine or equipment from energy sources.
(d)(6)(iv) Lockout or tagout devices shall be affixed to each energy isolating device by authorized employees.	(iv) Lockout or tagout devices shall be affixed to each energy isolating device by authorized employees.
(d)(6)(iv)(A) Lockout devices shall be attached in a manner that will hold the energy isolating devices in a “safe” or “off” position.	(A) Lockout devices shall be attached in a manner that will hold the energy isolating devices in a “safe” or “off” position.

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(d)(6)(iv)(B) Tagout devices shall be affixed in such a manner as will clearly indicate that the operation or movement of energy isolating devices from the “safe” or “off” position is prohibited.	(d) (6) (iv) (B) Tagout devices shall be affixed in such a manner as will clearly indicate that the operation or movement of energy isolating devices from the “safe” or “off” position is prohibited.
(d)(6)(iv)(B)(1) Where tagout devices are used with energy isolating devices designed with the capability of being locked out, the tag attachment shall be fastened at the same point at which the lock would have been attached.	(1) Where tagout devices are used with energy isolating devices designed with the capability of being locked out, the tag attachment shall be fastened at the same point at which the lock would have been attached.
(d)(6)(iv)(B)(2) Where a tag cannot be affixed directly to the energy isolating device, the tag shall be located as close as safely possible to the device, in a position that will be immediately obvious to anyone attempting to operate the device.	(2) Where a tag cannot be affixed directly to the energy isolating device, the tag shall be located as close as safely possible to the device, in a position that will be immediately obvious to anyone attempting to operate the device.
(d)(6)(v) Following the application of lockout or tagout devices to energy isolating devices, all potentially hazardous stored or residual energy shall be relieved, disconnected, restrained, or otherwise rendered safe.	(v) Following the application of lockout or tagout devices to energy isolating devices, all potentially hazardous stored or residual energy shall be relieved, disconnected, restrained, or otherwise rendered safe.
(d)(6)(vi) If there is a possibility of reaccumulation of stored energy to a hazardous level, verification of isolation shall be continued until the servicing or maintenance is completed or until the possibility of such accumulation no longer exists.	(vi) If there is a possibility of reaccumulation of stored energy to a hazardous level, verification of isolation shall be continued until the servicing or maintenance is completed or until the possibility of such accumulation no longer exists.
(d)(6)(vii) Before starting work on machines or equipment that have been locked out or tagged out, the authorized employee shall verify that isolation and deenergizing of the machine or equipment have been accomplished. If normally energized parts will be exposed to contact by an employee while the machine or equipment is deenergized, a test shall be performed to ensure that these parts are deenergized.	(vii) Before starting work on machines or equipment that have been locked out or tagged out, the authorized employee shall verify that isolation and deenergizing of the machine or equipment have been accomplished. If normally energized parts will be exposed to contact by an employee while the machine or equipment is deenergized, a test shall be performed to ensure that these parts are deenergized.
(d)(7) “Release from lockout/tagout.” Before lockout or tagout devices are removed and energy is restored to the machine or equipment, procedures shall be followed and actions taken by the authorized employees to ensure the following:	(7) Release from lockout/tagout. Before lockout or tagout devices are removed and energy is restored to the machine or equipment, procedures shall be followed and actions taken by the authorized employees to ensure the following:
(d)(7)(i) The work area shall be inspected to ensure that nonessential items have been removed and that machine or equipment components are operationally intact.	(i) The work area shall be inspected to ensure that nonessential items have been removed and that machine or equipment components are operationally intact.
(d)(7)(ii) The work area shall be checked to ensure that all employees have been safely positioned or removed.	(ii) The work area shall be checked to ensure that all employees have been safely positioned or removed.

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(d)(7)(iii) After lockout or tagout devices have been removed and before a machine or equipment is started, affected employees shall be notified that the lockout or tagout devices have been removed.	(d) (7) (iii) After lockout or tagout devices have been removed and before a machine or equipment is started, affected employees shall be notified that the lockout or tagout devices have been removed.
(d)(7)(iv) Each lockout or tagout device shall be removed from each energy isolating device by the authorized employee who applied the lockout or tagout device. However, if that employee is not available to remove it, the device may be removed under the direction of the employer, provided that specific procedures and training for such removal have been developed, documented, and incorporated into the employer's energy control program. The employer shall demonstrate that the specific procedure provides a degree of safety equivalent to that provided by the removal of the device by the authorized employee who applied it. The specific procedure shall include at least the following elements:	(iv) Each lockout or tagout device shall be removed from each energy isolating device by the authorized employee who applied the lockout or tagout device. However, if that employee is not available to remove it, the device may be removed under the direction of the employer, provided that specific procedures and training for such removal have been developed, documented, and incorporated into the employer's energy control program. The employer shall demonstrate that the specific procedure provides a degree of safety equivalent to that provided by the removal of the device by the authorized employee who applied it. The specific procedure shall include at least the following elements:
(d)(7)(iv)(A) Verification by the employer that the authorized employee who applied the device is not at the facility;	(A) Verification by the employer that the authorized employee who applied the device is not at the facility;
(d)(7)(iv)(B) Making all reasonable efforts to contact the authorized employee to inform him or her that his or her lockout or tagout device has been removed; and	(B) Making all reasonable efforts to contact the authorized employee to inform him or her that his or her lockout or tagout device has been removed; and
(d)(7)(iv)(C) Ensuring that the authorized employee has this knowledge before he or she resumes work at that facility.	(C) Ensuring that the authorized employee has this knowledge before he or she resumes work at that facility.
(d)(8) "Additional requirements."	(8) Additional requirements.
(d)(8)(i) If the lockout or tagout devices must be temporarily removed from energy isolating devices and the machine or equipment must be energized to test or position the machine, equipment, or component thereof, the following sequence of actions shall be followed:	(i) If the lockout or tagout devices must be temporarily removed from energy isolating devices and the machine or equipment must be energized to test or position the machine, equipment, or component thereof, the following sequence of actions shall be followed:
(d)(8)(i)(A) Clear the machine or equipment of tools and materials in accordance with paragraph (d)(7)(i) of this section;	(A) Clear the machine or equipment of tools and materials in accordance with paragraph (d)(7)(i) of this section;
(d)(8)(i)(B) Remove employees from the machine or equipment area in accordance with paragraphs (d)(7)(ii) and (d)(7)(iii) of this section;	(B) Remove employees from the machine or equipment area in accordance with paragraphs (d)(7)(ii) and (d)(7)(iii) of this section;
(d)(8)(i)(C) Remove the lockout or tagout devices as specified in paragraph (d)(7)(iv) of this section;	(C) Remove the lockout or tagout devices as specified in paragraph (d)(7)(iv) of this section;
(d)(8)(i)(D) Energize and proceed with the testing or positioning; and	(D) Energize and proceed with the testing or positioning; and

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(d)(8)(i)(E) Deenergize all systems and reapply energy control measures in accordance with paragraph (d)(6) of this section to continue the servicing or maintenance.	(d) (8) (i) (E) Deenergize all systems and reapply energy control measures in accordance with paragraph (d)(6) of this section to continue the servicing or maintenance.
(d)(8)(ii) When servicing or maintenance is performed by a crew, craft, department, or other group, they shall use a procedure which affords the employees a level of protection equivalent to that provided by the implementation of a personal lockout or tagout device. Group lockout or tagout devices shall be used in accordance with the procedures required by paragraphs (d)(2)(iii) and (d)(2)(iv) of this section including, but not limited to, the following specific requirements:	(ii) When servicing or maintenance is performed by a crew, craft, department, or other group, they shall use a procedure which affords the employees a level of protection equivalent to that provided by the implementation of a personal lockout or tagout device. Group lockout or tagout devices shall be used in accordance with the procedures required by paragraphs (d)(2)(iii) and (d)(2)(iv) of this section including, but not limited to, the following specific requirements:
(d)(8)(ii)(A) Primary responsibility shall be vested in an authorized employee for a set number of employees working under the protection of a group lockout or tagout device (such as an operations lock);	(A) Primary responsibility shall be vested in an authorized employee for a set number of employees working under the protection of a group lockout or tagout device (such as an operations lock);
(d)(8)(ii)(B) Provision shall be made for the authorized employee to ascertain the exposure status of all individual group members with regard to the lockout or tagout of the machine or equipment;	(B) Provision shall be made for the authorized employee to ascertain the exposure status of all individual group members with regard to the lockout or tagout of the machine or equipment;
(d)(8)(ii)(C) When more than one crew, craft, department, or other group is involved, assignment of overall job-associated lockout or tagout control responsibility shall be given to an authorized employee designated to coordinate affected work forces and ensure continuity of protection; and	(C) When more than one crew, craft, department, or other group is involved, assignment of overall job-associated lockout or tagout control responsibility shall be given to an authorized employee designated to coordinate affected work forces and ensure continuity of protection; and
(d)(8)(ii)(D) Each authorized employee shall affix a personal lockout or tagout device to the group lockout device, group lockbox, or comparable mechanism when he or she begins work and shall remove those devices when he or she stops working on the machine or equipment being serviced or maintained.	(D) Each authorized employee shall affix a personal lockout or tagout device to the group lockout device, group lockbox, or comparable mechanism when he or she begins work and shall remove those devices when he or she stops working on the machine or equipment being serviced or maintained.
(d)(8)(iii) Procedures shall be used during shift or personnel changes to ensure the continuity of lockout or tagout protection, including provision for the orderly transfer of lockout or tagout device protection between off-going and on-coming employees, to minimize their exposure to hazards from the unexpected energizing or start-up of the machine or equipment or from the release of stored energy.	(iii) Procedures shall be used during shift or personnel changes to ensure the continuity of lockout or tagout protection, including provision for the orderly transfer of lockout or tagout device protection between off-going and on-coming employees, to minimize their exposure to hazards from the unexpected energizing or start-up of the machine or equipment or from the release of stored energy.

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(d)(8)(iv) Whenever outside servicing personnel are to be engaged in activities covered by paragraph (d) of this section, the on-site employer and the outside employer shall inform each other of their respective lockout or tagout procedures, and each employer shall ensure that his or her personnel understand and comply with restrictions and prohibitions of the energy control procedures being used.	(d) (8) (iv) Whenever outside servicing personnel are to be engaged in activities covered by paragraph (d) of this section, the on-site employer and the outside employer shall inform each other of their respective lockout or tagout procedures, and each employer shall ensure that his or her personnel understand and comply with restrictions and prohibitions of the energy control procedures being used.
(d)(8)(v) If energy isolating devices are installed in a central location and are under the exclusive control of a system operator, the following requirements apply:	(v) If energy isolating devices are installed in a central location and are under the exclusive control of a system operator, the following requirements apply:
(d)(8)(v)(A) The employer shall use a procedure that affords employees a level of protection equivalent to that provided by the implementation of a personal lockout or tagout device.	(A) The employer shall use a procedure that affords employees a level of protection equivalent to that provided by the implementation of a personal lockout or tagout device.
(d)(8)(v)(B) The system operator shall place and remove lockout and tagout devices in place of the authorized employee under paragraphs (d)(4), (d)(6)(iv), and (d)(7)(iv) of this section.	(B) The system operator shall place and remove lockout and tagout devices in place of the authorized employee under paragraphs (d)(4), (d)(6)(iv), and (d)(7)(iv) of this section.
(d)(8)(v)(C) Provisions shall be made to identify the authorized employee who is responsible for (that is, being protected by) the lockout or tagout device, to transfer responsibility for lockout and tagout devices, and to ensure that an authorized employee requesting removal or transfer of a lockout or tagout device is the one responsible for it before the device is removed or transferred.	(C) Provisions shall be made to identify the authorized employee who is responsible for (that is, being protected by) the lockout or tagout device, to transfer responsibility for lockout and tagout devices, and to ensure that an authorized employee requesting removal or transfer of a lockout or tagout device is the one responsible for it before the device is removed or transferred.
	[Ø] <b>Note to paragraph (d):</b> Lockout and tagging procedures that comply with paragraphs (c) through (f) of § 1910.147 will also be deemed to comply with paragraph (d) of this section if the procedures address the hazards covered by paragraph (d) of this section.

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<p><b>1910.269(e)</b> “Enclosed spaces.” This paragraph covers enclosed spaces that may be entered by employees. It does not apply to vented vaults if a determination is made that the ventilation system is operating to protect employees before they enter the space. This paragraph applies to routine entry into enclosed spaces in lieu of the permit-space entry requirements contained in paragraphs (d) through (k) of 1910.146 of this Part. If, after the precautions given in paragraphs (e) and (t) of this section are taken, the hazards remaining in the enclosed space endanger the life of an entrant or could interfere with escape from the space, then entry into the enclosed space shall meet the permit-space entry requirements of paragraphs (d) through (k) of 1910.146 of this Part.</p>	<p><b>(e)</b> Enclosed spaces. This paragraph covers enclosed spaces that may be entered by employees. It does not apply to vented vaults if the employer makes a determination that the ventilation system is operating to protect employees before they enter the space. This paragraph applies to routine entry into enclosed spaces in lieu of the permit-space entry requirements contained in paragraphs (d) through (k) of § 1910.146. If, after the employer takes the precautions given in paragraphs (e) and (t) of this section, the hazards remaining in the enclosed space endanger the life of an entrant or could interfere with an entrant's escape from the space, then entry into the enclosed space shall meet the permit-space entry requirements of paragraphs (d) through (k) of § 1910.146.</p>
<p>Note: Entries into enclosed spaces conducted in accordance with the permit-space entry requirements of paragraphs (d) through (k) of 1910.146 of this Part are considered as complying with paragraph (e) of this section.</p>	<p><i>[Moved to end of (e) section]</i></p>
<p><b>(e)(1)</b> “Safe work practices.” The employer shall ensure the use of safe work practices for entry into and work in enclosed spaces and for rescue of employees from such spaces.</p>	<p><b>(1)</b> Safe work practices. The employer shall ensure the use of safe work practices for entry into, and work in, enclosed spaces and for rescue of employees from such spaces.</p>
<p><b>(e)(2)</b> “Training.” Employees who enter enclosed spaces or who serve as attendants shall be trained in the hazards of enclosed space entry, in enclosed space entry procedures, and in enclosed space rescue procedures.</p>	<p><b>(2)</b> Training. Each employee who enters an enclosed space or who serves as an attendant shall be trained in the hazards of enclosed-space entry, in enclosed-space entry procedures, and in enclosed-space rescue procedures.</p>
<p><b>(e)(3)</b> “Rescue equipment.” Employers shall provide equipment to ensure the prompt and safe rescue of employees from the enclosed space.</p>	<p><b>(3)</b> Rescue equipment. Employers shall provide equipment to ensure the prompt and safe rescue of employees from the enclosed space.</p>
<p><b>(e)(4)</b> “Evaluation of potential hazards.” Before any entrance cover to an enclosed space is removed, the employer shall determine whether it is safe to do so by checking for the presence of any atmospheric pressure or temperature differences and by evaluating whether there might be a hazardous atmosphere in the space. Any conditions making it unsafe to remove the cover shall be eliminated before the cover is removed.</p>	<p><b>(4)</b> Evaluating potential hazards. Before any entrance cover to an enclosed space is removed, the employer shall determine whether it is safe to do so by checking for the presence of any atmospheric pressure or temperature differences and by evaluating whether there might be a hazardous atmosphere in the space. Any conditions making it unsafe to remove the cover shall be eliminated before the cover is removed.</p>



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<p>Note: The evaluation called for in this paragraph may take the form of a check of the conditions expected to be in the enclosed space. For example, the cover could be checked to see if it is hot and, if it is fastened in place, could be loosened gradually to release any residual pressure. A determination must also be made of whether conditions at the site could cause a hazardous atmosphere, such as an oxygen deficient or flammable atmosphere, to develop within the space.</p>	<p>[Ø] Note to paragraph (e)(4): The determination called for in this paragraph may consist of a check of the conditions that might foreseeably be in the enclosed space. For example, the cover could be checked to see if it is hot and, if it is fastened in place, could be loosened gradually to release any residual pressure. An evaluation also needs to be made of whether conditions at the site could cause a hazardous atmosphere, such as an oxygen-deficient or flammable atmosphere, to develop within the space.</p>
<p>(e)(5) "Removal of covers." When covers are removed from enclosed spaces, the opening shall be promptly guarded by a railing, temporary cover, or other barrier intended to prevent an accidental fall through the opening and to protect employees working in the space from objects entering the space.</p>	<p>(e) (5) Removing covers. When covers are removed from enclosed spaces, the opening shall be promptly guarded by a railing, temporary cover, or other barrier designed to prevent an accidental fall through the opening and to protect employees working in the space from objects entering the space.</p>
<p>(e)(6) "Hazardous atmosphere." Employees may not enter any enclosed space while it contains a hazardous atmosphere, unless the entry conforms to the generic permit-required confined spaces standard in 1910.146 of this Part.</p>	<p>(6) Hazardous atmosphere. Employees may not enter any enclosed space while it contains a hazardous atmosphere, unless the entry conforms to the permit-required confined spaces standard in § 1910.146.</p>
<p>Note: The term "entry" is defined in 1910.146(b) of this Part.</p>	<p>[definition added to .269(x)]</p>
<p>(e)(7) "Attendants." While work is being performed in the enclosed space, a person with first aid training meeting paragraph (b) of this section shall be immediately available outside the enclosed space to render emergency assistance if there is reason to believe that a hazard may exist in the space or if a hazard exists because of traffic patterns in the area of the opening used for entry. That person is not precluded from performing other duties outside the enclosed space if these duties do not distract the attendant from monitoring employees within the space.</p>	<p>(7) Attendants. While work is being performed in the enclosed space, an attendant with first-aid training shall be immediately available outside the enclosed space to provide assistance if a hazard exists because of traffic patterns in the area of the opening used for entry. The attendant is not precluded from performing other duties outside the enclosed space if these duties do not distract the attendant from: monitoring employees within the space or ensuring that it is safe for employees to enter and exit the space.</p>
<p>Note: See paragraph (t)(3) of this section for additional requirements on attendants for work in manholes.</p>	<p>[Ø] Note to paragraph (e)(7): See paragraph (t) of this section for additional requirements on attendants for work in manholes and vaults.</p>
<p>(e)(8) "Calibration of test instruments." Test instruments used to monitor atmospheres in enclosed spaces shall be kept in calibration, with a minimum accuracy of + or - 10 percent.</p>	<p>(8) Calibration of test instruments. Test instruments used to monitor atmospheres in enclosed spaces shall be kept in calibration and shall have a minimum accuracy of ±10 percent.</p>

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(e)(9) “Testing for oxygen deficiency.” Before an employee enters an enclosed space, the internal atmosphere shall be tested for oxygen deficiency with a direct-reading meter or similar instrument, capable of collection and immediate analysis of data samples without the need for off-site evaluation. If continuous forced air ventilation is provided, testing is not required provided that the procedures used ensure that employees are not exposed to the hazards posed by oxygen deficiency.	(e) (9) Testing for oxygen deficiency. Before an employee enters an enclosed space, <b>the atmosphere in the enclosed space</b> shall be tested for oxygen deficiency with a direct-reading meter or similar instrument, capable of collection and immediate analysis of data samples without the need for off-site evaluation. If continuous forced-air ventilation is provided, testing is not required provided that the procedures used ensure that employees are not exposed to the hazards posed by oxygen deficiency.
(e)(10) “Testing for flammable gases and vapors.” Before an employee enters an enclosed space, the internal atmosphere shall be tested for flammable gases and vapors with a direct-reading meter or similar instrument capable of collection and immediate analysis of data samples without the need for off-site evaluation. This test shall be performed after the oxygen testing and ventilation required by paragraph (e)(9) of this section demonstrate that there is sufficient oxygen to ensure the accuracy of the test for flammability.	(10) Testing for flammable gases and vapors. Before an employee enters an enclosed space, the internal atmosphere shall be tested for flammable gases and vapors with a direct-reading meter or similar instrument capable of collection and immediate analysis of data samples without the need for off-site evaluation. This test shall be performed after the oxygen testing and ventilation required by paragraph (e)(9) of this section demonstrate that there is sufficient oxygen to ensure the accuracy of the test for flammability.
(e)(11) “Ventilation and monitoring.” If flammable gases or vapors are detected or if an oxygen deficiency is found, forced air ventilation shall be used to maintain oxygen at a safe level and to prevent a hazardous concentration of flammable gases and vapors from accumulating. A continuous monitoring program to ensure that no increase in flammable gas or vapor concentration occurs may be followed in lieu of ventilation, if flammable gases or vapors are detected at safe levels.	(11) Ventilation, and monitoring <b>for flammable gases or vapors.</b> If flammable gases or vapors are detected or if an oxygen deficiency is found, forced-air ventilation shall be used to maintain oxygen at a safe level and to prevent a hazardous concentration of flammable gases and vapors from accumulating. A continuous monitoring program to ensure that no increase in flammable gas or vapor concentration above safe levels occurs may be followed in lieu of ventilation if flammable gases or vapors are <b>initially</b> detected at safe levels.
Note: See the definition of hazardous atmosphere for guidance in determining whether or not a given concentration of a substance is considered to be hazardous.	[Ø] Note to paragraph (e)(11): See the definition of “hazardous atmosphere” for guidance in determining whether <b>a specific concentration of a substance is hazardous.</b>

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<p>(e)(12) “Specific ventilation requirements.” If continuous forced air ventilation is used, it shall begin before entry is made and shall be maintained long enough <b>to ensure</b> that a safe atmosphere exists before employees are allowed to enter the work area. The forced air ventilation shall be so directed as to ventilate the immediate area where employees are present within the enclosed space and shall continue until all employees leave the enclosed space.</p>	<p>(e) (12) Specific ventilation requirements. If continuous forced-air ventilation is used, it shall begin before entry is made and shall be maintained long enough <b>for the employer to be able to demonstrate</b> that a safe atmosphere exists before employees are allowed to enter the work area. The forced-air ventilation shall be so directed as to ventilate the immediate area where employees are present within the enclosed space and shall continue until all employees leave the enclosed space.</p>
<p>(e)(13) “Air supply.” The air supply for the continuous forced air ventilation shall be from a clean source and may not increase the hazards in the enclosed space.</p>	<p>(13) Air supply. The air supply for the continuous forced-air ventilation shall be from a clean source and may not increase the hazards in the enclosed space.</p>
<p>(e)(14) “Open flames.” If open flames are used in enclosed spaces, a test for flammable gases and vapors shall be made immediately before the open flame device is used and at least once per hour while the device is used in the space. Testing shall be conducted more frequently if conditions present in the enclosed space indicate that once per hour is insufficient to detect hazardous accumulations of flammable gases or vapors.</p>	<p>(14) Open flames. If open flames are used in enclosed spaces, a test for flammable gases and vapors shall be made immediately before the open flame device is used and at least once per hour while the device is used in the space. Testing shall be conducted more frequently if conditions present in the enclosed space indicate that once per hour is insufficient to detect hazardous accumulations of flammable gases or vapors.</p>
<p>Note: See the definition of hazardous atmosphere for guidance in determining whether or not a given concentration of a substance is considered to be hazardous.</p>	<p>[Ø] Note to paragraph (e)(14): See the definition of “hazardous atmosphere” for guidance in determining whether a <b>specific concentration of a substance is hazardous.</b></p>
	<p>[Ø] Note to paragraph (e): Entries into enclosed spaces conducted in accordance with the permit-space entry requirements of paragraphs (d) through (k) of § 1910.146 are considered as complying with paragraph (e) of this section.</p>
<p><b>1910.269(f)</b> “Excavations.” Excavation operations shall comply with Subpart P of Part 1926 of this chapter.</p>	<p>(f) Excavations. Excavation operations shall comply with Subpart P of Part 1926 of this chapter.</p>

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<b>1910.269(g)</b>	“Personal protective equipment.”	<b>(g)</b>	Personal protective equipment.
<b>(g)(1)</b>	“General.” Personal protective equipment shall meet the requirements of Subpart I of this Part.	<b>(1)</b>	General. Personal protective equipment shall meet the requirements of Subpart I of this part.
		<b>[Ø]</b>	Note to paragraph (g)(1) of this section: Paragraph (h) of § 1910.132 sets employer payment obligations for the personal protective equipment required by this section, including, but not limited to, the fall protection equipment required by paragraph (g)(2) of this section, the electrical protective equipment required by paragraph (l)(3) of this section, and the flame-resistant and arc-rated clothing and other protective equipment required by paragraph (l)(8) of this section.
<b>(g)(2)</b>	“Fall protection.”	<b>(g) (2)</b>	Fall protection.
<b>(g)(2)(i)</b>	Personal fall arrest equipment shall meet the requirements of Subpart M of Part 1926 of this Chapter.	<b>(i)</b>	Personal fall arrest systems shall meet the requirements of Subpart M of Part 1926 of this chapter.
		<b>(ii)</b>	Personal fall arrest equipment used by employees who are exposed to hazards from flames or electric arcs, as determined by the employer under paragraph (l)(8)(i) of this section, shall be capable of passing a drop test equivalent to that required by paragraph (g)(2)(iii)(L) of this section after exposure to an electric arc with a heat energy of 40±5 cal/cm <sup>2</sup> .
<b>(g)(2)(ii)</b>	Body belts and safety straps for work positioning shall meet the requirements of 1926.959 of this Chapter.	<b>(iii)</b>	Body belts and positioning straps for work-positioning equipment shall meet the following requirements:
		<b>(A)</b>	Hardware for body belts and positioning straps shall meet the following requirements:
		<b>(1)</b>	Hardware shall be made of drop-forged steel, pressed steel, formed steel, or equivalent material.
		<b>(2)</b>	Hardware shall have a corrosion-resistant finish.
		<b>(3)</b>	Hardware surfaces shall be smooth and free of sharp edges.
		<b>(B)</b>	Buckles shall be capable of withstanding an 8.9-kilonewton (2,000-pound-force) tension test with a maximum permanent deformation no greater than 0.4 millimeters (0.0156 inches).
		<b>(g) (2) (iii) (C)</b>	D rings shall be capable of withstanding a 22-kilonewton (5,000-pound-force) tensile test without cracking or breaking.

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	(g) (2) (iii) (D)	Snaphooks shall be capable of withstanding a 22-kilonewton (5,000-pound-force) tension test without failure.
	[Ø]	Note to paragraph (g)(2)(iii)(D): Distortion of the snaphook sufficient to release the keeper is considered to be tensile failure of a snaphook.
	(E)	Top grain leather or leather substitute may be used in the manufacture of body belts and positioning straps; however, leather and leather substitutes may not be used alone as a load-bearing component of the assembly.
	(F)	Plied fabric used in positioning straps and in load-bearing parts of body belts shall be constructed in such a way that no raw edges are exposed and the plies do not separate.
	(G)	Positioning straps shall be capable of withstanding the following tests:
	(1)	A dielectric test of 819.7 volts, AC, per centimeter (25,000 volts per foot) for 3 minutes without visible deterioration;
	(2)	A leakage test of 98.4 volts, AC, per centimeter (3,000 volts per foot) with a leakage current of no more than 1 mA;
	[Ø]	Note to paragraphs (g)(2)(iii)(G)(1) and (g)(2)(iii)(G)(2): Positioning straps that pass direct-current tests at equivalent voltages are considered as meeting this requirement.
	(3)	Tension tests of 20 kilonewtons (4,500 pounds-force) for sections free of buckle holes and of 15 kilonewtons (3,500 pounds-force) for sections with buckle holes;
	(4)	A buckle-tear test with a load of 4.4 kilonewtons (1,000 pounds-force); and
	(5)	A flammability test in accordance with Table R-2.

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Table R-2—Flammability Test

Test method	Criteria for passing the test
Vertically suspend a 500-mm (19.7-inch) length of strapping supporting a 100-kg (220.5-lb) weight. Use a butane or propane burner with a 76-mm (3-inch) flame. Direct the flame to an edge of the strapping at a distance of 25 mm (1 inch). Remove the flame after 5 seconds. Wait for any flames on the positioning strap to stop burning.	Any flames on the positioning strap shall self extinguish. The positioning strap shall continue to support the 100-kg (220.5-lb) mass.

	(g) (2) (iii) (H)	The cushion part of the body belt shall contain no exposed rivets on the inside and shall be at least 76 millimeters (3 inches) in width.
	(I)	Tool loops shall be situated on the body of a body belt so that the 100 millimeters (4 inches) of the body belt that is in the center of the back, measuring from D ring to D ring, is free of tool loops and any other attachments.
	(J)	Copper, steel, or equivalent liners shall be used around the bars of D rings to prevent wear between these members and the leather or fabric enclosing them.
	(K)	Snaphooks shall be of the locking type meeting the following requirements:
	(1)	The locking mechanism shall first be released, or a destructive force shall be placed on the keeper, before the keeper will open.
	(2)	A force in the range of 6.7 N (1.5 lbf) to 17.8 N (4 lbf) shall be required to release the locking mechanism.
	(3)	With the locking mechanism released and with a force applied on the keeper against the face of the nose, the keeper may not begin to open with a force of 11.2 N (2.5 lbf) or less and shall begin to open with a maximum force of 17.8 N (4 lbf).
	(L)	Body belts and positioning straps shall be capable of withstanding a drop test as follows:

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	(g) (2) (iii) (L) (1) The test mass shall be rigidly constructed of steel or equivalent material with a mass of 100 kg (220.5 lbm). For work-positioning equipment used by employees weighing more than 140 kg (310 lbm) fully equipped, the test mass shall be increased proportionately (that is, the test mass must equal the mass of the equipped worker divided by 1.4).
	(2) For body belts, the body belt shall be fitted snugly around the test mass and shall be attached to the test-structure anchorage point by means of a wire rope.
	(3) For positioning straps, the strap shall be adjusted to its shortest length possible to accommodate the test and connected to the test-structure anchorage point at one end and to the test mass on the other end.
	(4) The test mass shall be dropped an unobstructed distance of 1 meter (39.4 inches) from a supporting structure that will sustain minimal deflection during the test.
	(5) Body belts shall successfully arrest the fall of the test mass and shall be capable of supporting the mass after the test.
	(6) Positioning straps shall successfully arrest the fall of the test mass without breaking, and the arrest force may not exceed 17.8 kilonewtons (4,000 pounds-force). Additionally, snaphooks on positioning straps may not distort to such an extent that the keeper would release.
	[Ø] Note to paragraph (g)(2)(iii) of this section: When used by employees weighing no more than 140 kg (310 lbm) fully equipped, body belts and positioning straps that conform to American Society of Testing and Materials Standard Specifications for Personal Climbing Equipment, ASTM F887-12 <sup>e1</sup> , are deemed to be in compliance with paragraph (g)(2)(iii) of this section.
(g)(2)(iii) Body belts, safety straps, lanyards, lifelines, and body harnesses shall be inspected before use each day to determine that the equipment is in safe working condition. Defective equipment may not be used.	(iv) The following requirements apply to the care and use of personal fall protection equipment.
	(A) Work-positioning equipment shall be inspected before use each day to determine that the equipment is in safe working condition. Work-positioning equipment that is not in safe working condition may not be used.



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		[Ø]	Note to paragraph (g)(2)(iv)(A): Appendix F to this section contains guidelines for inspecting work-positioning equipment.
(g)(2)(iv)	Lifelines shall be protected against being cut or abraded.		
		(g) (2) (iv) (B)	Personal fall arrest systems shall be used in accordance with § 1926.502(d).
		[Ø]	Note to paragraph (g)(2)(iv)(B): Fall protection equipment rigged to arrest falls is considered a fall arrest system and must meet the applicable requirements for the design and use of those systems. Fall protection equipment rigged for work positioning is considered work-positioning equipment and must meet the applicable requirements for the design and use of that equipment.
(g)(2)(v)	Fall arrest equipment, work positioning equipment, or travel restricting equipment shall be used by employees working at elevated locations more than 4 feet (1.2 m) above the ground on poles, towers, or similar structures if other fall protection has not been provided. Fall protection equipment is not required to be used by a qualified employee climbing or changing location on poles, towers, or similar structures, unless conditions, such as, but not limited to, ice, high winds, the design of the structure (for example, no provision for holding on with hands), or the presence of contaminants on the structure, could cause the employee to lose his or her grip or footing.	(c)	The employer shall ensure that employees use fall protection systems as follows:
		(1)	Each employee working from an aerial lift shall use a fall restraint system or a personal fall arrest system. Paragraph (c)(2)(v) of § 1910.67 does not apply.
		(2)	Except as provided in paragraph (g)(2)(iv)(C)(3) of this section, each employee in elevated locations more than 1.2 meters (4 feet) above the ground on poles, towers, or similar structures shall use a personal fall arrest system, work-positioning equipment, or fall restraint system, as appropriate, if the employer has not provided other fall protection meeting Subpart D of this part.
		(3)	Until March 31, 2015, a qualified employee climbing or changing location on poles, towers, or similar structures need not use fall protection equipment, unless conditions, such as, but not limited to, ice, high winds, the design of the structure (for example, no provision for holding on with hands), or the presence of contaminants on the structure, could cause the employee to lose his or her grip or footing. On and after April 1, 2015, each qualified employee climbing or changing location on poles, towers, or similar structures must use fall protection equipment unless the employer can demonstrate that climbing or changing location with fall protection is infeasible or creates a greater hazard than climbing or changing location without it.

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<p>Note 1: This paragraph applies to structures that support overhead electric power generation, transmission, and distribution lines and equipment. It does not apply to portions of buildings, such as loading docks, to electric equipment, such as transformers and capacitors, <del>nor to aerial lifts.</del> Requirements for fall protection associated with walking and working surfaces are contained in Subpart D of this Part; <del>requirements for fall protection associated with aerial lifts are contained in 1910.67 of this Part.</del></p>	<p><b>[Ø]</b> Note 1 to paragraphs (g)(2)(iv)(C)(2) and (g)(2)(iv)(C)(3): These paragraphs apply to structures that support overhead electric power transmission and distribution lines and equipment. They do not apply to portions of buildings, such as loading docks, or to electric equipment, such as transformers and capacitors. Subpart D of this part contains the duty to provide fall protection associated with walking and working surfaces.</p>
<p>Note 2: Employees undergoing training are not considered “qualified employees” for the purposes of this provision. Unqualified employees (including trainees) are required to use fall protection any time they are more than 4 feet (1.2 m) above the ground.</p>	<p><b>[Ø]</b> Note 2 to paragraphs (g)(2)(iv)(C)( 2) and (g)(2)(iv)(C)(3): <b>Until the employer ensures that employees are proficient</b> in climbing and the use of fall protection under paragraph (a)(2)(viii) of this section, the employees are not considered “qualified employees” <b>for the purposes of paragraphs (g)(2)(iv)(C)(2) and (g)(2)(iv)(C)(3) of this section. These paragraphs require</b> unqualified employees (including trainees) to use fall protection any time they are more than <b>1.2 meters (4 feet)</b> above the ground.</p>
<p>(g)(2)(v) The following requirements apply to personal fall arrest systems:</p> <p>(g)(2)(vi)(B) <del>When stopping or arresting a fall, personal fall arrest systems shall limit the maximum arresting force on an employee to 1800 pounds (8 kN) if used with a body harness.</del></p> <p>(g)(2)(vi)(C) <del>Personal fall arrest systems shall be rigged such that an employee can neither free fall more than 6 feet (1.8 m) nor contact any lower level.</del></p> <p>(g)(2)(vii) <del>If vertical lifelines or droplines are used, not more than one employee may be attached to any one lifeline.</del></p>	<p><b>[Moved to (g)(2)(iv)(B) referencing § 1926.502(d)]</b></p>
	<p><b>(g) (2) (iv) (D)</b> On and after April 1, 2015, work-positioning systems shall be rigged so that an employee can free fall no more than 0.6 meters (2 feet).</p>
	<p><b>(E)</b> Anchorages for work-positioning equipment shall be capable of supporting at least twice the potential impact load of an employee's fall, or 13.3 kilonewtons (3,000 pounds-force), whichever is greater.</p>

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		<b>[Ø]</b> Note to paragraph (g)(2)(iv)(E): Wood-pole fall-restriction devices meeting American Society of Testing and Materials Standard Specifications for Personal Climbing Equipment, ASTM F887-12 <sup>e1</sup> , are deemed to meet the anchorage-strength requirement when they are used in accordance with manufacturers' instructions.
(g)(2)(viii)	Snaphooks may not be connected to loops made in webbing-type lanyards.	<b>(g) (2) (iv) (F)</b> Unless the snaphook is a locking type and designed specifically for the following connections, snaphooks on work-positioning equipment may not be engaged:  <b>(1)</b> Directly to webbing, rope, or wire rope; <b>(2)</b> To each other; <b>(3)</b> To a D ring to which another snaphook or other connector is attached; <b>(4)</b> To a horizontal lifeline; or <b>(5)</b> To any object that is incompatibly shaped or dimensioned in relation to the snaphook such that accidental disengagement could occur should the connected object sufficiently depress the snaphook keeper to allow release of the object.
(g)(2)(ix)	Snaphooks may not be connected to each other.	

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<b>1910.269(h)</b>	“Ladders, platforms, <b>step bolts, and manhole steps.</b> ”	<b>(h)</b>	<b>Portable</b> ladders and platforms.
<b>(h)(1)</b>	“General.” Requirements for ladders contained in Subpart D of this Part apply, except as specifically noted in paragraph (h)(2) of this section.	<b>(1)</b>	General. Requirements for <b>portable</b> ladders contained in Subpart D of this part apply <b>in addition to the requirements of paragraph (h) of this section</b> , except as specifically noted in paragraph (h)(2) of this section.
<b>(h)(2)</b>	“Special ladders and platforms.” Portable ladders <b>and platforms</b> used on structures or conductors in conjunction with overhead line work need not meet paragraphs (d)(2)(i) and (d)(2)(iii) of 1910.25 of this Part or paragraph (c)(3)(iii) of 1910.26 of this Part. However, these ladders and platforms shall meet the following requirements:	<b>(2)</b>	Special ladders and platforms. Portable ladders used on structures or conductors in conjunction with overhead line work need not meet <b>§ 1910.25(d)(2)(i) and (d)(2)(iii) or § 1910.26(c)(3)(iii)</b> . <b>Portable ladders and platforms used on structures or conductors in conjunction with overhead line work shall meet the following requirements:</b>

**[\*Note: In (h)(2), (i)-(iv) order has been revised: OLD = NEW: (i)=(iii), (iii)=(iv), (iv)=(i)]**

<b>(h)(2)(i)</b>	Ladders and platforms shall be secured to prevent their becoming accidentally dislodged.	<b>(h) (2) (i)</b>	In the configurations in which they are used, <b>portable</b> platforms shall be capable of supporting without failure at least 2.5 times the maximum intended load.
<b>(h)(2)(ii)</b>	Ladders and platforms may not be loaded in excess of the working loads for which they are designed.	<b>(ii)</b>	<b>Portable</b> ladders and platforms may not be loaded in excess of the working loads for which they are designed.
<b>(h)(2)(iii)</b>	Ladders and platforms may be used only in applications for which they were designed.	<b>(iii)</b>	<b>Portable</b> ladders and platforms shall be secured to prevent them from becoming dislodged.
<b>(h)(2)(iv)</b>	In the configurations in which they are used, ladders and platforms shall be capable of supporting without failure at least 2.5 times the maximum intended load.	<b>(iv)</b>	<b>Portable</b> ladders and platforms may be used only in applications for which they are designed.
<b>(h)(3)</b>	“Conductive ladders.” Portable metal ladders and other portable conductive ladders may not be used near exposed energized lines or equipment. However, in specialized high-voltage work, conductive ladders shall be used where the employer can demonstrate that nonconductive ladders would present a greater hazard than conductive ladders.	<b>(3)</b>	Conductive ladders. Portable metal ladders and other portable conductive ladders may not be used near exposed energized lines or equipment. However, in specialized high-voltage work, conductive ladders shall be used when the employer demonstrates that nonconductive ladders would present a greater hazard <b>to employees</b> than conductive ladders.

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<b>1910.269(i)</b> “Hand and portable power tools.”	(i) Hand and portable power equipment.
(i)(1) “General.” Paragraph (i)(2) of this section applies to electric equipment connected by cord and plug. Paragraph (i)(3) of this section applies to portable and vehicle-mounted generators used to supply cord-and plug-connected equipment. Paragraph (i)(4) of this section applies to hydraulic and pneumatic tools.	(1) General. Paragraph (i)(2) of this section applies to electric equipment connected by cord and plug. Paragraph (i)(3) of this section applies to portable and vehicle-mounted generators used to supply cord- and plug-connected equipment. Paragraph (i)(4) of this section applies to hydraulic and pneumatic tools.
(i)(2) “Cord- and plug-connected equipment.”	(i) (2) Cord- and plug-connected equipment. <b>Cord- and plug-connected equipment not covered by Subpart S of this part shall comply with one of the following instead of § 1910.243(a)(5):</b>
(i)(2)(i) Cord-and plug-connected equipment supplied by premises wiring is covered by Subpart S of this Part.	
(i)(2)(ii) Any cord- and plug-connected equipment supplied by other than premises wiring shall comply with one of the following in lieu of 1910.243(a)(5) of this Part:	
(i)(2)(ii)(A) It shall be equipped with a cord containing an equipment grounding conductor connected to the tool frame and to a means for grounding the other end (however, this option may not be used where the introduction of the ground into the work environment increases the hazard to an employee); or	(i) <b>The equipment shall be equipped with a cord containing an equipment grounding conductor connected to the equipment frame and to a means for grounding the other end of the conductor</b> (however, this option may not be used where the introduction of the ground into the work environment increases the hazard to an employee); or
(i)(2)(ii)(B) It shall be of the double-insulated type conforming to Subpart S of this Part; or	(ii) <b>The equipment</b> shall be of the double-insulated type conforming to Subpart S of this part; or
(i)(2)(ii)(C) It shall be connected to the power supply through an isolating transformer with an ungrounded secondary.	(iii) <b>The equipment</b> shall be connected to the power supply through an isolating transformer with an ungrounded secondary <b>of not more than 50 volts.</b>
(i)(3) “Portable and vehicle-mounted generators.” Portable and vehicle-mounted generators used to supply cord- and plug-connected equipment shall meet the following requirements:	(3) Portable and vehicle-mounted generators. Portable and vehicle-mounted generators used to supply cord- and plug-connected equipment <b>covered by paragraph (i)(2) of this section</b> shall meet the following requirements:
(i)(3)(i) The generator may only supply equipment located on the generator or the vehicle and cord- and plug-connected equipment through receptacles mounted on the generator or the vehicle.	(i) The generator may only supply equipment located on the generator or the vehicle and cord- and plug-connected equipment through receptacles mounted on the generator or the vehicle.
(i)(3)(ii) The non-current-carrying metal parts of equipment and the equipment grounding conductor terminals of the receptacles shall be bonded to the generator frame.	(ii) The non-current-carrying metal parts of equipment and the equipment grounding conductor terminals of the receptacles shall be bonded to the generator frame.
(i)(3)(iii) <del>In the case of</del> vehicle-mounted generators, the frame of the generator shall be bonded to the vehicle frame.	(iii) <b>For</b> vehicle-mounted generators, the frame of the generator shall be bonded to the vehicle frame.

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(i)(3)(iv)	Any neutral conductor shall be bonded to the generator frame.	(i) (3) (iv)	Any neutral conductor shall be bonded to the generator frame.
(i)(4)	"Hydraulic and pneumatic tools."	(4)	Hydraulic and pneumatic tools.
(i)(4)(i)	Safe operating pressures for hydraulic and pneumatic tools, hoses, valves, pipes, filters, and fittings may not be exceeded.	(i)	Safe operating pressures for hydraulic and pneumatic tools, hoses, valves, pipes, filters, and fittings may not be exceeded.
	Note: If any hazardous defects are present, no operating pressure <del>would be</del> safe, and the hydraulic or pneumatic equipment involved may not be used. In the absence of defects, the maximum rated operating pressure is the maximum safe pressure.	[Ø]	Note to paragraph (i)(4)(i): If any hazardous defects are present, no operating pressure <b>is</b> safe, and the hydraulic or pneumatic equipment involved may not be used. In the absence of defects, the maximum rated operating pressure is the maximum safe pressure.
(i)(4)(ii)	A hydraulic or pneumatic tool used where it may contact exposed live parts shall be designed and maintained for such use.	(ii)	A hydraulic or pneumatic tool used where it may contact exposed <b>energized</b> parts shall be designed and maintained for such use.
(i)(4)(iii)	The hydraulic system supplying a hydraulic tool used where it may contact exposed live parts shall provide protection against loss of insulating value for the voltage involved due to the formation of a partial vacuum in the hydraulic line.	(iii)	The hydraulic system supplying a hydraulic tool used where it may contact exposed live parts shall provide protection against loss of insulating value, for the voltage involved, due to the formation of a partial vacuum in the hydraulic line.
	Note: Hydraulic lines without check valves having a separation of more than 35 feet (10.7 m) between the oil reservoir and the upper end of the hydraulic system promote the formation of a partial vacuum.	[Ø]	Note to paragraph (i)(4)(iii): <b>Use of hydraulic lines that do not have check valves and that have a separation of more than 10.7 meters (35 feet)</b> between the oil reservoir and the upper end of the hydraulic system promotes the formation of a partial vacuum.
(i)(4)(iv)	A pneumatic tool used on energized electric lines or equipment or used where it may contact exposed live parts shall provide protection against the accumulation of moisture in the air supply.	(iv)	A pneumatic tool used on energized electric lines or equipment, or used where it may contact exposed live parts, shall provide protection against the accumulation of moisture in the air supply.
(i)(4)(v)	Pressure shall be released before connections are broken, unless quick acting, self-closing connectors are used. Hoses may not be kinked.	(v)	Pressure shall be released before connections are broken, unless quick-acting, self-closing connectors are used.
(i)(4)(vi)	Employees may not use any part of their bodies to locate or attempt to stop a hydraulic leak.	(vi)	<b>Employers must ensure that employees</b> do not use any part of their bodies to locate, or attempt to stop, a hydraulic leak.
		(vii)	<b>Hoses may not be kinked.</b>

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<b>1910.269(j)</b>	“Live-line tools.”	<b>(j)</b>	Live-line tools.
<b>(j)(1)</b>	“Design of tools.” Live-line tool rods, tubes, and poles shall be designed and constructed to withstand the following minimum tests:	<b>(1)</b>	Design of tools. Live-line tool rods, tubes, and poles shall be designed and constructed to withstand the following minimum tests:
<b>(j)(1)(i)</b>	100,000 volts per foot (3281 volts per centimeter) of length for 5 minutes if the tool is made of fiberglass-reinforced plastic (FRP), or	<b>(i)</b>	If the tool is made of fiberglass-reinforced plastic (FRP), it shall withstand 328,100 volts per meter (100,000 volts per foot) of length for 5 minutes, or
		<b>[Ø]</b>	Note to paragraph (j)(1)(i): Live-line tools using rod and tube that meet ASTM F711-02 (2007), Standard Specification for Fiberglass-Reinforced Plastic (FRP) Rod and Tube Used in Live Line Tools, are deemed to comply with paragraph (j)(1) of this section.
<b>(j)(1)(ii)</b>	75,000 volts per foot (2461 volts per centimeter) of length for 3 minutes if the tool is made of wood, or	<b>(j) (1) (ii)</b>	If the tool is made of wood, it shall withstand 246,100 volts per meter (75,000 volts per foot) of length for 3 minutes, or
<b>(j)(1)(iii)</b>	Other tests that the employer can demonstrate are equivalent.	<b>(iii)</b>	The tool shall withstand other tests that the employer can demonstrate are equivalent.
	Note: Live-line tools using rod and tube that meet ASTM F711-89, Standard Specification for Fiberglass-Reinforced Plastic (FRP) Rod and Tube Used in Live-Line Tools, conform to paragraph (j)(1)(i) of this section.		<b>[Moved to after (j)(1)(i)]</b>
<b>(j)(2)</b>	“Condition of tools.”	<b>(2)</b>	Condition of tools.
<b>(j)(2)(i)</b>	Each live-line tool shall be wiped clean and visually inspected for defects before use each day.	<b>(i)</b>	Each live-line tool shall be wiped clean and visually inspected for defects before use each day.
<b>(j)(2)(ii)</b>	If any defect or contamination that could adversely affect the insulating qualities or mechanical integrity of the live-line tool is present after wiping, the tool shall be removed from service and examined and tested according to paragraph (j)(2)(iii) of this section before being returned to service.	<b>(ii)</b>	If any defect or contamination that could adversely affect the insulating qualities or mechanical integrity of the live-line tool is present after wiping, the tool shall be removed from service and examined and tested according to paragraph (j)(2)(iii) of this section before being returned to service.
<b>(j)(2)(iii)</b>	Live-line tools used for primary employee protection shall be removed from service every 2 years and whenever required under paragraph (j)(2)(ii) of this section for examination, cleaning, repair, and testing as follows:	<b>(iii)</b>	Live-line tools used for primary employee protection shall be removed from service every 2 years, and whenever required under paragraph (j)(2)(ii) of this section, for examination, cleaning, repair, and testing as follows:
<b>(j)(2)(iii)(A)</b>	Each tool shall be thoroughly examined for defects.	<b>(A)</b>	Each tool shall be thoroughly examined for defects.



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(j)(2)(iii)(B)	If a defect or contamination that could adversely affect the insulating qualities or mechanical integrity of the live-line tool is found, the tool shall be repaired and refinished or shall be permanently removed from service. If no such defect or contamination is found, the tool shall be cleaned and waxed.	(j) (2) (iii) (B)	If a defect or contamination that could adversely affect the insulating qualities or mechanical integrity of the live-line tool is found, the tool shall be repaired and refinished or shall be permanently removed from service. If no such defect or contamination is found, the tool shall be cleaned and waxed.
(j)(2)(iii)(C)	The tool shall be tested in accordance with paragraphs (j)(2)(iii)(D) and (j)(2)(iii)(E) of this section under the following conditions:	(C)	The tool shall be tested in accordance with paragraphs (j)(2)(iii)(D) and (j)(2)(iii)(E) of this section under the following conditions:
(j)(2)(iii)(C)(1)	After the tool has been repaired or refinished; and	(1)	After the tool has been repaired or refinished; and
(j)(2)(iii)(C)(2)	After the examination if repair or refinishing is not performed, unless the tool is made of FRP rod or foam-filled FRP tube and the employer can demonstrate that the tool has no defects that could cause it to fail in use.	(2)	After the examination if repair or refinishing is not performed, unless the tool is made of FRP rod or foam-filled FRP tube and the employer can demonstrate that the tool has no defects that could cause it to fail during use.
(j)(2)(iii)(D)	The test method used shall be designed to verify the tool's integrity along its entire working length and, if the tool is made of fiberglass-reinforced plastic, its integrity under wet conditions.	(D)	The test method used shall be designed to verify the tool's integrity along its entire working length and, if the tool is made of fiberglass-reinforced plastic, its integrity under wet conditions.
(j)(2)(iii)(E)	The voltage applied during the tests shall be as follows:	(E)	The voltage applied during the tests shall be as follows:
(j)(2)(iii)(E)(1)	75,000 volts per foot (2461 volts per centimeter) of length for 1 minute if the tool is made of fiberglass, or	(1)	246,100 volts per meter (75,000 volts per foot) of length for 1 minute if the tool is made of fiberglass, or
(j)(2)(iii)(E)(2)	50,000 volts per foot (1640 volts per centimeter) of length for 1 minute if the tool is made of wood, or	(2)	164,000 volts per meter (50,000 volts per foot) of length for 1 minute if the tool is made of wood, or
(j)(2)(iii)(E)(3)	Other tests that the employer can demonstrate are equivalent.	(3)	Other tests that the employer can demonstrate are equivalent.
	Note: Guidelines for the examination, cleaning, repairing, and in-service testing of live-line tools are contained in the Institute of Electrical and Electronics Engineers Guide for In-Service Maintenance and Electrical Testing of Live-Line Tools, IEEE Std. 978-1984.	[Ø]	Note to paragraph (j)(2): Guidelines for the examination, cleaning, repairing, and in-service testing of live-line tools are specified in the Institute of Electrical and Electronics Engineers' IEEE Guide for Maintenance Methods on Energized Power Lines, IEEE Std 516-2009.

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<b>1910.269(k)</b>	“Materials handling and storage.”	<b>(k)</b>	Materials handling and storage.
<b>(k)(1)</b>	“General.” Material handling and storage shall conform to the requirements of Subpart N of this Part.	<b>(1)</b>	General. Materials handling and storage shall <b>comply with applicable material-handling and material-storage requirements in this part, including those in Subpart N of this part.</b>
<b>(k)(2)</b>	“Materials storage near energized lines or equipment.”	<b>(2)</b>	Materials storage near energized lines or equipment.
<b>(k)(2)(i)</b>	In areas not restricted to qualified persons only, materials or equipment may not be stored closer to energized lines or exposed energized parts of equipment than the following distances plus an amount providing for the maximum sag and side swing of all conductors and providing for the height and movement of material handling equipment:	<b>(i)</b>	<b>In areas to which access is</b> not restricted to qualified persons only, materials or equipment may not be stored closer to energized lines or exposed energized parts of equipment than the following distances, <b>plus a distance that provides for the maximum sag and side swing of all conductors and for the height and movement of material-handling equipment:</b>
<b>(k)(2)(i)(A)</b>	For lines and equipment energized at 50 kV or less, the distance is 10 feet (305 cm).	<b>(A)</b>	For lines and equipment energized at 50 kilovolts or less, the distance is <b>3.05 meters (10 feet).</b>
<b>(k)(2)(i)(B)</b>	For lines and equipment energized at more than 50 kV, the distance is 10 feet (305 cm) plus 4 inches (10 cm) for every 10 kV over 50 kV.	<b>(B)</b>	For lines and equipment energized at more than 50 kilovolts, the distance is <b>3.05 meters (10 feet) plus 0.10 meter (4 inches)</b> for every 10 kilovolts over 50 kilovolts.
<b>(k)(2)(ii)</b>	In areas restricted to qualified employees, material may not be stored within the working space about energized lines or equipment.	<b>(ii)</b>	In areas restricted to qualified employees, materials may not be stored within the working space about energized lines or equipment.
	Note: Requirements for the size of the working space are contained in paragraphs (u)(1) and (v)(3) of this section.	<b>[Ø]</b>	Note to paragraph (k)(2)(ii): <b>Paragraphs (u)(1) and (v)(3) of this section specify the size of the working space.</b>

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1910.269(l)	“Working on or near exposed energized parts.” This paragraph applies to work on exposed live parts, or near enough to them, to expose the employee to any hazard they present.	(l)	Working on or near exposed energized parts. This paragraph applies to work on exposed live parts, or near enough to them to expose the employee to any hazard they present.
(l)(1)	“General.” Only qualified employees may work on or with exposed energized lines or parts of equipment. Only qualified employees may work in areas containing unguarded, uninsulated energized lines or parts of equipment operating at 50 volts or more. Electric lines and equipment shall be considered and treated as energized unless the provisions of paragraph (d) or paragraph (m) of this section have been followed.	(1)	General.
		(i)	Only qualified employees may work on or with exposed energized lines or parts of equipment.
		(ii)	Only qualified employees may work in areas containing unguarded, uninsulated energized lines or parts of equipment operating at 50 volts or more.
		(iii)	Electric lines and equipment shall be considered and treated as energized unless they have been deenergized in accordance with paragraph (d) or (m) of this section.
(l)(1)(i)	Except as provided in paragraph (l)(1)(ii) of this section, at least two employees shall be present while the following types of work are being performed:	(2)	At least two employees.
		(i)	Except as provided in paragraph (l)(2)(ii) of this section, at least two employees shall be present while any employees perform the following types of work:
(l)(1)(i)(A)	Installation, removal, or repair of lines <del>that are</del> energized at more than 600 volts,	(A)	Installation, removal, or repair of lines energized at more than 600 volts,
(l)(1)(i)(B)	Installation, removal, or repair of deenergized lines if an employee is exposed to contact with other parts energized at more than 600 volts,	(B)	Installation, removal, or repair of deenergized lines if an employee is exposed to contact with other parts energized at more than 600 volts,
(l)(1)(i)(C)	Installation, removal, or repair of equipment, such as transformers, capacitors, and regulators, if an employee is exposed to contact with parts energized at more than 600 volts,	(C)	Installation, removal, or repair of equipment, such as transformers, capacitors, and regulators, if an employee is exposed to contact with parts energized at more than 600 volts,
(l)(1)(i)(D)	Work involving the use of mechanical equipment, other than insulated aerial lifts, near parts energized at more than 600 volts, and	(D)	Work involving the use of mechanical equipment, other than insulated aerial lifts, near parts energized at more than 600 volts, and
(l)(1)(i)(E)	Other work that exposes an employee to electrical hazards greater than or equal to <del>those</del> posed by operations <del>that are</del> specifically listed in paragraphs (l)(1)(i)(A) through (l)(1)(i)(D) of this section.	(E)	Other work that exposes an employee to electrical hazards greater than, or equal to, the electrical hazards posed by operations listed specifically in paragraphs (l)(2)(i)(A) through (l)(2)(i)(D) of this section.
(l)(1)(ii)	Paragraph (l)(1)(i) of this section does not apply to the following operations:	(ii)	Paragraph (l)(2)(i) of this section does not apply to the following operations:
(l)(1)(ii)(A)	Routine switching of circuits, if the employer can demonstrate that conditions at the site allow this work to be performed safely,	(l) (2) (ii) (A)	Routine circuit switching, when the employer can demonstrate that conditions at the site allow safe performance of this work,

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(l)(1)(ii)(B) Work performed with live-line tools if the employee is positioned so that he or she is neither within reach of nor otherwise exposed to contact with energized parts, and	(l) (2) (ii) (B) Work performed with live-line tools <b>when the position of the employee is such</b> that he or she is neither within reach of, nor otherwise exposed to contact with, energized parts, and
(l)(1)(ii)(C) Emergency repairs to the extent necessary to safeguard the general public.	(c) Emergency repairs to the extent necessary to safeguard the general public.
(l)(2) "Minimum approach distances." The employer shall ensure that no employee approaches or takes any conductive object closer to exposed energized parts than set forth in Table R-6 through Table R-10, unless:	(3) Minimum approach distances.
	(i) The employer shall establish minimum approach distances no less than the distances computed by Table R-3 for ac systems or Table R-8 for dc systems.
	(ii) No later than April 1, 2015, for voltages over 72.5 kilovolts, the employer shall determine the maximum anticipated per-unit transient overvoltage, phase-to-ground, through an engineering analysis or assume a maximum anticipated per-unit transient overvoltage, phase-to-ground, in accordance with Table R-9. When the employer uses portable protective gaps to control the maximum transient overvoltage, the value of the maximum anticipated per-unit transient overvoltage, phase-to-ground, must provide for five standard deviations between the statistical sparkover voltage of the gap and the statistical withstand voltage corresponding to the electrical component of the minimum approach distance. The employer shall make any engineering analysis conducted to determine maximum anticipated per-unit transient overvoltage available upon request to employees and to the Assistant Secretary or designee for examination and copying.
	[Ø] Note to paragraph (l)(3)(ii): See Appendix B to this section for information on how to calculate the maximum anticipated per-unit transient overvoltage, phase-to-ground, when the employer uses portable protective gaps to reduce maximum transient overvoltages.
	(iii) The employer shall ensure that no employee approaches or takes any conductive object closer to exposed energized parts than the employer's established minimum approach distance, unless:

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(l)(2)(i)	The employee is insulated from the energized part (insulating gloves or insulating gloves and sleeves worn in accordance with paragraph (l)(3) of this section are considered insulation of the employee only with regard to the energized part upon which work is being performed), or	(l) (3) (iii) (A)	The employee is insulated from the energized part (rubber insulating gloves or rubber insulating gloves and sleeves worn in accordance with paragraph (l)(4) of this section constitutes insulation of the employee from the energized part upon which the employee is working provided that the employee has control of the part in a manner sufficient to prevent exposure to uninsulated portions of the employee's body), or
(l)(2)(ii)	The energized part is insulated from the employee and from any other conductive object at a different potential, or	(B)	The energized part is insulated from the employee and from any other conductive object at a different potential, or
(l)(2)(iii)	The employee is insulated from any other exposed conductive object, as during live-line bare-hand work.	(C)	The employee is insulated from any other exposed conductive object in accordance with the requirements for live-line barehand work in paragraph (q)(3) of this section.
<p><b>Note:</b>            Paragraphs (u)(5)(i) and (v)(5)(i) and of this section contain requirements for the guarding and isolation of live parts. Parts of electric circuits that meet these two provisions are not considered as "exposed" unless a guard is removed or an employee enters the space intended to provide isolation from the live parts.</p>			
(l)(3)	<p>"Type of insulation."            If the employee is to be insulated from energized parts by the use of insulating gloves (under paragraph (l)(2)(i) of this section), insulating sleeves shall also be used. However, insulating sleeves need not be used under the following conditions:</p>	(4)	Type of insulation.
		(i)	When an employee uses rubber insulating gloves as insulation from energized parts (under paragraph (l)(3)(iii)(A) of this section), the employer shall ensure that the employee also uses rubber insulating sleeves. However, an employee need not use rubber insulating sleeves if:
(l)(3)(i)	If exposed energized parts on which work is not being performed are insulated from the employee and	(A)	Exposed energized parts on which the employee is not working are insulated from the employee; and
(l)(3)(ii)	If such insulation is placed from a position not exposing the employee's upper arm to contact with other energized parts.	(B)	When installing insulation for purposes of paragraph (l)(4)(i)(A) of this section, the employee installs the insulation from a position that does not expose his or her upper arm to contact with other energized parts.
		(ii)	When an employee uses rubber insulating gloves or rubber insulating gloves and sleeves as insulation from energized parts (under paragraph (l)(3)(iii)(A) of this section), the employer shall ensure that the employee:

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		(I) (4) (ii) (A)	Puts on the rubber insulating gloves and sleeves in a position where he or she cannot reach into the minimum approach distance, established by the employer under paragraph (I)(3)(i) of this section; and
		(B)	Does not remove the rubber insulating gloves and sleeves until he or she is in a position where he or she cannot reach into the minimum approach distance, established by the employer under paragraph (I)(3)(i) of this section.
(I)(4)	“Working position.” The employer shall ensure that each employee, to the extent that other safety-related conditions at the worksite permit, works in a position from which a slip or shock will not bring the employee’s body into contact with exposed, uninsulated parts energized at a potential different from the employee.	(5)	Working position.
		(i)	The employer shall ensure that each employee, to the extent that other safety-related conditions at the worksite permit, works in a position from which a slip or shock will not bring the employee's body into contact with exposed, uninsulated parts energized at a potential different from the employee's.
		(ii)	When an employee performs work near exposed parts energized at more than 600 volts, but not more than 72.5 kilovolts, and is not wearing rubber insulating gloves, being protected by insulating equipment covering the energized parts, performing work using live-line tools, or performing live-line barehand work under paragraph (q)(3) of this section, the employee shall work from a position where he or she cannot reach into the minimum approach distance, established by the employer under paragraph (I)(3)(i) of this section.
(I)(5)	“Making connections.” The employer shall ensure that connections are made as follows:	(6)	Making connections. The employer shall ensure that <b>employees make connections</b> as follows:
(I)(5)(i)	In connecting deenergized equipment or lines to an energized circuit by means of a conducting wire or device, an employee shall first attach the wire to the deenergized part;	(i)	In connecting deenergized equipment or lines to an energized circuit by means of a conducting wire or device, an employee shall first attach the wire to the deenergized part;
(I)(5)(ii)	When disconnecting equipment or lines from an energized circuit by means of a conducting wire or device, an employee shall remove the source end first; and	(ii)	When disconnecting equipment or lines from an energized circuit by means of a conducting wire or device, an employee shall remove the source end first; and
(I)(5)(iii)	When lines or equipment are connected to or disconnected from energized circuits, loose conductors shall be kept away from exposed energized parts.	(6) (iii)	When lines or equipment are connected to or disconnected from energized circuits, <b>an employee shall keep loose conductors</b> away from exposed energized parts.

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<p>(l)(6) “Apparel.”</p> <p>(l)(6)(i) When work is performed within reaching distance of exposed energized parts of equipment, the employer shall ensure that each employee removes or renders nonconductive all exposed conductive articles, such as key or watch chains, rings, or wrist watches or bands, unless such articles do not increase the hazards associated with contact with the energized parts.</p>	<p>(l) (7) <b>Conductive articles. When an employee performs work</b> within reaching distance of exposed energized parts of equipment, the employer shall ensure that the employee removes or renders nonconductive all exposed conductive articles, such as keychains or watch chains, rings, or wrist watches or bands, unless such articles do not increase the hazards associated with contact with the energized parts.</p>
<p>(l)(6)(ii) The employer shall train each employee who is exposed to the hazards of flames or electric arcs in the hazards involved.</p>	<p>(8) <b>Protection from flames and electric arcs.</b></p>
	<p>(i) The employer shall assess the workplace to identify employees exposed to hazards from flames or from electric arcs.</p> <p>(ii) For each employee exposed to hazards from electric arcs, the employer shall make a reasonable estimate of the incident heat energy to which the employee would be exposed.</p>
	<p>[Ø] Note 1 to paragraph (l)(8)(ii): Appendix E to this section provides guidance on estimating available heat energy. The Occupational Safety and Health Administration will deem employers following the guidance in Appendix E to this section to be in compliance with paragraph (l)(8)(ii) of this section. An employer may choose a method of calculating incident heat energy not included in Appendix E to this section if the chosen method reasonably predicts the incident energy to which the employee would be exposed.</p>
	<p>[Ø] Note 2 to paragraph (l)(8)(ii): This paragraph does not require the employer to estimate the incident heat energy exposure for every job task performed by each employee. The employer may make broad estimates that cover multiple system areas provided the employer uses reasonable assumptions about the energy-exposure distribution throughout the system and provided the estimates represent the maximum employee exposure for those areas. For example, the employer could estimate the heat energy just outside a substation feeding a radial distribution system and use that estimate for all jobs performed on that radial system.</p>



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(l)(6)(iii) The employer shall ensure that each employee who is exposed to the hazards of flames or electric arcs does not wear clothing that, when exposed to flames or electric arcs, could increase the extent of injury that would be sustained by the employee.	(l) (8) (iii) The employer shall ensure that each employee who is exposed to hazards from flames or electric arcs does not wear clothing that could melt onto his or her skin or that could ignite and continue to burn when exposed to flames or the heat energy estimated under paragraph (l)(8)(ii) of this section.
Note: Clothing made from the following types of fabrics, either alone or in blends, is prohibited by this paragraph, unless the employer can demonstrate that the fabric has been treated to withstand the conditions that may be encountered or that the clothing is worn in such a manner as to eliminate the hazard involved: acetate, nylon, polyester, rayon.	[Ø] Note to paragraph (l)(8)(iii) of this section: This paragraph prohibits clothing made from acetate, nylon, polyester, rayon and polypropylene, either alone or in blends, unless the employer demonstrates that the fabric has been treated to withstand the conditions that may be encountered by the employee or that the employee wears the clothing in such a manner as to eliminate the hazard involved.
	(iv) The employer shall ensure that the outer layer of clothing worn by an employee, except for clothing not required to be arc rated under paragraphs (l)(8)(v)(A) through (l)(8)(v)(E) of this section, is flame resistant under any of the following conditions:
	(A) The employee is exposed to contact with energized circuit parts operating at more than 600 volts,
	(B) An electric arc could ignite flammable material in the work area that, in turn, could ignite the employee's clothing,
	(C) Molten metal or electric arcs from faulted conductors in the work area could ignite the employee's clothing, or
	[Ø] Note to paragraph (l)(8)(iv)(C): This paragraph does not apply to conductors that are capable of carrying, without failure, the maximum available fault current for the time the circuit protective devices take to interrupt the fault.
	(iv) (D) The incident heat energy estimated under paragraph (l)(8)(ii) of this section exceeds 2.0 cal/cm <sup>2</sup>

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	(l) (8) (v)	The employer shall ensure that each employee exposed to hazards from electric arcs wears protective clothing and other protective equipment with an arc rating greater than or equal to the heat energy estimated under paragraph (l)(8)(ii) of this section whenever that estimate exceeds 2.0 cal/cm <sup>2</sup> . This protective equipment shall cover the employee's entire body, except as follows:
	(A)	Arc-rated protection is not necessary for the employee's hands when the employee is wearing rubber insulating gloves with protectors or, if the estimated incident energy is no more than 14 cal/cm <sup>2</sup> , heavy-duty leather work gloves with a weight of at least 407 gm/m <sup>2</sup> (12 oz/yd <sup>2</sup> ),
	(B)	Arc-rated protection is not necessary for the employee's feet when the employee is wearing heavy-duty work shoes or boots,
	(C)	Arc-rated protection is not necessary for the employee's head when the employee is wearing head protection meeting § 1910.135 if the estimated incident energy is less than 9 cal/cm <sup>2</sup> for exposures involving single-phase arcs in open air or 5 cal/cm <sup>2</sup> for other exposures,
	(D)	The protection for the employee's head may consist of head protection meeting § 1910.135 and a faceshield with a minimum arc rating of 8 cal/cm <sup>2</sup> if the estimated incident-energy exposure is less than 13 cal/cm <sup>2</sup> for exposures involving single-phase arcs in open air or 9 cal/cm <sup>2</sup> for other exposures, and
	(E)	For exposures involving single-phase arcs in open air, the arc rating for the employee's head and face protection may be 4 cal/cm <sup>2</sup> less than the estimated incident energy.
	[Ø]	Note to paragraph (l)(8): See Appendix E to this section for further information on the selection of appropriate protection.
	(l) (8) (vi)	Dates.
	(A)	The obligation in paragraph (l)(8)(ii) of this section for the employer to make reasonable estimates of incident energy commences January 1, 2015.

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		(I) (8) (vi) (B)	The obligation in paragraph (I)(8)(iv)(D) of this section for the employer to ensure that the outer layer of clothing worn by an employee is flame-resistant when the estimated incident heat energy exceeds 2.0 cal/cm <sup>2</sup> commences April 1, 2015.
		(C)	The obligation in paragraph (I)(8)(v) of this section for the employer to ensure that each employee exposed to hazards from electric arcs wears the required arc-rated protective equipment commences April 1, 2015.
(I)(7)	“Fuse handling.” When fuses must be installed or removed with one or both terminals energized at more than 300 volts or with exposed parts energized at more than 50 volts, the employer shall ensure that tools or gloves rated for the voltage are used. When expulsion-type fuses are installed with one or both terminals energized at more than 300 volts, the employer shall ensure that each employee wears eye protection meeting the requirements of Subpart I of this Part, uses a tool rated for the voltage, and is clear of the exhaust path of the fuse barrel.	(9)	Fuse handling. When an employee must install or remove fuses with one or both terminals energized at more than 300 volts, or with exposed parts energized at more than 50 volts, the employer shall ensure that the employee uses tools or gloves rated for the voltage. When an employee installs or removes expulsion-type fuses with one or both terminals energized at more than 300 volts, the employer shall ensure that the employee wears eye protection meeting the requirements of Subpart I of this part, uses a tool rated for the voltage, and is clear of the exhaust path of the fuse barrel.
(I)(8)	“Covered (noninsulated) conductors.” The requirements of this section which pertain to the hazards of exposed live parts also apply when work is performed in the proximity of covered (noninsulated) wires.	(10)	Covered (noninsulated) conductors. The requirements of this section that pertain to the hazards of exposed live parts also apply when an employee performs work in proximity to covered (noninsulated) wires.
(I)(9)	“Noncurrent-carrying metal parts.” Noncurrent-carrying metal parts of equipment or devices, such as transformer cases and circuit breaker housings, shall be treated as energized at the highest voltage to which they are exposed, unless the employer inspects the installation and determines that these parts are grounded before work is performed.	(11)	Non-current-carrying metal parts. Non-current-carrying metal parts of equipment or devices, such as transformer cases and circuit-breaker housings, shall be treated as energized at the highest voltage to which these parts are exposed, unless the employer inspects the installation and determines that these parts are grounded before employees begin performing the work.
(I)(10)	“Opening circuits under load.” Devices used to open circuits under load conditions shall be designed to interrupt the current involved.	(12)	Opening and closing circuits under load.
		(i)	The employer shall ensure that devices used by employees to open circuits under load conditions are designed to interrupt the current involved.
		(ii)	The employer shall ensure that devices used by employees to close circuits under load conditions are designed to safely carry the current involved.

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**Table R-3 — AC Live-Line Work Minimum Approach Distance**

[The minimum approach distance (MAD; in meters) shall conform to the following equations.]

For phase-to-phase system voltages of 50 V to 300 V:<sup>1</sup>

MAD = avoid contact

For phase-to-phase system voltages of 301 V to 5 kV:<sup>1</sup> $MAD = M + D$ , where

$D = 0.02$  m ..... the electrical component of the minimum approach distance.

$M = 0.31$  m for voltages up to 750 V and 0.61 m otherwise ..... the inadvertent movement factor.

For phase-to-phase system voltages of 5.1 kV to 72.5 kV:<sup>1, 4</sup> $MAD = M + AD$ , where $M = 0.61$  m ..... the inadvertent movement factor. $A$  = the applicable value from Table R-5 ..... the altitude correction factor.

$D$  = the value from Table R-4 corresponding to the voltage and exposure or the value of the electrical component the minimum approach distance using the method provided in Appendix B to this section ..... the electrical component of the minimum approach distance.

For phase-to-phase system voltages of more than 72.5 kV, nominal:<sup>2, 4</sup> $MAD = 0.3048(C + )V_{L-G} TA + M$ , where

$C = 0.01$  for phase-to-ground exposures that the employer can demonstrate consist only of air across the approach distance (gap),

$0.01$  for phase-to-phase exposures if the employer can demonstrate that no insulated tool spans the gap and that no large conductive object is in the gap, or

 $0.011$  otherwise $V_{L-G}$  = phase-to-ground rms voltage, in kV

$T =$  maximum anticipated per-unit transient overvoltage; for phase-to-ground exposures,  $T$  equals  $T_{L-G}$ , the maximum per-unit transient overvoltage, phase-to-ground, determined by the employer under paragraph (I)(3)(ii) of this section; for phase-to-phase exposures,  $T$  equals  $1.35T_{L-G} + 0.45$

 $A =$  altitude correction factor from Table R-5 $M = 0.31$  m, the inadvertent movement factor $a =$  saturation factor, as follows:

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## Phase-to-Ground Exposures

$V_{Peak} = T_{L-G} V_{L-G} \sqrt{2} \dots$ $a \dots$	635 kV or less 0	635.1 to 915 kV ( $V_{Peak} - 635$ )/140,000	915.1 to 1,050 kV ( $V_{Peak} - 645$ )/135,000	More than 1,050 kV ( $V_{Peak} - 675$ )/125,000
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Phase-to-Phase Exposures<sup>3</sup>

$V_{Peak} = (1.35 T_{L-G} + 0.45) V_{L-G} \sqrt{2} \dots$ $a \dots$	630 kV or less 0	630.1 to 848 kV ( $V_{Peak} - 630$ )/155,000	848.1 to 1,131 kV ( $V_{Peak} - 633.6$ )/152,207	1,131.1 to 1,485 kV ( $V_{Peak} - 628$ )/153,846	More than 1,485 kV ( $V_{Peak} - 350.5$ )/203,666
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<sup>1</sup> Employers may use the minimum approach distances in Table R-6. If the worksite is at an elevation of more than 900 meters (3,000 feet), see footnote 1 to Table R-6.

<sup>2</sup> Employers may use the minimum approach distances in Table R-7, except that the employer may not use the minimum approach distances in Table R-7 for phase-to-phase exposures if an insulated tool spans the gap or if any large conductive object is in the gap. If the worksite is at an elevation of more than 900 meters (3,000 feet), see footnote 1 to Table R-7. Employers may use the minimum approach distances in Table 6 through Table 13 in Appendix B to this section, which calculated MAD for various values of  $T$ , provided the employer follows the notes to those tables.

<sup>3</sup> Use the equations for phase-to-ground exposures (with  $V_{Peak}$  for phase-to-phase exposures) unless the employer can demonstrate that no insulated tool spans the gap and that no large conductive object is in the gap.

<sup>4</sup> Until March 31, 2015, employers may use the minimum approach distances in Table 6 through Table 13 in Appendix B to this section.

## Table R-4 — Electrical Component of the Minimum Approach Distance at 5.1 to 72.5 kV

[D; In meters]

Nominal voltage (kV) phase-to-phase	Phase-to-ground exposure D (m)	Phase-to-phase exposure D (m)
5.1 to 15.0 .....	0.04	0.07
15.1 to 36.0 .....	0.16	0.28
36.1 to 46.0 .....	0.23	0.37
46.1 to 72.5 .....	0.39	0.59

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[Previously Table 10]

Table R-10- Altitude Correction Factor

Altitude				Correction factor	
ft	ft	m	m		
3000	10000	900	3000	1.00	1.20
4000	12000	1200	3600	1.02	1.25
5000	14000	1500	4200	1.05	1.30
6000	16000	1800	4800	1.08	1.35
7000	18000	2100	5400	1.11	1.39
8000	20000	2400	6000	1.14	1.44
9000		2700		1.17	

Note: If the work is performed at elevations greater than 3000 ft (900 m) above mean sea level, the minimum approach distance shall be determined by multiplying the distances in Table R-6 through Table R-9 by the correction factor corresponding to the altitude at which work is performed.

Table R-5 — Altitude Correction Factor

Altitude above sea level (m)	A
0 to 900 .....	1.00
901 to 1,200 .....	1.02
1,201 to 1,500 .....	1.05
1,501 to 1,800 .....	1.08
1,801 to 2,100 .....	1.11
2,101 to 2,400 .....	1.14
2,401 to 2,700 .....	1.17
2,701 to 3,000 .....	1.20
3,001 to 3,600 .....	1.25
3,601 to 4,200 .....	1.30
4,201 to 4,800 .....	1.35
4,801 to 5,400 .....	1.39
5,401 to 6,000 .....	1.44

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Table R-6- AC Live-Line Work Minimum Approach Distance

Nominal voltage in kilovolts phase to phase	Distance			
	Phase to ground exposure		Phase to phase exposure	
	(ft-in)	(m)	(ft-in)	(m)
0.05 to 1.0	(4)	(4)	(4)	(4)
1.1 to 15.0	2-1	0.64	2-2	0.66
15.1 to 36.0	2-4	0.72	2-7	0.77
36.1 to 46.0	2-7	0.77	2-10	0.85
46.1 to 72.5	3-0	0.90	3-6	1.05
72.6 to 121	3-2	0.95	4-3	1.29
138 to 145	3-7	1.09	4-11	1.50
161 to 169	4-0	1.22	5-8	1.71
230 to 242	5-3	1.59	7-6	2.27
345 to 362	8-6	2.59	12-6	3.80
500 to 550	11-3	3.42	18-1	5.50
765 to 800	14-11	4.53	26-0	7.91

Note 1: These distances take into consideration the highest switching surge an employee will be exposed to on any system with air as the insulating medium and the maximum voltages shown.

Note 2: The clear live-line tool distance shall equal or exceed the values for the indicated voltage ranges.

Note 3: See Appendix B to this section for information on how the minimum approach distances listed in the tables were derived.

<sup>4</sup> Avoid contact.

Table R-6—Alternative Minimum Approach Distances for Voltages of 72.5 kV and Less<sup>1</sup>

[In meters or feet and inches]

Nominal voltage (kV) phase-to-phase	Distance			
	Phase-to-ground exposure		Phase-to-phase exposure	
	m	ft	m	ft
0.50 to 0.300 <sup>2</sup> .....	Avoid Contact		Avoid Contact	
0.301 to 0.750 <sup>2</sup> .....	0.33	1.09	0.33	1.09
0.751 to 5.0.....	0.63	2.07	0.63	2.07
5.1 to 15.0.....	0.65	2.14	0.68	2.24
15.1 to 36.0.....	0.77	2.53	0.89	2.92
36.1 to 46.0.....	0.84	2.76	0.98	3.22
46.1 to 72.5.....	1.00	3.29	1.20	3.94

<sup>1</sup> Employers may use the minimum approach distances in this table provided the worksite is at an elevation of 900 meters (3,000 feet) or less. If employees will be working at elevations greater than 900 meters (3,000 feet) above mean sea level, the employer shall determine minimum approach distances by multiplying the distances in this table by the correction factor in Table R-5 corresponding to the altitude of the work.

<sup>2</sup> For single-phase systems, use voltage-to-ground.

Table R-7—Alternative Minimum Approach Distances for Voltages of More Than 72.5 kV<sup>1 2 3</sup>

[In meters or feet and inches]

Voltage range phase to phase (kV)	Phase-to-ground exposure		Phase-to-phase exposure	
	m	ft	m	ft
72.6 to 121.0.....	1.13	3.71	1.42	4.66
121.1 to 145.0.....	1.30	4.27	1.64	5.38
145.1 to 169.0.....	1.46	4.79	1.94	6.36
169.1 to 242.0.....	2.01	6.59	3.08	10.10
242.1 to 362.0.....	3.41	11.19	5.52	18.11
362.1 to 420.0.....	4.25	13.94	6.81	22.34
420.1 to 550.0.....	5.07	16.63	8.24	27.03
550.1 to 800.0.....	6.88	22.57	11.38	37.34

<sup>1</sup> Employers may use the minimum approach distances in this table provided the worksite is at an elevation of 900 meters (3,000 feet) or less. If employees will be working at elevations greater than 900 meters (3,000 feet) above mean sea level, the employer shall determine minimum approach distances by multiplying the distances in this table by the correction factor in Table R-5 corresponding to the altitude of the work.

<sup>2</sup> Employers may use the phase-to-phase minimum approach distances in this table provided that no insulated tool spans the gap and no large conductive object is in the gap.

<sup>3</sup> The clear live-line tool distance shall equal or exceed the values for the indicated voltage ranges.



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**Table R-7- AC Live-Line Work Minimum Approach Distance With Overvoltage Factor Phase-to-Ground Exposure**

Maximum anticipated per-unit transient over voltage	Distance in feet-inches						
	Maximum phase-to-phase voltage in kilovolts						
	121	145	169	242	362	552	800
1.5	.....	.....	.....	.....	.....	6-0	9-8
1.6	.....	.....	.....	.....	.....	6-6	10-8
1.7	.....	.....	.....	.....	.....	7-0	11-8
1.8	.....	.....	.....	.....	.....	7-7	12-8
1.9	.....	.....	.....	.....	.....	8-1	13-9
2.0	2-5	2-9	3-0	3-10	5-3	8-9	14-11
2.1	2-6	2-10	3-2	4-0	5-5	9-4	.....
2.2	2-7	2-11	3-3	4-1	5-9	9-11	.....
2.3	2-8	3-0	3-4	4-3	6-1	10-6	.....
2.4	2-9	3-1	3-5	4-5	6-4	11-3	.....
2.5	2-9	3-2	3-6	4-6	6-8	.....	.....
2.6	2-10	3-3	3-8	4-8	7-1	.....	.....
2.7	2-11	3-4	3-9	4-10	7-5	.....	.....
2.8	3-0	3-5	3-10	4-11	7-9	.....	.....
2.9	3-1	3-6	3-11	5-1	8-2	.....	.....
3.0	3-2	3-7	4-0	5-3	8-6	.....	.....

Note 1: The distance specified in this table may be applied only where the maximum anticipated per-unit transient overvoltage has been determined by engineering analysis and has been supplied by the employer. Table R-6 applies otherwise.

Note 2: The distances specified in this table are the air, bare-hand, and live-line tool distances.

Note 3: See Appendix B to this section for information on how the minimum approach distances listed in the tables were derived and on how to calculate revised minimum approach distances based on the control of transient overvoltages.

**Table R-8-AC Live-Line Work Minimum Approach Distance With Overvoltage Factor Phase-to-Phase Exposure**

Maximum anticipated per-unit transient over voltage	Distance in feet-inches						
	Maximum phase-to-phase voltage in kilovolts						
	121	145	169	242	362	552	800
1.5	.....	.....	.....	.....	.....	7-4	12-1
1.6	.....	.....	.....	.....	.....	8-9	14-6
1.7	.....	.....	.....	.....	.....	10-2	17-2
1.8	.....	.....	.....	.....	.....	11-7	19-11
1.9	.....	.....	.....	.....	.....	13-2	22-11
2.0	3-7	4-1	4-8	6-1	8-7	14-10	26-0
2.1	3-7	4-2	4-9	6-3	8-10	15-7	.....
2.2	3-8	4-3	4-10	6-4	9-2	16-4	.....
2.3	3-9	4-4	4-11	6-6	9-6	17-2	.....
2.4	3-10	4-5	5-0	6-7	9-11	18-1	.....
2.5	3-11	4-6	5-2	6-9	10-4	.....	.....
2.6	4-0	4-7	5-3	6-11	10-9	.....	.....
2.7	4-1	4-8	5-4	7-0	11-2	.....	.....
2.8	4-1	4-9	5-5	7-2	11-7	.....	.....
2.9	4-2	4-10	5-6	7-4	12-1	.....	.....
3.0	4-3	4-11	5-8	7-6	12-6	.....	.....

Note 1: The distance specified in this table may be applied only where the maximum anticipated per-unit transient overvoltage has been determined by engineering analysis and has been supplied by the employer. Table R-6 applies otherwise.

Note 2: The distances specified in this table are the air, bare-hand, and live-line tool distances.

Note 3: See Appendix B to this section for information on how the minimum approach distances listed in the tables were derived and on how to calculate revised minimum approach distances based on the control of transient overvoltages.

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**Table R-9- DC Live-Line Work Minimum Approach Distance With Overvoltage Factor**

Maximum anticipated per-unit transient overvoltage	Distance in feet-inches				
	Maximum line-to-ground voltage in kilovolts				
	250	400	500	600	750
1.5 or lower....	3-8	5-3	6-9	8-7	11-10
1.6.....	3-10	5-7	7-4	9-5	13-1
1.7.....	4-1	6-0	7-11	10-3	14-4
1.8.....	4-3	6-5	8-7	11-2	15-9

Note 1: The distances specified in this table may be applied only where the maximum anticipated per unit transient overvoltage has been determined by engineering analysis and has been supplied by the employer. However, if the transient overvoltage factor is not known, a factor of 1.8 shall be assumed.

Note 2: The distances specified in this table are the air, bare-hand, and live-line tool distances.

**Table R-8—DC Live-Line Minimum Approach Distance with Overvoltage Factor<sup>1</sup>**  
**[In meters]**

Maximum anticipated per-unit transient overvoltage	Distance (m)				
	maximum line-to-ground voltage (kV)				
	250	400	500	600	750
1.5 or less .....	1.12	1.60	2.06	2.62	3.61
1.6 .....	1.17	1.69	2.24	2.86	3.98
1.7 .....	1.23	1.82	2.42	3.12	4.37
1.8 .....	1.28	1.95	2.62	3.39	4.79

<sup>1</sup> The distances specified in this table are for air, bare-hand, and live-line tool conditions. If employees will be working at elevations greater than 900 meters (3,000 feet) above mean sea level, the employer shall determine minimum approach distances by multiplying the distances in this table by the correction factor in Table R-5 corresponding to the altitude of the work.

**Table R-10- Altitude Correction Factor***[See NEW Table R-5 location, changes highlighted]***Table R-9 — Assumed Maximum Per-Unit Transient Overvoltage**

Voltage range (kV)	Type of current (ac or dc)	Assumed maximum per-unit transient overvoltage
72.6 to 420.0 .....	ac	3.5
420.1 to 550.0 .....	ac	3.0
550.1 to 800.0 .....	ac	2.5
250 to 750 .....	dc	1.8

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<b>1910.269(m)</b> “Deenergizing lines and equipment for employee protection.”	<b>(m)</b> Deenergizing lines and equipment for employee protection.
<b>(m)(1)</b> “Application.” Paragraph (m) of this section applies to the deenergizing of transmission and distribution lines and equipment for the purpose of protecting employees. Control of hazardous energy sources used in the generation of electric energy is covered in paragraph (d) of this section. Conductors and parts of electric equipment that have been deenergized under procedures other than those required by paragraph (d) or (m) of this section, as applicable, shall be treated as energized.	<b>(1)</b> Application. Paragraph (m) of this section applies to the deenergizing of transmission and distribution lines and equipment for the purpose of protecting employees. <a href="#">See paragraph (d) of this section for requirements on the control of hazardous energy sources used in the generation of electric energy.</a> Conductors and parts of electric equipment that have been deenergized under procedures other than those required by paragraph (d) or (m) of this section, as applicable, shall be treated as energized.
<b>(m)(2)</b> “General.”	<b>(2)</b> General.
<b>(m)(2)(i)</b> If a system operator is in charge of the lines or equipment and their means of disconnection, all of the requirements of paragraph (m)(3) of this section shall be observed, in the order given.	<b>(i)</b> If a system operator is in charge of the lines or equipment and their means of disconnection, <b>the employer shall designate one employee in the crew to be in charge of the clearance and shall comply with</b> all of the requirements of paragraph (m)(3) of this section in the order specified.
<b>(m)(2)(ii)</b> If no system operator is in charge of the lines or equipment and their means of disconnection, one employee in the crew shall be designated as being in charge of the clearance. All of the requirements of paragraph (m)(3) of this section apply, in the order given, except as provided in paragraph (m)(2)(iii) of this section. The employee in charge of the clearance shall take the place of the system operator, as necessary.	<b>(ii)</b> If no system operator is in charge of the lines or equipment and their means of disconnection, <a href="#">the employer shall designate one employee in the crew to be in charge of the clearance and to perform the functions that the system operator would otherwise perform under paragraph (m) of this section. All of the requirements of paragraph (m)(3) of this section apply, in the order specified, except as provided in paragraph (m)(2)(iii) of this section.</a>
<b>(m)(2)(iii)</b> If only one crew will be working on the lines or equipment and if the means of disconnection is accessible and visible to and under the sole control of the employee in charge of the clearance, paragraphs (m)(3)(i), (m)(3)(iii), (m)(3)(iv), (m)(3)(viii), and (m)(3)(xii) of this section do not apply. Additionally, tags required by the remaining provisions of paragraph (m)(3) of this section need not be used.	<b>(iii)</b> If only one crew will be working on the lines or equipment and if the means of disconnection is accessible and visible to, and under the sole control of, the employee in charge of the clearance, paragraphs (m)(3)(i), (m)(3)(iii), <a href="#">and (m)(3)(v)</a> of this section do not apply. Additionally, <a href="#">the employer does not need to use the</a> tags required by the remaining provisions of paragraph (m)(3) of this section.
	<b>(iv)</b> <b>If two or more crews will be working on the same lines or equipment, then:</b>

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		(m) (2) (iv) (A)	The crews shall coordinate their activities under paragraph (m) of this section with a single employee in charge of the clearance for all of the crews and follow the requirements of paragraph (m) of this section as if all of the employees formed a single crew, or
		(B)	Each crew shall independently comply with paragraph (m) of this section and, if there is no system operator in charge of the lines or equipment, shall have separate tags and coordinate deenergizing and reenergizing the lines and equipment with the other crews.
(m)(2)(iv)	Any disconnecting means that are accessible to persons outside the employer's control (for example, the general public) shall be rendered inoperable while they are open for the purpose of protecting employees.	(v)	The employer shall render any disconnecting means that are accessible to individuals outside the employer's control (for example, the general public) inoperable while the disconnecting means are open for the purpose of protecting employees.
(m)(3)	"Deenergizing lines and equipment."	(3)	Deenergizing lines and equipment.
(m)(3)(i)	A designated employee shall make a request of the system operator to have the particular section of line or equipment deenergized. The designated employee becomes the employee in charge (as this term is used in paragraph (m)(3) of this section) and is responsible for the clearance.	(i)	The employee that the employer designates pursuant to paragraph (m)(2) of this section as being in charge of the clearance shall make a request of the system operator to deenergize the particular section of line or equipment. The designated employee becomes the employee in charge (as this term is used in paragraph (m)(3) of this section) and is responsible for the clearance.
(m)(3)(ii)	All switches, disconnectors, jumpers, taps, and other means through which known sources of electric energy may be supplied to the particular lines and equipment to be deenergized shall be opened. Such means shall be rendered inoperable, unless its design does not so permit, and tagged to indicate that employees are at work.	(ii)	The employer shall ensure that all switches, disconnectors, jumpers, taps, and other means through which known sources of electric energy may be supplied to the particular lines and equipment to be deenergized are open. The employer shall render such means inoperable, unless its design does not so permit, and then ensure that such means are tagged to indicate that employees are at work.
(m)(3)(iii)	Automatically and remotely controlled switches that could cause the opened disconnecting means to close shall also be tagged at the point of control. The automatic or remote control feature shall be rendered inoperable, unless its design does not so permit.	(iii)	The employer shall ensure that automatically and remotely controlled switches that could cause the opened disconnecting means to close are also tagged at the points of control. The employer shall render the automatic or remote control feature inoperable, unless its design does not so permit.

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		(m) (3) (iv)	The employer need not use the tags mentioned in paragraphs (m)(3)(ii) and (m)(3)(iii) of this section on a network protector for work on the primary feeder for the network protector's associated network transformer when the employer can demonstrate all of the following conditions:
		(A)	Every network protector is maintained so that it will immediately trip open if closed when a primary conductor is deenergized;
		(B)	Employees cannot manually place any network protector in a closed position without the use of tools, and any manual override position is blocked, locked, or otherwise disabled; and
		(C)	The employer has procedures for manually overriding any network protector that incorporate provisions for determining, before anyone places a network protector in a closed position, that: The line connected to the network protector is not deenergized for the protection of any employee working on the line; and (if the line connected to the network protector is not deenergized for the protection of any employee working on the line) the primary conductors for the network protector are energized.
(m)(3)(iv)	Tags shall prohibit operation of the disconnecting means and shall indicate that employees are at work.	(v)	Tags shall prohibit operation of the disconnecting means and shall indicate that employees are at work.
(m)(3)(v)	After the applicable requirements in paragraphs (m)(3)(i) through (m)(3)(iv) of this section have been followed and the employee in charge of the work has been given a clearance by the system operator, the lines and equipment to be worked shall be tested to ensure that they are deenergized.	(vi)	After the applicable requirements in paragraphs (m)(3)(i) through (m)(3)(v) of this section have been followed and the system operator gives a clearance to the employee in charge, the employer shall ensure that the lines and equipment are deenergized by testing the lines and equipment to be worked with a device designed to detect voltage.
(m)(3)(vi)	Protective grounds shall be installed as required by paragraph (n) of this section.	(vii)	The employer shall ensure the installation of protective grounds as required by paragraph (n) of this section.
(m)(3)(vii)	After the applicable requirements of paragraphs (m)(3)(i) through (m)(3)(vi) of this section have been followed, the lines and equipment involved may be worked as deenergized.	(viii)	After the applicable requirements of paragraphs (m)(3)(i) through (m)(3)(vii) of this section have been followed, the lines and equipment involved may be considered deenergized.

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(m)(3)(viii)	If two or more independent crews will be working on the same lines or equipment, each crew shall independently comply with the requirements in paragraph (m)(3) of this section.	<b>[see (m)(2)(iv)]</b>	
(m)(3)(ix)	To transfer the clearance, the employee in charge (or, if the employee in charge is forced to leave the worksite due to illness or other emergency, the employee's supervisor) shall inform the system operator; employees in the crew shall be informed of the transfer; and the new employee in charge shall be responsible for the clearance.	<b>(m) (3) (ix)</b>	To transfer the clearance, the employee in charge (or the employee's supervisor if the employee in charge must leave the worksite due to illness or other emergency) shall inform the system operator and employees in the crew; and the new employee in charge shall be responsible for the clearance.
(m)(3)(x)	To release a clearance, the employee in charge shall:	<b>(x)</b>	To release a clearance, the employee in charge shall:
(m)(3)(x)(A)	Notify employees under his or her direction that the clearance is to be released;	<b>(A)</b>	Notify each employee under that clearance of the pending release of the clearance;
(m)(3)(x)(B)	Determine that all employees in the crew are clear of the lines and equipment;	<b>(B)</b>	Ensure that all employees under that clearance are clear of the lines and equipment;
(m)(3)(x)(C)	Determine that all protective grounds installed by the crew have been removed; and	<b>(C)</b>	Ensure that all protective grounds protecting employees under that clearance have been removed; and
(m)(3)(x)(D)	Report this information to the system operator and release the clearance.	<b>(D)</b>	Report this information to the system operator and then release the clearance.
(m)(3)(xi)	The person releasing a clearance shall be the same person that requested the clearance, unless responsibility has been transferred under paragraph (m)(3)(ix) of this section.	<b>(xi)</b>	Only the employee in charge who requested the clearance may release the clearance, unless the employer transfers responsibility under paragraph (m)(3)(ix) of this section.
(m)(3)(xii)	Tags may not be removed unless the associated clearance has been released under paragraph (m)(3)(x) of this section.	<b>(xii)</b>	No one may remove tags without the release of the associated clearance as specified under paragraphs (m)(3)(x) and (m)(3)(xi) of this section.
(m)(3)(xiii)	Only after all protective grounds have been removed, after all crews working on the lines or equipment have released their clearances, after all employees are clear of the lines and equipment, and after all protective tags have been removed from a given point of disconnection, may action be initiated to reenergize the lines or equipment at that point of disconnection.	<b>(xiii)</b>	The employer shall ensure that no one initiates action to reenergize the lines or equipment at a point of disconnection until all protective grounds have been removed, all crews working on the lines or equipment release their clearances, all employees are clear of the lines and equipment, and all protective tags are removed from that point of disconnection.

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<p><b>1910.269(n)</b> “Grounding for the protection of employees.”</p> <p>(n)(1) “Application.” Paragraph (n) of this section applies to the grounding of transmission and distribution lines and equipment for the purpose of protecting employees. Paragraph (n)(4) of this section also applies to the protective grounding of other equipment as required elsewhere in this section.</p>	<p>(n) Grounding for the protection of employees.</p> <p>(1) Application. Paragraph (n) of this section applies to grounding of generation, transmission, and distribution lines and equipment for the purpose of protecting employees. Paragraph (n)(4) of this section also applies to protective grounding of other equipment as required elsewhere in this section.</p>
	<p>[Ø] Note to paragraph (n)(1): This paragraph covers grounding of generation, transmission, and distribution lines and equipment when this section requires protective grounding and whenever the employer chooses to ground such lines and equipment for the protection of employees.</p>
<p>(n)(2) “General.” For the employee to work lines or equipment as deenergized, the lines or equipment shall be deenergized under the provisions of paragraph (m) of this section and shall be grounded as specified in paragraphs (n)(3) through (n)(9) of this section. However, if the employer can demonstrate that installation of a ground is impracticable or that the conditions resulting from the installation of a ground would present greater hazards than working without grounds, the lines and equipment may be treated as deenergized provided all of the following conditions are met:</p>	<p>(2) General. For any employee to work transmission and distribution lines or equipment as deenergized, the employer shall ensure that the lines or equipment are deenergized under the provisions of paragraph (m) of this section and shall ensure proper grounding of the lines or equipment as specified in paragraphs (n)(3) through (n)(8) of this section. However, if the employer can demonstrate that installation of a ground is impracticable or that the conditions resulting from the installation of a ground would present greater hazards to employees than working without grounds, the lines and equipment may be treated as deenergized provided that the employer establishes that all of the following conditions apply:</p>
<p>(n)(2)(i) The lines and equipment have been deenergized under the provisions of paragraph (m) of this section.</p>	<p>(i) The employer ensures that the lines and equipment are deenergized under the provisions of paragraph (m) of this section.</p>
<p>(n)(2)(ii) There is no possibility of contact with another energized source.</p>	<p>(ii) There is no possibility of contact with another energized source.</p>
<p>(n)(2)(iii) The hazard of induced voltage is not present.</p>	<p>(iii) The hazard of induced voltage is not present.</p>
<p>(n)(3) “Equipotential zone.” Temporary protective grounds shall be placed at such locations and arranged in such a manner as to prevent each employee from being exposed to hazardous differences in electrical potential.</p>	<p>(3) Equipotential zone. Temporary protective grounds shall be placed at such locations and arranged in such a manner that the employer can demonstrate will prevent each employee from being exposed to hazardous differences in electric potential.</p>



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		[Ø]	Note to paragraph (n)(3): Appendix C to this section contains guidelines for establishing the equipotential zone required by this paragraph. The Occupational Safety and Health Administration will deem grounding practices meeting these guidelines as complying with paragraph (n)(3) of this section.
(n)(4)	“Protective grounding equipment.”	(n) (4)	Protective grounding equipment.
(n)(4)(i)	Protective grounding equipment shall be capable of conducting the maximum fault current that could flow at the point of grounding for the time necessary to clear the fault. This equipment shall have an ampacity greater than or equal to that of No. 2 AWG copper.	(i)	Protective grounding equipment shall be capable of conducting the maximum fault current that could flow at the point of grounding for the time necessary to clear the fault.
	Note: Guidelines for protective grounding equipment are contained in American Society for Testing and Materials Standard Specifications for Temporary Grounding Systems to be Used on De-Energized Electric Power Lines and Equipment, ASTM F855-1990.	(ii)	Protective grounding equipment shall have an ampacity greater than or equal to that of No. 2 AWG copper.
			[Moved to end of (n)(4)]
(n)(4)(ii)	Protective grounds shall have an impedance low enough to cause immediate operation of protective devices in case of accidental energizing of the lines or equipment.	(iii)	Protective grounds shall have an impedance low enough so that they do not delay the operation of protective devices in case of accidental energizing of the lines or equipment.
		[Ø]	Note to paragraph (n)(4): American Society for Testing and Materials Standard Specifications for Temporary Protective Grounds to Be Used on De-Energized Electric Power Lines and Equipment, ASTM F855-09, contains guidelines for protective grounding equipment. The Institute of Electrical Engineers Guide for Protective Grounding of Power Lines, IEEE Std 1048-2003, contains guidelines for selecting and installing protective grounding equipment.
(n)(5)	“Testing.” Before any ground is installed, lines and equipment shall be tested and found absent of nominal voltage, unless a previously installed ground is present.	(5)	Testing. The employer shall ensure that, unless a previously installed ground is present, employees test lines and equipment and verify the absence of nominal voltage before employees install any ground on those lines or that equipment.

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<p>(n)(6) “Order of connection.” When a ground is to be attached to a line or to equipment, the ground-end connection shall be attached first, and then the other end shall be attached by means of a live-line tool.</p>	<p>(n) (6) <b>Connecting and removing grounds.</b>          (6) (i) The employer shall ensure that, when an employee attaches a ground to a line or to equipment, the employee attaches the ground-end connection first and then attaches the other end by means of a live-line tool. For lines or equipment operating at 600 volts or less, the employer may permit the employee to use insulating equipment other than a live-line tool if the employer ensures that the line or equipment is not energized at the time the ground is connected or if the employer can demonstrate that each employee is protected from hazards that may develop if the line or equipment is energized.</p>
	<p>(ii) The employer shall ensure that, when an employee removes a ground, the employee removes the grounding device from the line or equipment using a live-line tool before he or she removes the ground-end connection. For lines or equipment operating at 600 volts or less, the employer may permit the employee to use insulating equipment other than a live-line tool if the employer ensures that the line or equipment is not energized at the time the ground is disconnected or if the employer can demonstrate that each employee is protected from hazards that may develop if the line or equipment is energized.</p>
<p>(n)(8) “Additional precautions.” When work is performed on a cable at a location remote from the cable terminal, the cable may not be grounded at the cable terminal if there is a possibility of hazardous transfer of potential should a fault occur.</p>	<p>(7) <b>Additional precautions.</b> The employer shall ensure that, when an employee performs work on a cable at a location remote from the cable terminal, the cable is not grounded at the cable terminal if there is a possibility of hazardous transfer of potential should a fault occur.</p>
<p>(n)(9) “Removal of grounds for test.” Grounds may be removed temporarily during tests. During the test procedure, the employer shall ensure that each employee uses insulating equipment and is isolated from any hazards involved, and the employer shall institute any additional measures as may be necessary to protect each exposed employee in case the previously grounded lines and equipment become energized.</p>	<p>(8) <b>Removal of grounds for test.</b> The employer may permit employees to remove grounds temporarily during tests. During the test procedure, the employer shall ensure that each employee uses insulating equipment, shall isolate each employee from any hazards involved, and shall implement any additional measures necessary to protect each exposed employee in case the previously grounded lines and equipment become energized.</p>

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<b>1910.269(o)</b>	“Testing and test facilities.”	<b>(o)</b>	Testing and test facilities.
<b>(o)(1)</b>	“Application.” Paragraph (o) of this section provides for safe work practices for high-voltage and high-power testing performed in laboratories, shops, and substations, and in the field and on electric transmission and distribution lines and equipment. It applies only to testing involving interim measurements utilizing high voltage, high power, or combinations of both, and not to testing involving continuous measurements as in routine metering, relaying, and normal line work.	<b>(1)</b>	Application. Paragraph (o) of this section provides for safe work practices for high-voltage and high-power testing performed in laboratories, shops, and substations, and in the field and on electric transmission and distribution lines and equipment. It applies only to testing involving interim measurements using high voltage, high power, or combinations of high voltage and high power, and not to testing involving continuous measurements as in routine metering, relaying, and normal line work.
	Note: Routine inspection and maintenance measurements made by qualified employees are considered to be routine line work and are not included in the scope of paragraph (o) of this section, as long as the hazards related to the use of intrinsic high-voltage or high-power sources require only the normal precautions associated with routine operation and maintenance work required in the other paragraphs of this section. Two typical examples of such excluded test work procedures are “phasing-out” testing and testing for a “no-voltage” condition.	<b>[Ø]</b>	<b>Note to paragraph (o)(1):</b> OSHA considers routine inspection and maintenance measurements made by qualified employees to be routine line work not included in the scope of paragraph (o) of this section, provided that the hazards related to the use of intrinsic high-voltage or high-power sources require only the normal precautions associated with routine work specified in the other paragraphs of this section. Two typical examples of such excluded test work procedures are “phasing-out” testing and testing for a “no-voltage” condition.
<b>(o)(2)</b>	“General requirements.”	<b>(2)</b>	General requirements.
<b>(o)(2)(i)</b>	The employer shall establish and enforce work practices for the protection of each worker from the hazards of high-voltage or high-power testing at all test areas, temporary and permanent. Such work practices shall include, as a minimum, test area guarding, grounding, and the safe use of measuring and control circuits. A means providing for periodic safety checks of field test areas shall also be included. (See paragraph (o)(6) of this section.)	<b>(i)</b>	The employer shall establish and enforce work practices for the protection of each worker from the hazards of high-voltage or high-power testing at all test areas, temporary and permanent. Such work practices shall include, as a minimum, test area safeguarding, grounding, the safe use of measuring and control circuits, and a means providing for periodic safety checks of field test areas.
<b>(o)(2)(ii)</b>	Employees shall be trained in safe work practices upon their initial assignment to the test area, with periodic reviews and updates provided as required by paragraph (a)(2) of this section.	<b>(ii)</b>	The employer shall ensure that each employee, upon initial assignment to the test area, receives training in safe work practices, with retraining provided as required by paragraph (a)(2) of this section.
<b>(o)(3)</b>	“Guarding of test areas.”	<b>(3)</b>	Safeguarding of test areas.

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		(o) (3) (i)	The employer shall provide safeguarding within test areas to control access to test equipment or to apparatus under test that could become energized as part of the testing by either direct or inductive coupling and to prevent accidental employee contact with energized parts.
(o)(3)(i)	Permanent test areas shall be guarded by walls, fences, or barriers designed to keep employees out of the test areas.	(ii)	The employer shall guard permanent test areas with walls, fences, or other barriers designed to keep employees out of the test areas.
(o)(3)(ii)	In field testing, or at a temporary test site where permanent fences and gates are not provided, one of the following means shall be used to prevent unauthorized employees from entering:	(iii)	In field testing, or at a temporary test site not guarded by permanent fences and gates, the employer shall ensure the use of one of the following means to prevent employees without authorization from entering:
(o)(3)(ii)(A)	The test area shall be guarded by the use of distinctively colored safety tape that is supported approximately waist high and to which safety signs are attached,	(A)	Distinctively colored safety tape supported approximately waist high with safety signs attached to it,
(o)(3)(ii)(B)	The test area shall be guarded by a barrier or barricade that limits access to the test area to a degree equivalent, physically and visually, to the barricade specified in paragraph (o)(3)(ii)(A) of this section, or	(B)	A barrier or barricade that limits access to the test area to a degree equivalent, physically and visually, to the barricade specified in paragraph (o)(3)(iii)(A) of this section, or
(o)(3)(ii)(C)	The test area shall be guarded by one or more test observers stationed so that the entire area can be monitored.	(C)	One or more test observers stationed so that they can monitor the entire area.
(o)(3)(iii)	The barriers required by paragraph (o)(3)(ii) of this section shall be removed when the protection they provide is no longer needed.	(iv)	The employer shall ensure the removal of the safeguards required by paragraph (o)(3)(iii) of this section when employees no longer need the protection afforded by the safeguards.
(o)(3)(iv)	Guarding shall be provided within test areas to control access to test equipment or to apparatus under test that may become energized as part of the testing by either direct or inductive coupling, in order to prevent accidental employee contact with energized parts.		
(o)(4)	"Grounding practices."	(4)	Grounding practices.
(o)(4)(i)	The employer shall establish and implement safe grounding practices for the test facility.	(i)	The employer shall establish and implement safe grounding practices for the test facility.
(o)(4)(i)(A)	All conductive parts accessible to the test operator during the time the equipment is operating at high voltage shall be maintained at ground potential except for portions of the equipment that are isolated from the test operator by guarding.	(A)	The employer shall maintain at ground potential all conductive parts accessible to the test operator while the equipment is operating at high voltage.

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(o)(4)(i)(B) Wherever ungrounded terminals of test equipment or apparatus under test may be present, they shall be treated as energized until determined by tests to be deenergized.	(o) (4) (i) (B) Wherever ungrounded terminals of test equipment or apparatus under test may be present, they shall be treated as energized until tests demonstrate that they are deenergized.
(o)(4)(ii) Visible grounds shall be applied, either automatically or manually with properly insulated tools, to the high-voltage circuits after they are deenergized and before work is performed on the circuit or item or apparatus under test. Common ground connections shall be solidly connected to the test equipment and the apparatus under test.	(ii) The employer shall ensure either that visible grounds are applied automatically, or that employees using properly insulated tools manually apply visible grounds, to the high-voltage circuits after they are deenergized and before any employee performs work on the circuit or on the item or apparatus under test. Common ground connections shall be solidly connected to the test equipment and the apparatus under test.
(o)(4)(iii) In high-power testing, an isolated ground-return conductor system shall be provided so that no intentional passage of current, with its attendant voltage rise, can occur in the ground grid or in the earth. However, an isolated ground-return conductor need not be provided if the employer can demonstrate that both the following conditions are met:	(iii) In high-power testing, the employer shall provide an isolated ground-return conductor system designed to prevent the intentional passage of current, with its attendant voltage rise, from occurring in the ground grid or in the earth. However, the employer need not provide an isolated ground-return conductor if the employer can demonstrate that both of the following conditions exist:
(o)(4)(iii)(A) An isolated ground-return conductor cannot be provided due to the distance of the test site from the electric energy source, and	(A) The employer cannot provide an isolated ground-return conductor due to the distance of the test site from the electric energy source, and
(o)(4)(iii)(B) Employees are protected from any hazardous step and touch potentials that may develop during the test.	(B) The employer protects employees from any hazardous step and touch potentials that may develop during the test.
Note: See Appendix C to this section for information on measures that can be taken to protect employees from hazardous step and touch potentials.	[Ø] Note to paragraph (o)(4)(iii)(B): See Appendix C to this section for information on measures that employers can take to protect employees from hazardous step and touch potentials.
(o)(4)(iv) In tests in which grounding of test equipment by means of the equipment grounding conductor located in the equipment power cord cannot be used due to increased hazards to test personnel or the prevention of satisfactory measurements, a ground that the employer can demonstrate affords equivalent safety shall be provided, and the safety ground shall be clearly indicated in the test set-up.	(iv) For tests in which using the equipment grounding conductor in the equipment power cord to ground the test equipment would result in greater hazards to test personnel or prevent the taking of satisfactory measurements, the employer may use a ground clearly indicated in the test set-up if the employer can demonstrate that this ground affords protection for employees equivalent to the protection afforded by an equipment grounding conductor in the power supply cord.

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(o)(4)(v) When the test area is entered after equipment is deenergized, a ground shall be placed on the high-voltage terminal and any other exposed terminals.	(o) (4) (v) <b>The employer shall ensure</b> that, when any employee enters the test area after equipment is deenergized, a ground is placed on the high-voltage terminal and any other exposed terminals.
(o)(4)(v)(A) High capacitance equipment or apparatus shall be discharged through a resistor rated for the available energy.	(A) <b>Before any employee applies a direct ground, the employer shall</b> discharge high capacitance equipment through a resistor rated for the available energy.
(o)(4)(v)(B) A direct ground shall be applied to the exposed terminals when the stored energy drops to a level at which it is safe to do so.	(B) A direct ground shall be applied to the exposed terminals after the stored energy drops to a level at which it is safe to do so.
(o)(4)(vi) If a test trailer or test vehicle is used in field testing, its chassis shall be grounded. Protection against hazardous touch potentials with respect to the vehicle, instrument panels, and other conductive parts accessible to employees shall be provided by bonding, insulation, or isolation.	(vi) <b>If the employer uses a test trailer or test vehicle in field testing, its chassis shall be grounded. The employer shall protect each employee against hazardous touch potentials with respect to the vehicle, instrument panels, and other conductive parts accessible to employees with bonding, insulation, or isolation.</b>
(o)(5) "Control and measuring circuits."	(5) Control and measuring circuits.
(o)(5)(i) Control wiring, meter connections, test leads and cables may not be run from a test area unless they are contained in a grounded metallic sheath and terminated in a grounded metallic enclosure or unless other precautions are taken that the employer can demonstrate as ensuring equivalent safety.	(i) <b>The employer may not run</b> control wiring, meter connections, test leads, or cables from a test area unless contained in a grounded metallic sheath and terminated in a grounded metallic enclosure or unless <b>the employer takes other precautions that it can demonstrate will provide employees with equivalent safety.</b>
(o)(5)(ii) Meters and other instruments with accessible terminals or parts shall be isolated from test personnel to protect against hazards arising from such terminals and parts becoming energized during testing. If this isolation is provided by locating test equipment in metal compartments with viewing windows, interlocks shall be provided to interrupt the power supply if the compartment cover is opened.	(ii) <b>The employer shall</b> isolate meters and other instruments with accessible terminals or parts from test personnel to protect against hazards that could arise should such terminals and parts become energized during testing. <b>If the employer provides</b> this isolation by locating test equipment in metal compartments with viewing windows, <b>the employer shall provide</b> interlocks to interrupt the power <b>supply when someone opens the compartment cover.</b>
(o)(5)(iii) The routing and connections of temporary wiring shall be made secure against damage, accidental interruptions and other hazards. To the maximum extent possible, signal, control, ground, and power cables shall be kept separate.	(iii) <b>The employer shall protect</b> temporary wiring and its connections against damage, accidental interruptions, and other hazards. To the maximum extent possible, <b>the employer shall</b> keep signal, control, ground, and power cables separate from each other.

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(o)(5)(iv)	If employees will be present in the test area during testing, a test observer shall be present. The test observer shall be capable of implementing the immediate deenergizing of test circuits for safety purposes.	(o) (5) (iv)	If <b>any</b> employee will be present in the test area during testing, a test observer shall be present. The test observer shall be capable of implementing the immediate deenergizing of test circuits for safety purposes.
(o)(6)	"Safety check."	(6)	Safety check.
(o)(6)(i)	Safety practices governing employee work at temporary or field test areas shall provide for a routine check of such test areas for safety at the beginning of each series of tests.	(i)	<b>Safety practices governing employee work at temporary or field test areas shall provide, at the beginning of each series of tests, for a routine safety check of such test areas.</b>
(o)(6)(ii)	The test operator in charge shall conduct these routine safety checks before each series of tests and shall verify at least the following conditions:	(ii)	The test operator in charge shall conduct these routine safety checks before each series of tests and shall verify at least the following conditions:
(o)(6)(ii)(A)	That barriers and guards are in workable condition and are properly placed to isolate hazardous areas;	(A)	<b>Barriers and safeguards are in workable condition and placed properly to isolate hazardous areas;</b>
(o)(6)(ii)(B)	<del>That</del> system test status signals, if used, are in operable condition;	(B)	System test status signals, if used, are in operable condition;
(o)(6)(ii)(C)	That test power disconnects are clearly marked and readily available in an emergency;	(C)	<b>Clearly marked test-power disconnects are readily available in an emergency;</b>
(o)(6)(ii)(D)	That ground connections are clearly identifiable;	(D)	Ground connections are clearly identifiable;
(o)(6)(ii)(E)	<del>That</del> personal protective equipment is provided and used as required by Subpart I of this Part and by this section; and	(E)	Personal protective equipment is provided and used as required by Subpart I of this part and by this section; and
(o)(6)(ii)(F)	That signal, ground, and power cables are properly separated.	(F)	<b>Proper separation between signal, ground, and power cables.</b>



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<b>1910.269(p)</b>	“Mechanical equipment.”	<b>(p)</b>	Mechanical equipment.
<b>(p)(1)</b>	“General requirements.”	<b>(1)</b>	General requirements.
<b>(p)(1)(i)</b>	The critical safety components of mechanical elevating and rotating equipment shall receive a thorough visual inspection before use on each shift.	<b>(i)</b>	The critical safety components of mechanical elevating and rotating equipment shall receive a thorough visual inspection before use on each shift.
	Note: Critical safety components of mechanical elevating and rotating equipment are components whose failure would result in a free fall or free rotation of the boom.	<b>[Ø]</b>	Note to paragraph (p)(1)(i): Critical safety components of mechanical elevating and rotating equipment are components <b>for which</b> failure would result in free fall or free rotation of the boom.
<b>(p)(1)(ii)</b>	No vehicular equipment having an obstructed view to the rear may be operated on off-highway jobsites where any employee is exposed to the hazards created by the moving vehicle, unless:	<b>(ii)</b>	<b>No motor vehicle or earthmoving or compacting equipment</b> having an obstructed view to the rear may be operated on off-highway jobsites where any employee is exposed to the hazards created by the moving vehicle, unless:
<b>(p)(1)(ii)(A)</b>	The vehicle has a reverse signal alarm audible above the surrounding noise level, or	<b>(A)</b>	The vehicle has a reverse signal alarm audible above the surrounding noise level, or
<b>(p)(1)(ii)(B)</b>	The vehicle is backed up only when a designated employee signals that it is safe to do so.	<b>(B)</b>	The vehicle is backed up only when a designated employee signals that it is safe to do so.
<b>(p)(1)(iii)</b>	The operator of an electric line truck may not leave his or her position at the controls while a load is suspended, unless the employer can demonstrate that no employee (including the operator) might be endangered.	<b>(iii)</b>	Rubber-tired self-propelled scrapers, rubber-tired front-end loaders, rubber-tired dozers, wheel-type agricultural and industrial tractors, crawler-type tractors, crawler-type loaders, and motor graders, with or without attachments, shall have rollover protective structures that meet the requirements of Subpart W of Part 1926 of this chapter.
<b>(p)(1)(iv)</b>	Rubber-tired, self-propelled scrapers, rubber-tired front-end loaders, rubber-tired dozers, wheel-type agricultural and industrial tractors, crawler-type tractors, crawler-type loaders, and motor graders, with or without attachments, shall have roll-over protective structures that meet the requirements of Subpart W of Part 1926 of this chapter.	<b>(iv)</b>	The operator of an electric line truck may not leave his or her position at the controls while a load is suspended, unless the employer can demonstrate that no employee (including the operator) is endangered.
<b>(p)(2)</b>	“Outriggers.”	<b>(2)</b>	Outriggers.
<b>(p)(2)(i)</b>	Vehicular equipment, if provided with outriggers, shall be operated with the outriggers extended and firmly set as <del>necessary for the stability of the specific configuration of the equipment.</del> Outriggers may not be extended or retracted outside of clear view of the operator unless all employees are outside the range of possible equipment motion.	<b>(i)</b>	Mobile equipment, if provided with outriggers, shall be operated with the outriggers extended and firmly set, except as provided in paragraph (p)(2)(iii) of this section.
		<b>(ii)</b>	Outriggers may not be extended or retracted outside of the clear view of the operator unless all employees are outside the range of possible equipment motion.

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(p)(2)(ii) If the work area or the terrain precludes the use of outriggers, the equipment may be operated only within its maximum load ratings for the particular configuration of the equipment without outriggers.	(p) (2) (iii) If the work area or the terrain precludes the use of outriggers, the equipment may be operated only within its maximum load ratings <b>specified by the equipment manufacturer</b> for the particular configuration of the equipment without outriggers.
(p)(3) “Applied loads.” Mechanical equipment used to lift or move lines or other material shall be used within its maximum load rating and other design limitations for the conditions under which the work is being performed.	(3) Applied loads. Mechanical equipment used to lift or move lines or other material shall be used within its maximum load rating and other design limitations for the conditions under which the mechanical equipment is being used.
(p)(4) “Operations near energized lines or equipment.”	(4) Operations near energized lines or equipment.
(p)(4)(i) Mechanical equipment shall be operated so that the minimum approach distances of Table R-6 through Table R-10 are maintained from exposed energized lines and equipment. However, the insulated portion of an aerial lift operated by a qualified employee in the lift is exempt from this requirement.	(i) Mechanical equipment shall be operated so that the minimum approach distances, <b>established by the employer under paragraph (l)(3)(i) of this section</b> , are maintained from exposed energized lines and equipment. However, the insulated portion of an aerial lift operated by a qualified employee in the lift is exempt from this requirement <b>if the applicable minimum approach distance is maintained between the uninsulated portions of the aerial lift and exposed objects having a different electrical potential.</b>
(p)(4)(ii) A designated employee other than the equipment operator shall observe the approach distance to exposed lines and equipment and give timely warnings before the minimum approach distance required by paragraph (p)(4)(i) is reached, unless the employer can demonstrate that the operator can accurately determine that the minimum approach distance is being maintained.	(ii) A designated employee other than the equipment operator shall observe the approach distance to exposed lines and equipment and <b>provide</b> timely warnings before the minimum approach distance required by paragraph (p)(4)(i) <b>of this section</b> is reached, unless the employer can demonstrate that the operator can accurately determine that the minimum approach distance is being maintained.
(p)(4)(iii) If, during operation of the mechanical equipment, the equipment could become energized, the operation shall also comply with at least one of paragraphs (p)(4)(iii)(A) through (p)(4)(iii)(C) of this section.	(iii) If, during operation of the mechanical equipment, that equipment could become energized, the operation also shall comply with at least one of paragraphs (p)(4)(iii)(A) through (p)(4)(iii)(C) of this section.
(p)(4)(iii)(A) The energized lines exposed to contact shall be covered with insulating protective material that will withstand the type of contact that might be made during the operation.	(A) The energized lines <b>or equipment</b> exposed to contact shall be covered with insulating protective material that will withstand the type of contact that could be made during the operation.

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(p)(4)(iii)(B) The equipment shall be insulated for the voltage involved. The equipment shall be positioned so that its uninsulated portions cannot approach the lines or equipment any closer than the minimum approach distances specified in Table R-6 through Table R-10.	(p) (4) (iii) (B) The <b>mechanical</b> equipment shall be insulated for the voltage involved. The <b>mechanical</b> equipment shall be positioned so that its uninsulated portions cannot approach the <b>energized</b> lines or equipment any closer than the minimum approach distances, <b>established by the employer</b> under paragraph (l)(3)(i) of this section.
(p)(4)(iii)(C) Each employee shall be protected from hazards that might arise from equipment contact with the energized lines. The measures used shall ensure that employees will not be exposed to hazardous differences in potential. Unless the employer can demonstrate that the methods in use protect each employee from the hazards that might arise if the equipment contacts the energized line, the measures used shall include all of the following techniques:	(C) Each employee shall be protected from hazards that <b>could</b> arise from <b>mechanical</b> equipment contact with energized lines or equipment. The measures used shall ensure that employees will not be exposed to hazardous differences in electric potential. Unless the employer can demonstrate that the methods in use protect each employee from the hazards that could arise if the mechanical equipment contacts the energized line or equipment, the measures used shall include all of the following techniques:
(p)(4)(iii)(C)(1) Using the best available ground to minimize the time the lines remain energized,	(1) Using the best available ground to minimize the time the lines <b>or electric equipment remain energized,</b>
(p)(4)(iii)(C)(2) Bonding equipment together to minimize potential differences,	(2) Bonding <b>mechanical</b> equipment together to minimize potential differences,
(p)(4)(iii)(C)(3) Providing ground mats to extend areas of equipotential, and	(3) Providing ground mats to extend areas of equipotential, and
(p)(4)(iii)(C)(4) Employing insulating protective equipment or barricades to guard against any remaining hazardous potential differences.	(4) Employing insulating protective equipment or barricades to guard against any remaining hazardous electrical potential differences.
Note: Appendix C to this section contains information on hazardous step and touch potentials and on methods of protecting employees from hazards resulting from such potentials.	[Ø] Note to paragraph (p)(4)(iii)(C): Appendix C to this section contains information on hazardous step and touch potentials and on methods of protecting employees from hazards resulting from such potentials.

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<b>1910.269(q)</b> “Overhead lines.” This paragraph provides additional requirements for work performed on or near overhead lines and equipment.	<b>(q)</b> Overhead lines and live-line barehand work. <b>(1)</b> This paragraph provides additional requirements for work performed on or near overhead lines and equipment and <b>for live-line barehand work.</b>
<b>(q)(1)</b> “General.”	<b>(q)</b> General.
<b>(q)(1)(i)</b> Before elevated structures, such as poles or towers, are subjected to such stresses as climbing or the installation or removal of equipment may impose, the employer shall ascertain that the structures are capable of sustaining the additional or unbalanced stresses. If the pole or other structure cannot withstand the loads which will be imposed, it shall be braced or otherwise supported so as to prevent failure.	<b>(i)</b> Before allowing employees to subject elevated structures, such as poles or towers, to such stresses as climbing or the installation or removal of equipment may impose, the employer shall ascertain that the structures are capable of sustaining the additional or unbalanced stresses. If the pole or other structure cannot withstand the expected loads, the employer shall brace or otherwise support the pole or structure so as to prevent failure.
<b>Note:</b> Appendix D to this section contains test methods that can be used in ascertaining whether a wood pole is capable of sustaining the forces that would be imposed by an employee climbing the pole. This paragraph also requires the employer to ascertain that the pole can sustain all other forces that will be imposed by the work to be performed.	<b>[Ø]</b> Note to paragraph (q)(1)(i): Appendix D to this section contains test methods that <b>employers</b> can use in ascertaining whether a wood pole is capable of sustaining the forces imposed by an employee climbing the pole. This paragraph also requires the employer to ascertain that the pole can sustain all other forces imposed by the work employees will perform.
<b>(q)(1)(ii)</b> When poles are set, moved, or removed near exposed energized overhead conductors, the pole may not contact the conductors.	<b>(ii)</b> When a pole is set, moved, or removed near an exposed energized overhead conductor, the pole may not contact the conductor.
<b>(q)(1)(iii)</b> When a pole is set, moved, or removed near an exposed energized overhead conductor, the employer shall ensure that each employee wears electrical protective equipment or uses insulated devices when handling the pole and that no employee contacts the pole with uninsulated parts of his or her body.	<b>(iii)</b> When a pole is set, moved, or removed near an exposed energized overhead conductor, the employer shall ensure that each employee wears electrical protective equipment or uses insulated devices when handling the pole and that no employee contacts the pole with uninsulated parts of his or her body.
<b>(q)(1)(iv)</b> To protect employees from falling into holes into which poles are to be placed, the holes shall be attended by employees or physically guarded whenever anyone is working nearby.	<b>(iv)</b> To protect employees from falling into holes used for placing poles, the employer shall physically guard the holes, or ensure that employees attend the holes, whenever anyone is working nearby.
<b>(q)(2)</b> “Installing and removing overhead lines.” The following provisions apply to the installation and removal of overhead conductors or cable.	<b>(2)</b> Installing and removing overhead lines. The following provisions apply to the installation and removal of overhead conductors or cable ( <b>overhead lines</b> ).

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(q)(2)(i)	The employer shall use the tension stringing method, barriers, or other equivalent measures to minimize the possibility that conductors and cables being installed or removed will contact energized power lines or equipment.	(q) (2) (i)	When lines that employees are installing or removing can contact energized parts, the employer shall use the tension-stringing method, barriers, or other equivalent measures to minimize the possibility that conductors and cables the employees are installing or removing will contact energized power lines or equipment.
(q)(2)(ii)	The protective measures required by paragraph (p)(4)(iii) of this section for mechanical equipment shall also be provided for conductors, cables, and pulling and tensioning equipment when the conductor or cable is being installed or removed close enough to energized conductors that any of the following failures could energize the pulling or tensioning equipment or the wire or cable being installed or removed:	(ii)	For conductors, cables, and pulling and tensioning equipment, the employer shall provide the protective measures required by paragraph (p)(4)(iii) of this section when employees are installing or removing a conductor or cable close enough to energized conductors that any of the following failures could energize the pulling or tensioning equipment or the conductor or cable being installed or removed:
(q)(2)(ii)(A)	Failure of the pulling or tensioning equipment,	(A)	Failure of the pulling or tensioning equipment,
(q)(2)(ii)(B)	Failure of the wire or cable being pulled, or	(B)	Failure of the conductor or cable being pulled, or
(q)(2)(ii)(C)	Failure of the previously installed lines or equipment.	(C)	Failure of the previously installed lines or equipment.
(q)(2)(iii)	If the conductors being installed or removed cross over energized conductors in excess of 600 volts and if the design of the circuit-interrupting devices protecting the lines so permits, the automatic-reclosing feature of these devices shall be made inoperative.	(iii)	If the conductors that employees are installing or removing cross over energized conductors in excess of 600 volts and if the design of the circuit-interrupting devices protecting the lines so permits, the employer shall render inoperable the automatic-reclosing feature of these devices.
(q)(2)(iv)	Before lines are installed parallel to existing energized lines, the employer shall make a determination of the approximate voltage to be induced in the new lines, or work shall proceed on the assumption that the induced voltage is hazardous. Unless the employer can demonstrate that the lines being installed are not subject to the induction of a hazardous voltage or unless the lines are treated as energized, the following requirements also apply:	(iv)	Before employees install lines parallel to existing energized lines, the employer shall make a determination of the approximate voltage to be induced in the new lines, or work shall proceed on the assumption that the induced voltage is hazardous. Unless the employer can demonstrate that the lines that employees are installing are not subject to the induction of a hazardous voltage or unless the lines are treated as energized, temporary protective grounds shall be placed at such locations and arranged in such a manner that the employer can demonstrate will prevent exposure of each employee to hazardous differences in electric potential.
(q)(2)(iv)(A)	<del>Each bare conductor shall be grounded in increments so that no point along the conductor is more than 2 miles (3.22 km) from a ground.</del>		

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(q)(2)(iv)(B)	The grounds required in paragraph (q)(2)(iv)(A) of this section shall be left in place until the conductor installation is completed between dead ends.		
(q)(2)(iv)(C)	The grounds required in paragraph (q)(2)(iv)(A) of this section shall be removed as the last phase of aerial cleanup.		
(q)(2)(iv)(D)	If employees are working on bare conductors, grounds shall also be installed at each location where these employees are working, and grounds shall be installed at all open dead-end or catch-off points or the next adjacent structure.		
(q)(2)(iv)(E)	If two bare conductors are to be spliced, the conductors shall be bonded and grounded before being spliced.		
		[Ø]	Note 1 to paragraph (q)(2)(iv): If the employer takes no precautions to protect employees from hazards associated with involuntary reactions from electric shock, a hazard exists if the induced voltage is sufficient to pass a current of 1 milliamperes through a 500-ohm resistor. If the employer protects employees from injury due to involuntary reactions from electric shock, a hazard exists if the resultant current would be more than 6 milliamperes.
		[Ø]	Note 2 to paragraph (q)(2)(iv): Appendix C to this section contains guidelines for protecting employees from hazardous differences in electric potential as required by this paragraph.
(q)(2)(v)	Reel handling equipment, including pulling and tensioning devices, shall be in safe operating condition and shall be leveled and aligned.	(q) (2) (v)	Reel-handling equipment, including pulling and tensioning devices, shall be in safe operating condition and shall be leveled and aligned.
(q)(2)(vi)	Load ratings of stringing lines, pulling lines, conductor grips, load-bearing hardware and accessories, rigging, and hoists may not be exceeded.	(vi)	The employer shall ensure that employees do not exceed load ratings of stringing lines, pulling lines, conductor grips, load-bearing hardware and accessories, rigging, and hoists.
(q)(2)(vii)	Pulling lines and accessories shall be repaired or replaced when defective.	(vii)	The employer shall repair or replace defective pulling lines and accessories.
(q)(2)(viii)	Conductor grips may not be used on wire rope, unless the grip is specifically designed for this application.	(viii)	The employer shall ensure that employees do not use conductor grips on wire rope unless the manufacturer specifically designed the grip for this application.

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(q)(2)(ix)	Reliable communications, through two-way radios or other equivalent means, shall be maintained between the reel tender and the pulling rig operator.	(q) (2) (ix)	The employer shall ensure that employees maintain reliable communications, through two-way radios or other equivalent means, between the reel tender and the pulling-rig operator.
(q)(2)(x)	The pulling rig may only be operated when it is safe to do so.	(x)	Employees may operate the pulling rig only when it is safe to do so.
	Note: Examples of unsafe conditions include employees in locations prohibited by paragraph (q)(2)(xi) of this section, conductor and pulling line hang-ups, and slipping of the conductor grip.	[Ø]	Note to paragraph (q)(2)(x): Examples of unsafe conditions include: employees in locations prohibited by paragraph (q)(2)(xi) of this section, conductor and pulling line hang-ups, and slipping of the conductor grip.
(q)(2)(xi)	While the conductor or pulling line is being pulled (in motion) with a power-driven device, employees are not permitted directly under overhead operations or on the cross arm, except as necessary to guide the stringing sock or board over or through the stringing sheave.	(xi)	While a power-driven device is pulling the conductor or pulling line and the conductor or pulling line is in motion, the employer shall ensure that employees are not directly under overhead operations or on the crossarm, except as necessary for the employees to guide the stringing sock or board over or through the stringing sheave.
(q)(3)	“Live-line bare-hand work.” In addition to other applicable provisions contained in this section, the following requirements apply to live-line bare-hand work:	(3)	Live-line barehand work. In addition to other applicable provisions contained in this section, the following requirements apply to live-line barehand work:
(q)(3)(i)	Before using or supervising the use of the live-line bare-hand technique on energized circuits, employees shall be trained in the technique and in the safety requirements of paragraph (q)(3) of this section. Employees shall receive refresher training as required by paragraph (a)(2) of this section.	(i)	Before an employee uses or supervises the use of the live-line barehand technique on energized circuits, the employer shall ensure that the employee completes training conforming to paragraph (a)(2) of this section in the technique and in the safety requirements of paragraph (q)(3) of this section.
(q)(3)(ii)	Before any employee uses the live-line bare-hand technique on energized high-voltage conductors or parts, the following information shall be ascertained:	(ii)	Before any employee uses the live-line barehand technique on energized high-voltage conductors or parts, the employer shall ascertain the following information in addition to information about other existing conditions required by paragraph (a)(4) of this section:
(q)(3)(ii)(A)	The nominal voltage rating of the circuit on which the work is to be performed,	(A)	The nominal voltage rating of the circuit on which employees will perform the work,
(q)(3)(ii)(B)	The minimum approach distances to ground of lines and other energized parts on which work is to be performed, and	(B)	The clearances to ground of lines and other energized parts on which employees will perform the work, and
(q)(3)(ii)(C)	The voltage limitations of equipment to be used.	(C)	The voltage limitations of equipment employees will use.



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(q)(3)(iii) The insulated equipment, insulated tools, and aerial devices and platforms used shall be designed, tested, and intended for live-line bare-hand work. Tools and equipment shall be kept clean and dry while they are in use.	(q) (3) (iii) The employer shall ensure that the insulated equipment, insulated tools, and aerial devices and platforms used by employees are designed, tested, and made for live-line barehand work.  (iv) The employer shall ensure that employees keep tools and equipment clean and dry while they are in use.
(q)(3)(iv) The automatic-reclosing feature of circuit-interrupting devices protecting the lines shall be made inoperative, if the design of the devices permits.	(v) The employer shall render inoperable the automatic-reclosing feature of circuit-interrupting devices protecting the lines if the design of the devices permits.
(q)(3)(v) Work may not be performed when adverse weather conditions would make the work hazardous even after the work practices required by this section are employed. Additionally, work may not be performed when winds reduce the phase-to-phase or phase-to-ground minimum approach distances at the work location below that specified in paragraph (q)(3)(xiii) of this section, unless the grounded objects and other lines and equipment are covered by insulating guards.	(vi) The employer shall ensure that employees do not perform work when adverse weather conditions would make the work hazardous even after the employer implements the work practices required by this section. Additionally, employees may not perform work when winds reduce the phase-to-phase or phase-to-ground clearances at the work location below the minimum approach distances specified in paragraph (q)(3)(xiv) of this section, unless insulating guards cover the grounded objects and other lines and equipment.
Note: Thunderstorms in the immediate vicinity, high winds, snow storms, and ice storms are examples of adverse weather conditions that are presumed to make live-line bare-hand work too hazardous to perform safely.	[Ø] Note to paragraph (q)(3)(vi): Thunderstorms in the vicinity, high winds, snow storms, and ice storms are examples of adverse weather conditions that make live-line barehand work too hazardous to perform safely even after the employer implements the work practices required by this section.
(q)(3)(vi) A conductive bucket liner or other conductive device shall be provided for bonding the insulated aerial device to the energized line or equipment.	(vii) The employer shall provide and ensure that employees use a conductive bucket liner or other conductive device for bonding the insulated aerial device to the energized line or equipment.
(q)(3)(vi)(A) The employee shall be connected to the bucket liner or other conductive device by the use of conductive shoes, leg clips, or other means.	(A) The employee shall be connected to the bucket liner or other conductive device by the use of conductive shoes, leg clips, or other means.
(q)(3)(vi)(B) Where differences in potentials at the worksite pose a hazard to employees, electrostatic shielding designed for the voltage being worked shall be provided.	(B) Where differences in potentials at the worksite pose a hazard to employees, the employer shall provide electrostatic shielding designed for the voltage being worked.



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(q)(3)(vii)	Before the employee contacts the energized part, the conductive bucket liner or other conductive device shall be bonded to the energized conductor by means of a positive connection. This connection shall remain attached to the energized conductor until the work on the energized circuit is completed.	(q) (3) (viii)	The employer shall ensure that, before the employee contacts the energized part, the employee bonds the conductive bucket liner or other conductive device to the energized conductor by means of a positive connection. This connection shall remain attached to the energized conductor until the employee completes the work on the energized circuit.
(q)(3)(viii)	Aerial lifts to be used for live-line bare-hand work shall have dual controls (lower and upper) as follows:	(ix)	Aerial lifts used for live-line barehand work shall have dual controls (lower and upper) as follows:
(q)(3)(viii)(A)	The upper controls shall be within easy reach of the employee in the bucket. On a two-bucket-type lift, access to the controls shall be within easy reach from either bucket.	(A)	The upper controls shall be within easy reach of the employee in the bucket. On a two-bucket-type lift, access to the controls shall be within easy reach of both buckets.
(q)(3)(viii)(B)	The lower set of controls shall be located near the base of the boom, and they shall be so designed that they can override operation of the equipment at any time.	(B)	The lower set of controls shall be near the base of the boom and shall be designed so that they can override operation of the equipment at any time.
(q)(3)(ix)	Lower (ground-level) lift controls may not be operated with an employee in the lift, except in case of emergency.	(x)	Lower (ground-level) lift controls may not be operated with an employee in the lift except in case of emergency.
(q)(3)(x)	Before employees are elevated into the work position, all controls (ground level and bucket) shall be checked to determine that they are in proper working condition.	(xi)	The employer shall ensure that, before employees elevate an aerial lift into the work position, the employees check all controls (ground level and bucket) to determine that they are in proper working condition.
(q)(3)(xi)	Before the boom of an aerial lift is elevated, the body of the truck shall be grounded, or the body of the truck shall be barricaded and treated as energized.	(xii)	The employer shall ensure that, before employees elevate the boom of an aerial lift, the employees ground the body of the truck or barricade the body of the truck and treat it as energized.
(q)(3)(xii)	A boom-current test shall be made before work is started each day, each time during the day when higher voltage is encountered, and when changed conditions indicate a need for an additional test. This test shall consist of placing the bucket in contact with an energized source equal to the voltage to be encountered for a minimum of 3 minutes. The leakage current may not exceed 1 microampere per kilovolt of nominal phase-to-ground voltage. Work from the aerial lift shall be immediately suspended upon indication of a malfunction in the equipment.	(xiii)	The employer shall ensure that employees perform a boom-current test before starting work each day, each time during the day when they encounter a higher voltage, and when changed conditions indicate a need for an additional test.
		(A)	This test shall consist of placing the bucket in contact with an energized source equal to the voltage to be encountered for a minimum of 3 minutes.
		(B)	The leakage current may not exceed 1 microampere per kilovolt of nominal phase-to-ground voltage.
		(C)	The employer shall immediately suspend work from the aerial lift when there is any indication of a malfunction in the equipment.

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(q)(3)(xiii)	The minimum approach distances specified in Table R-6 through Table R-10 shall be maintained from all grounded objects and from lines and equipment at a potential different from that to which the live-line bare-hand equipment is bonded, unless such grounded objects and other lines and equipment are covered by insulating guards.	(q) (3) (xiv)	The employer shall ensure that employees maintain the minimum approach distances, established by the employer under paragraph (l)(3)(i) of this section, from all grounded objects and from lines and equipment at a potential different from that to which the live-line barehand equipment is bonded, unless insulating guards cover such grounded objects and other lines and equipment.
(q)(3)(xiv)	While an employee is approaching, leaving, or bonding to an energized circuit, the minimum approach distances in Table R-6 through Table R-10 shall be maintained between the employee and any grounded parts, including the lower boom and portions of the truck.	(xv)	The employer shall ensure that, while an employee is approaching, leaving, or bonding to an energized circuit, the employee maintains the minimum approach distances, established by the employer under paragraph (l)(3)(i) of this section, between the employee and any grounded parts, including the lower boom and portions of the truck and between the employee and conductive objects energized at different potentials.
(q)(3)(xv)	While the bucket is positioned alongside an energized bushing or insulator string, the phase-to-ground minimum approach distances of Table R-6 through Table R-10 shall be maintained between all parts of the bucket and the grounded end of the bushing or insulator string or any other grounded surface.	(xvi)	While the bucket is alongside an energized bushing or insulator string, the employer shall ensure that employees maintain the phase-to-ground minimum approach distances, established by the employer under paragraph (l)(3)(i) of this section, between all parts of the bucket and the grounded end of the bushing or insulator string or any other grounded surface.
(q)(3)(xvi)	Hand lines may not be used between the bucket and the boom or between the bucket and the ground. However, non-conductive-type hand lines may be used from conductor to ground if not supported from the bucket. Ropes used for live-line bare-hand work may not be used for other purposes.	(xvii)	The employer shall ensure that employees do not use handlines between the bucket and the boom or between the bucket and the ground. However, employees may use nonconductive-type handlines from conductor to ground if not supported from the bucket. The employer shall ensure that no one uses ropes used for live-line barehand work for other purposes.
(q)(3)(xvii)	Uninsulated equipment or material may not be passed between a pole or structure and an aerial lift while an employee working from the bucket is bonded to an energized part.	(xviii)	The employer shall ensure that employees do not pass uninsulated equipment or material between a pole or structure and an aerial lift while an employee working from the bucket is bonded to an energized part.
(q)(3)(xviii)	A minimum approach distance table reflecting the minimum approach distances listed in Table R-6 through Table R-10 shall be printed on a plate of durable non-conductive material. This table shall be mounted so as to be visible to the operator of the boom.		

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(q)(3)(xix)	A non-conductive measuring device shall be readily accessible to assist employees in maintaining the required minimum approach distance.	(q) (3) (xix)	A nonconductive measuring device shall be readily accessible to employees performing live-line barehand work to assist them in maintaining the required minimum approach distance.
(q)(4)	"Towers and structures." The following requirements apply to work performed on towers or other structures which support overhead lines.	(4)	Towers and structures. The following requirements apply to work performed on towers or other structures that support overhead lines.
(q)(4)(i)	The employer shall ensure that no employee is under a tower or structure while work is in progress, except where the employer can demonstrate that such a working position is necessary to assist employees working above.	(i)	The employer shall ensure that no employee is under a tower or structure while work is in progress, except when the employer can demonstrate that such a working position is necessary to assist employees working above.
(q)(4)(ii)	Tag lines or other similar devices shall be used to maintain control of tower sections being raised or positioned, unless the employer can demonstrate that the use of such devices would create a greater hazard.	(ii)	The employer shall ensure that employees use tag lines or other similar devices to maintain control of tower sections being raised or positioned, unless the employer can demonstrate that the use of such devices would create a greater hazard to employees.
(q)(4)(iii)	The loadline may not be detached from a member or section until the load is safely secured.	(iii)	The employer shall ensure that employees do not detach the loadline from a member or section until they safely secure the load.
(q)(4)(iv)	Except during emergency restoration procedures, work shall be discontinued when adverse weather conditions would make the work hazardous in spite of the work practices required by this section.	(iv)	The employer shall ensure that, except during emergency restoration procedures, employees discontinue work when adverse weather conditions would make the work hazardous in spite of the work practices required by this section.
	Note: Thunderstorms in the immediate vicinity, high winds, snow storms, and ice storms are examples of adverse weather conditions that are presumed to make this work too hazardous to perform, except under emergency conditions.	[Ø]	Note to paragraph (q)(4)(iv): Thunderstorms in the vicinity, high winds, snow storms, and ice storms are examples of adverse weather conditions that make this work too hazardous to perform even after the employer implements the work practices required by this section.

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<b>1910.269(r)</b> “Line-clearance tree trimming operations.” This paragraph provides additional requirements for line-clearance tree-trimming operations and for equipment used in these operations.	<b>(r)</b> Line-clearance tree trimming operations. This paragraph provides additional requirements for line-clearance tree-trimming operations and for equipment used in these operations.
<b>(r)(1)</b> “Electrical hazards.” This paragraph does not apply to qualified employees.	<b>(1)</b> Electrical hazards. This paragraph does not apply to qualified employees.
<b>(r)(1)(i)</b> Before an employee climbs, enters, or works around any tree, a determination shall be made of the nominal voltage of electric power lines posing a hazard to employees. However, a determination of the maximum nominal voltage to which an employee will be exposed may be made instead, if all lines are considered as energized at this maximum voltage.	<b>(i)</b> Before an employee climbs, enters, or works around any tree, a determination shall be made of the nominal voltage of electric power lines posing a hazard to employees. However, a determination of the maximum nominal voltage to which an employee will be exposed may be made instead, if all lines are considered as energized at this maximum voltage.
<b>(r)(1)(ii)</b> There shall be a second line-clearance tree trimmer within normal (that is, unassisted) voice communication under any of the following conditions:	<b>(ii)</b> There shall be a second line-clearance tree trimmer within normal (that is, unassisted) voice communication under any of the following conditions:
<b>(r)(1)(ii)(A)</b> If a line-clearance tree trimmer is to approach more closely than 10 feet (305 cm) any conductor or electric apparatus energized at more than 750 volts or	<b>(A)</b> If a line-clearance tree trimmer is to approach more closely than <a href="#">3.05 meters (10 feet)</a> to any conductor or electric apparatus energized at more than 750 volts or
<b>(r)(1)(ii)(B)</b> If branches or limbs being removed are closer to lines energized at more than 750 volts than the distances listed in Table R-6, Table R-9, and Table R-10 or	<b>(B)</b> If branches or limbs being removed are closer to lines energized at more than 750 volts than the distances listed in <a href="#">Table R-5, Table R-6, Table R-7, and Table R-8</a> or
<b>(r)(1)(ii)(C)</b> If roping is necessary to remove branches or limbs from such conductors or apparatus.	<b>(C)</b> If roping is necessary to remove branches or limbs from such conductors or apparatus.
<b>(r)(1)(iii)</b> Line-clearance tree trimmers shall maintain the minimum approach distances from energized conductors given in Table R-6, Table R-9, and Table R-10.	<b>(iii)</b> Line-clearance tree trimmers shall maintain the minimum approach distances from energized conductors given in <a href="#">Table R-5, Table R-6, Table R-7, and Table R-8</a> .
<b>(r)(1)(iv)</b> Branches that are contacting exposed energized conductors or equipment or that are within the distances specified in Table R-6, Table R-9, and Table R-10 may be removed only through the use of insulating equipment.	<b>(iv)</b> Branches that are contacting exposed energized conductors or equipment or that are within the distances specified in <a href="#">Table R-5, Table R-6, Table R-7, and Table R-8</a> may be removed only through the use of insulating equipment.
<b>Note:</b> A tool constructed of a material that the employer can demonstrate has insulating qualities meeting paragraph (j)(1) of this section is considered as insulated under this paragraph if the tool is clean and dry.	<b>[Ø]</b> Note to paragraph (r)(1)(iv): A tool constructed of a material that the employer can demonstrate has insulating qualities meeting paragraph (j)(1) of this section is considered as insulated under <a href="#">paragraph (r)(1)(iv)</a> of this section if the tool is clean and dry.

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(r)(1)(v)	Ladders, platforms, and aerial devices may not be brought closer to an energized part than the distances listed in Table R-6, Table R-9, and Table R-10.	(r) (1) (v)	Ladders, platforms, and aerial devices may not be brought closer to an energized part than the distances listed in Table R-5, Table R-6, Table R-7, and Table R-8.
(r)(1)(vi)	Line-clearance tree-trimming work may not be performed when adverse weather conditions make the work hazardous in spite of the work practices required by this section. Each employee performing line-clearance tree trimming work in the aftermath of a storm or under similar emergency conditions shall be trained in the special hazards related to this type of work.	(vi)	Line-clearance tree-trimming work may not be performed when adverse weather conditions make the work hazardous in spite of the work practices required by this section. Each employee performing line-clearance tree trimming work in the aftermath of a storm or under similar emergency conditions shall be trained in the special hazards related to this type of work.
	Note: Thunderstorms in the immediate vicinity, high winds, snow storms, and ice storms are examples of adverse weather conditions that are presumed to make line-clearance tree trimming work too hazardous to perform safely.	[Ø]	Note to paragraph (r)(1)(vi): Thunderstorms in the immediate vicinity, high winds, snow storms, and ice storms are examples of adverse weather conditions that are presumed to make line-clearance tree trimming work too hazardous to perform safely.
(r)(2)	“Brush chippers.”	(2)	Brush chippers.
(r)(2)(i)	Brush chippers shall be equipped with a locking device in the ignition system.	(i)	Brush chippers shall be equipped with a locking device in the ignition system.
(r)(2)(ii)	Access panels for maintenance and adjustment of the chipper blades and associated drive train shall be in place and secure during operation of the equipment.	(ii)	Access panels for maintenance and adjustment of the chipper blades and associated drive train shall be in place and secure during operation of the equipment.
(r)(2)(iii)	Brush chippers not equipped with a mechanical infeed system shall be equipped with an infeed hopper of length sufficient to prevent employees from contacting the blades or knives of the machine during operation.	(iii)	Brush chippers not equipped with a mechanical infeed system shall be equipped with an infeed hopper of length sufficient to prevent employees from contacting the blades or knives of the machine during operation.
(r)(2)(iv)	Trailer chippers detached from trucks shall be chocked or otherwise secured.	(iv)	Trailer chippers detached from trucks shall be chocked or otherwise secured.
(r)(2)(v)	Each employee in the immediate area of an operating chipper feed table shall wear personal protective equipment as required by Subpart I of this Part.	(v)	Each employee in the immediate area of an operating chipper feed table shall wear personal protective equipment as required by Subpart I of this part.
(r)(3)	“Sprayers and related equipment.”	(3)	Sprayers and related equipment.
(r)(3)(i)	Walking and working surfaces of sprayers and related equipment shall be covered with slip-resistant material. If slipping hazards cannot be eliminated, slip-resistant footwear or handrails and stair rails meeting the requirements of Subpart D may be used instead of slip-resistant material.	(i)	Walking and working surfaces of sprayers and related equipment shall be covered with slip-resistant material. If slipping hazards cannot be eliminated, slip-resistant footwear or handrails and stair rails meeting the requirements of Subpart D of this part may be used instead of slip-resistant material.

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(r)(3)(ii)	Equipment on which employees stand to spray while the vehicle is in motion shall be equipped with guardrails around the working area. The guardrail shall be constructed in accordance with Subpart D of this Part.	(r) (3) (ii)	Equipment on which employees stand to spray while the vehicle is in motion shall be equipped with guardrails around the working area. The guardrail shall be constructed in accordance with Subpart D of this part.
(r)(4)	"Stump cutters."	(4)	Stump cutters.
(r)(4)(i)	Stump cutters shall be equipped with enclosures or guards to protect employees.	(i)	Stump cutters shall be equipped with enclosures or guards to protect employees.
(r)(4)(ii)	Each employee in the immediate area of stump grinding operations (including the stump cutter operator) shall wear personal protective equipment as required by Subpart I of this Part.	(ii)	Each employee in the immediate area of stump grinding operations (including the stump cutter operator) shall wear personal protective equipment as required by Subpart I of this part.
(r)(5)	"Gasoline-engine power saws." Gasoline-engine power saw operations shall meet the requirements of 1910.266(e) and the following:	(5)	Gasoline-engine power saws. Gasoline-engine power saw operations shall meet the requirements of § 1910.266(e) and the following:
(r)(5)(i)	Each power saw weighing more than 15 pounds (6.8 kilograms, service weight) that is used in trees shall be supported by a separate line, except when work is performed from an aerial lift and except during topping or removing operations where no supporting limb will be available.	(i)	Each power saw weighing more than <b>6.8 kilograms (15 pounds)</b> , service weight) that is used in trees shall be supported by a separate line, except when work is performed from an aerial lift and except during topping or removing operations where no supporting limb will be available.
(r)(5)(ii)	Each power saw shall be equipped with a control that will return the saw to idling speed when released.	(ii)	Each power saw shall be equipped with a control that will return the saw to idling speed when released.
(r)(5)(iii)	Each power saw shall be equipped with a clutch and shall be so adjusted that the clutch will not engage the chain drive at idling speed.	(iii)	Each power saw shall be equipped with a clutch and shall be so adjusted that the clutch will not engage the chain drive at idling speed.
(r)(5)(iv)	A power saw shall be started on the ground or where it is otherwise firmly supported. Drop starting of saws over 15 pounds (6.8 kg) is permitted outside of the bucket of an aerial lift only if the area below the lift is clear of personnel.	(iv)	A power saw shall be started on the ground or where it is otherwise firmly supported. Drop starting of saws <b>over 6.8 kilograms (15 pounds)</b> , <b>other than chain saws</b> , is permitted outside of the bucket of an aerial lift only if the area below the lift is clear of personnel.
		<b>[Ø]</b>	<b>Note to paragraph (r)(5)(iv):</b> Paragraph (e)(2)(vi) of § 1910.266 prohibits drop starting of chain saws.
(r)(5)(v)	A power saw engine may be started and operated only when all employees other than the operator are clear of the saw.	(v)	A power saw engine may be started and operated only when all employees other than the operator are clear of the saw.
(r)(5)(vi)	A power saw may not be running when the saw is being carried up into a tree by an employee.	(vi)	A power saw may not be running when the saw is being carried up into a tree by an employee.

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(r)(5)(vii) Power saw engines shall be stopped for all cleaning, refueling, adjustments, and repairs to the saw or motor, except as the manufacturer's servicing procedures require otherwise.	(r) (5) (vii) Power saw engines shall be stopped for all cleaning, refueling, adjustments, and repairs to the saw or motor, except as the manufacturer's servicing procedures require otherwise.
(r)(6) "Backpack power units for use in pruning and clearing."	(6) Backpack power units for use in pruning and clearing.
(r)(6)(i) While a backpack power unit is running, no one other than the operator may be within 10 feet (305 cm) of the cutting head of a brush saw.	(i) While a backpack power unit is running, no one other than the operator may be within 3.05 meters (10 feet) of the cutting head of a brush saw.
(r)(6)(ii) A backpack power unit shall be equipped with a quick shutoff switch readily accessible to the operator.	(ii) A backpack power unit shall be equipped with a quick shutoff switch readily accessible to the operator.
(r)(6)(iii) Backpack power unit engines shall be stopped for all cleaning, refueling, adjustments, and repairs to the saw or motor, except as the manufacturer's servicing procedures require otherwise.	(iii) Backpack power unit engines shall be stopped for all cleaning, refueling, adjustments, and repairs to the saw or motor, except as the manufacturer's servicing procedures require otherwise.
(r)(7) "Rope."	(7) Rope.
(r)(7)(i) Climbing ropes shall be used by employees working aloft in trees. These ropes shall have a minimum diameter of 0.5 inch (1.2 cm) with a minimum breaking strength of 2300 pounds (10.2 kN). Synthetic rope shall have elasticity of not more than 7 percent.	(i) Climbing ropes shall be used by employees working aloft in trees. These ropes shall have a minimum diameter of 12 millimeters (0.5 inch) with a minimum breaking strength of 10.2 kilonewtons (2,300 pounds). Synthetic rope shall have elasticity of not more than 7 percent.
(r)(7)(ii) Rope shall be inspected before each use and, if unsafe (for example, because of damage or defect), may not be used.	(ii) Rope shall be inspected before each use and, if unsafe (for example, because of damage or defect), may not be used.
(r)(7)(iii) Rope shall be stored away from cutting edges and sharp tools. Rope contact with corrosive chemicals, gas, and oil shall be avoided.	(iii) Rope shall be stored away from cutting edges and sharp tools. Rope contact with corrosive chemicals, gas, and oil shall be avoided.
(r)(7)(iv) When stored, rope shall be coiled and piled, or shall be suspended, so that air can circulate through the coils.	(iv) When stored, rope shall be coiled and piled, or shall be suspended, so that air can circulate through the coils.
(r)(7)(v) Rope ends shall be secured to prevent their unraveling.	(v) Rope ends shall be secured to prevent their unraveling.
(r)(7)(vi) Climbing rope may not be spliced to effect repair.	(vi) Climbing rope may not be spliced to effect repair.
(r)(7)(vii) A rope that is wet, that is contaminated to the extent that its insulating capacity is impaired, or that is otherwise not considered to be insulated for the voltage involved may not be used near exposed energized lines.	(vii) A rope that is wet, that is contaminated to the extent that its insulating capacity is impaired, or that is otherwise not considered to be insulated for the voltage involved may not be used near exposed energized lines.
(r)(8) "Fall protection." Each employee shall be tied in with a climbing rope and safety saddle when the employee is working above the ground in a tree, unless he or she is ascending into the tree.	(8) Fall protection. Each employee shall be tied in with a climbing rope and safety saddle when the employee is working above the ground in a tree, unless he or she is ascending into the tree.



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<b>1910.269(s)</b>	“Communication facilities.”	<b>(s)</b>	Communication facilities.
<b>(s)(1)</b>	“Microwave transmission.”	<b>(1)</b>	Microwave transmission.
<b>(s)(1)(i)</b>	The employer shall ensure that no employee looks into an open waveguide or antenna <del>that is</del> connected to an energized microwave source.	<b>(i)</b>	The employer shall ensure that no employee looks into an open waveguide or antenna connected to an energized microwave source.
<b>(s)(1)(ii)</b>	If the electromagnetic radiation level within an accessible area associated with microwave communications systems exceeds the radiation protection guide given in 1910.97(a)(2) of this Part, the area shall be posted with the warning symbol described in 1910.97(a)(3) of this Part. The lower half of the warning symbol shall include the following statements or ones that the employer can demonstrate are equivalent: Radiation in this area may exceed hazard limitations and special precautions are required. Obtain specific instruction before entering.	<b>(ii)</b>	If the electromagnetic-radiation level within an accessible area associated with microwave communications systems exceeds the radiation-protection guide <b>specified</b> by § 1910.97(a)(2), <b>the employer shall post the area</b> with warning signs containing the warning symbol described in § 1910.97(a)(3). The lower half of the warning symbol shall include the following statements, or ones that the employer can demonstrate are equivalent: “Radiation in this area may exceed hazard limitations and special precautions are required. Obtain specific instruction before entering.”
<b>(s)(1)(iii)</b>	When an employee works in an area where the electromagnetic radiation could exceed the radiation protection guide, the employer shall institute measures that ensure that the employee’s exposure is not greater than that permitted by that guide. Such measures may include administrative and engineering controls and personal protective equipment.	<b>(iii)</b>	When an employee works in an area where the electromagnetic radiation could exceed the radiation-protection guide, the employer shall institute measures that ensure that the employee's exposure is not greater than that permitted by that guide. Such measures may include administrative and engineering controls and personal protective equipment.
<b>(s)(2)</b>	“Power line carrier.” Power line carrier work, including work on equipment used for coupling carrier current to power line conductors, <del>shall be performed</del> in accordance with the requirements of this section pertaining to work on energized lines.	<b>(2)</b>	Power-line carrier. <b>The employer shall ensure that employees perform</b> power-line carrier work, including work on equipment used for coupling carrier current to power line conductors, in accordance with the requirements of this section pertaining to work on energized lines.



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<b>1910.269(t)</b> “Underground electrical installations.” This paragraph provides additional requirements for work on underground electrical installations.	<b>(t)</b> Underground electrical installations. This paragraph provides additional requirements for work on underground electrical installations.
<b>(t)(1)</b> “Access.” A ladder or other climbing device shall be used to enter and exit a manhole or subsurface vault exceeding 4 feet (122 cm) in depth. No employee may climb into or out of a manhole or vault by stepping on cables or hangers.	<b>(1)</b> Access. <b>The employer shall ensure that employees</b> use a ladder or other climbing device to enter and exit a manhole or subsurface vault exceeding <b>1.22 meters (4 feet)</b> in depth. No employee may climb into or out of a manhole or vault by stepping on cables or hangers.
<b>(t)(2)</b> “Lowering equipment into manholes.” Equipment used to lower materials and tools into manholes or vaults shall be capable of supporting the weight to be lowered and shall be checked for defects before use. Before tools or material are lowered into the opening for a manhole or vault, each employee working in the manhole or vault shall be clear of the area directly under the opening.	<b>(2)</b> Lowering equipment into manholes.
	<b>(i)</b> Equipment used to lower materials and tools into manholes or vaults shall be capable of supporting the weight to be lowered and shall be checked for defects before use.
	<b>(ii)</b> Before anyone lowers tools or material into the opening for a manhole or vault, each employee working in the manhole or vault shall be clear of the area directly under the opening.
<b>(t)(3)</b> “Attendants for manholes.”	<b>(3)</b> Attendants for manholes <b>and vaults</b> .
<b>(t)(3)(i)</b> While work is being performed in a manhole containing energized electric equipment, an employee with first aid <del>and CPR training meeting paragraph (b)(1) of this section</del> shall be available on the surface in the immediate vicinity to render emergency assistance.	<b>(i)</b> While work is being performed in a manhole or vault containing energized electric equipment, an employee with first-aid training shall be available on the surface in the immediate vicinity of the manhole or vault entrance to render emergency assistance.
<b>(t)(3)(ii)</b> Occasionally, the employee on the surface may briefly enter a manhole to provide assistance, other than emergency.	<b>(ii)</b> Occasionally, the employee on the surface may briefly enter a manhole <b>or vault</b> to provide <b>nonemergency assistance</b> .
Note 1: An attendant may also be required under paragraph (e)(7) of this section. One person may serve to fulfill both requirements. However, attendants required under paragraph (e)(7) of this section are not permitted to enter the manhole.	<b>[Ø]</b> Note 1 to paragraph (t)(3)(ii): <b>Paragraph (e)(7) of this section may also require an attendant and does not permit this attendant to enter the manhole or vault.</b>
Note 2: Employees entering manholes containing unguarded, uninsulated energized lines or parts of electric equipment operating at 50 volts or more are required to be qualified under paragraph (l)(1) of this section.	<b>[Ø]</b> Note 2 to paragraph (t)(3)(ii): Paragraph (l)(1)(ii) of this section requires employees entering manholes <b>or vaults</b> containing unguarded, uninsulated energized lines or parts of electric equipment operating at 50 volts or more to be qualified.

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(t)(3)(iii)	For the purpose of inspection, housekeeping, taking readings, or similar work, an employee working alone may enter, for brief periods of time, a manhole where energized cables or equipment are in service, if the employer can demonstrate that the employee will be protected from all electrical hazards.	(t) (3) (iii)	For the purpose of inspection, housekeeping, taking readings, or similar work, an employee working alone may enter, for brief periods of time, a manhole <b>or vault</b> where energized cables or equipment are in service if the employer can demonstrate that the employee will be protected from all electrical hazards.
(t)(3)(iv)	Reliable communications, through two-way radios or other equivalent means, shall be maintained among all employees involved in the job.	(iv)	<b>The employer shall ensure that employees maintain</b> reliable communications, through two-way radios or other equivalent means, among all employees involved in the job.
(t)(4)	"Duct rods." If duct rods are used, they shall be installed in the direction presenting the least hazard to employees. An employee shall be stationed at the far end of the duct line being rodded to ensure that the required minimum approach distances are maintained.	(4)	Duct rods. <b>The employer shall ensure that, if employees use duct rods, the employees</b> install the duct rods in the direction presenting the least hazard to employees. <b>The employer shall station an employee</b> at the far end of the duct line being rodded to ensure that the employees maintain the required minimum approach distances.
(t)(5)	"Multiple cables." When multiple cables are present in a work area, the cable to be worked shall be identified by electrical means, unless its identity is obvious by reason of distinctive appearance or location or by other readily apparent means of identification. Cables other than the one being worked shall be protected from damage.	(5)	Multiple cables. When multiple cables are present in a work area, <b>the employer shall identify the cable to be worked</b> by electrical means, unless its identity is obvious by reason of distinctive appearance or location or by other readily apparent means of identification. <b>The employer shall protect</b> cables other than the one being worked from damage.
(t)(6)	"Moving cables." Energized cables that are to be moved shall be inspected for defects.	(6)	Moving cables. <b>Except when paragraph (t)(7)(ii) of this section permits employees to perform work that could cause a fault in an energized cable in a manhole or vault, the employer shall ensure that employees</b> inspect energized cables to be moved for <b>abnormalities</b> .

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(t)(7) “Defective cables.” Where a cable in a manhole has one or more abnormalities that could lead to or be an indication of an impending fault, the defective cable shall be deenergized before any employee may work in the manhole, except when service load conditions and a lack of feasible alternatives require that the cable remain energized. In that case, employees may enter the manhole provided they are protected from the possible effects of a failure by shields or other devices that are capable of containing the adverse effects of a fault in the joint.	(t) (7) <b>Protection against faults.</b>
Note: Abnormalities such as oil or compound leaking from cable or joints, broken cable sheaths or joint sleeves, hot localized surface temperatures of cables or joints, or joints that are swollen beyond normal tolerance are presumed to lead to or be an indication of an impending fault.	(i) Where a cable in a manhole <b>or vault</b> has one or more abnormalities that could lead to a fault or be an indication of an impending fault, <b>the employer shall deenergize the cable with the abnormality</b> before any employee may work in the manhole <b>or vault</b> , except when service-load conditions and a lack of feasible alternatives require that the cable remain energized. In that case, employees may enter the manhole <b>or vault</b> provided <b>the employer protects them</b> from the possible effects of a failure using shields or other devices that are capable of containing the adverse effects of a fault. <b>The employer shall treat the following abnormalities as indications of impending faults unless the employer can demonstrate that the conditions could not lead to a fault:</b> Oil or compound leaking from cable or joints, broken cable sheaths or joint sleeves, hot localized surface temperatures of cables or joints, or joints swollen beyond normal tolerance.
	(ii) <b>If the work employees will perform in a manhole or vault could cause a fault in a cable, the employer shall deenergize that cable before any employee works in the manhole or vault, except when service-load conditions and a lack of feasible alternatives require that the cable remain energized. In that case, employees may enter the manhole or vault provided the employer protects them from the possible effects of a failure using shields or other devices that are capable of containing the adverse effects of a fault.</b>
(t)(8) “Sheath continuity.” When work is performed on buried cable or on cable in manholes, metallic sheath continuity shall be maintained or the cable sheath shall be treated as energized.	(8) Sheath continuity. When employees perform work on buried cable or on cable in a manhole <b>or vault</b> , <b>the employer shall maintain</b> metallic-sheath continuity, or the cable sheath shall be treated as energized.

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<b>1910.269(u)</b> “Substations.” This paragraph provides additional requirements for substations and for work performed in them.	<b>(u)</b> Substations. This paragraph provides additional requirements for substations and for work performed in them.
<b>(u)(1)</b> “Access and working space.” Sufficient access and working space shall be provided and maintained about electric equipment to permit ready and safe operation and maintenance of such equipment.	<b>(1)</b> Access and working space. <b>The employer shall provide and maintain</b> sufficient access and working space about electric equipment to permit ready and safe operation and maintenance of such equipment <b>by employees.</b>
Note: Guidelines for the dimensions of access and working space about electric equipment in substations are contained in American National Standard - National Electrical Safety Code, ANSI C2-1987. Installations meeting the ANSI provisions comply with paragraph (u)(1) of this section. An installation that does not conform to this ANSI standard will, nonetheless, be considered as complying with paragraph (u)(1) of this section if the employer can demonstrate that the installation provides ready and safe access based on the following evidence:	<b>[Ø]</b> Note to paragraph (u)(1): American National Standard National Electrical Safety Code, ANSI/IEEE C2-2012 contains guidelines for the dimensions of access and working space about electric equipment in substations. Installations meeting the ANSI provisions comply with paragraph (u)(1) of this section. <b>The Occupational Safety and Health Administration will determine whether an installation that does not conform to this ANSI standard complies with paragraph (u)(1) of this section based on the following criteria:</b>
[1] That the installation conforms to the edition of ANSI C2 that was in effect at the time the installation was made,	<b>(1)</b> <b>Whether</b> the installation conforms to the edition of ANSI C2 that was in effect when the installation was made,
[2] That the configuration of the installation enables employees to maintain the minimum approach distances required by paragraph (l)(2) of this section while they are working on exposed, energized parts, and	<b>(2)</b> <b>Whether</b> the configuration of the installation enables employees to maintain the minimum approach distances, established by the employer under paragraph <b>(l)(3)(i)</b> of this section, while <b>the employees</b> are working on exposed, energized parts, and
[3] That the precautions taken when work is performed on the installation provide protection equivalent to the protection that would be provided by access and working space meeting ANSI C2-1987.	<b>(3)</b> <b>Whether</b> the precautions taken <b>when employees perform</b> work on the installation provide protection equivalent to the protection provided by access and working space meeting <b>ANSI/IEEE C2-2012.</b>
<b>(u)(2)</b> “Draw-out-type circuit breakers.” When draw-out-type circuit breakers are removed or inserted, the breaker shall be in the open position. The control circuit shall also be rendered inoperative, if the design of the equipment permits.	<b>(2)</b> Draw-out-type circuit breakers. <b>The employer shall ensure that, when employees</b> remove or insert draw-out-type circuit breakers, the breaker is in the open position. <b>The employer shall also render</b> the control circuit inoperative if the design of the equipment permits.

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(u)(3)	“Substation fences.” Conductive fences around substations shall be grounded. When a substation fence is expanded or a section is removed, fence grounding continuity shall be maintained, and bonding shall be used to prevent electrical discontinuity.	(u) (3)	Substation fences. Conductive fences around substations shall be grounded. When a substation fence is expanded or a section is removed, fence sections shall be isolated, grounded, or bonded as necessary to protect employees from hazardous differences in electric potential.
		[Ø]	Note to paragraph (u)(3): IEEE Std 80-2000, IEEE Guide for Safety in AC Substation Grounding, contains guidelines for protection against hazardous differences in electric potential.
(u)(4)	“Guarding of rooms containing electric supply equipment.”	(4)	Guarding of rooms and other spaces containing electric supply equipment.
(u)(4)(i)	Rooms and spaces in which electric supply lines or equipment are installed shall meet the requirements of paragraphs (u)(4)(ii) through (u)(4)(v) of this section under the following conditions:	(i)	Rooms and other spaces in which electric supply lines or equipment are installed shall meet the requirements of paragraphs (u)(4)(ii) through (u)(4)(v) of this section under the following conditions:
(u)(4)(i)(A)	If exposed live parts operating at 50 to 150 volts to ground are located within 8 feet of the ground or other working surface inside the room or space,	(A)	If exposed live parts operating at 50 to 150 volts to ground are within 2.4 meters (8 feet) of the ground or other working surface inside the room or other space,
(u)(4)(i)(B)	If live parts operating at 151 to 600 volts and located within 8 feet of the ground or other working surface inside the room or space are guarded only by location, as permitted under paragraph (u)(5)(i) of this section, or	(B)	If live parts operating at 151 to 600 volts to ground and located within 2.4 meters (8 feet) of the ground or other working surface inside the room or other space are guarded only by location, as permitted under paragraph (u)(5)(i) of this section, or
(u)(4)(i)(C)	If live parts operating at more than 600 volts are located within the room or space, unless:	(C)	If live parts operating at more than 600 volts to ground are within the room or other space, unless:
(u)(4)(i)(C)(1)	The live parts are enclosed within grounded, metal-enclosed equipment whose only openings are designed so that foreign objects inserted in these openings will be deflected from energized parts, or	(1)	The live parts are enclosed within grounded, metal-enclosed equipment whose only openings are designed so that foreign objects inserted in these openings will be deflected from energized parts, or
(u)(4)(i)(C)(2)	The live parts are installed at a height above ground and any other working surface that provides protection at the voltage to which they are energized corresponding to the protection provided by an 8-foot height at 50 volts.	(2)	The live parts are installed at a height, above ground and any other working surface, that provides protection at the voltage on the live parts corresponding to the protection provided by a 2.4-meter (8-foot) height at 50 volts.
(u)(4)(ii)	The rooms and spaces shall be so enclosed within fences, screens, partitions, or walls as to minimize the possibility that unqualified persons will enter.	(ii)	Fences, screens, partitions, or walls shall enclose the rooms and other spaces so as to minimize the possibility that unqualified persons will enter.

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*[\*Note: In (u)(4), (iii)-(v) order has been revised: OLD = NEW: (iii)=(iv), (iv)=(v), (v)=(iii)]*

(u)(4)(iii)	Signs warning unqualified persons to keep out shall be displayed at entrances to the rooms and spaces.	(u) (4) (iii)	Unqualified persons may not enter the rooms or other spaces while the electric supply lines or equipment are energized.
(u)(4)(iv)	Entrances to rooms and spaces that are not under the observation of an attendant shall be kept locked.	(iv)	The employer shall display signs at entrances to the rooms and other spaces warning unqualified persons to keep out.
(u)(4)(v)	Unqualified persons may not enter the rooms or spaces while the electric supply lines or equipment are energized.	(v)	The employer shall keep each entrance to a room or other space locked, unless the entrance is under the observation of a person who is attending the room or other space for the purpose of preventing unqualified employees from entering.
(u)(5)	"Guarding of energized parts."	(5)	Guarding of energized parts.
(u)(5)(i)	Guards shall be provided around all live parts operating at more than 150 volts to ground without an insulating covering, unless the location of the live parts gives sufficient horizontal or vertical or a combination of these clearances to minimize the possibility of accidental employee contact.	(i)	The employer shall provide guards around all live parts operating at more than 150 volts to ground without an insulating covering unless the location of the live parts gives sufficient clearance (horizontal, vertical, or both) to minimize the possibility of accidental employee contact.
<p>Note:</p> <p>Guidelines for the dimensions of clearance distances about electric equipment in substations are contained in American National Standard - National Electrical Safety Code, ANSI C2-1987. Installations meeting the ANSI provisions comply with paragraph (u)(5)(i) of this section. An installation that does not conform to this ANSI standard will, nonetheless, be considered as complying with paragraph (u)(5)(i) of this section if the employer can demonstrate that the installation provides sufficient clearance based on the following evidence:</p>		[Ø]	<p>Note to paragraph (u)(5)(i):</p> <p>American National Standard National Electrical Safety Code, ANSI/IEEE C2-2002 contains guidelines for the dimensions of clearance distances about electric equipment in substations. Installations meeting the ANSI provisions comply with paragraph (u)(5)(i) of this section. The Occupational Safety and Health Administration will determine whether an installation that does not conform to this ANSI standard complies with paragraph (u)(5)(i) of this section based on the following criteria:</p>
	[1] That the installation conforms to the edition of ANSI C2 that was in effect at the time the installation was made,	(1)	Whether the installation conforms to the edition of ANSI C2 that was in effect when the installation was made,
	[2] That each employee is isolated from energized parts at the point of closest approach, and	(2)	Whether each employee is isolated from energized parts at the point of closest approach; and
	[3] That the precautions taken when work is performed on the installation provide protection equivalent to the protection that would be provided by horizontal and vertical clearances meeting ANSI C2-1987.	(3)	Whether the precautions taken when employees perform work on the installation provide protection equivalent to the protection provided by horizontal and vertical clearances meeting ANSI/IEEE C2-2002.

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(u)(5)(ii)	Except for fuse replacement and other necessary access by qualified persons, the guarding of energized parts within a compartment shall be maintained during operation and maintenance functions to prevent accidental contact with energized parts and to prevent tools or other equipment from being dropped on energized parts.	(u) (5) (ii)	Except for fuse replacement and other necessary access by qualified persons, the employer shall maintain guarding of energized parts within a compartment during operation and maintenance functions to prevent accidental contact with energized parts and to prevent dropped tools or other equipment from contacting energized parts.
(u)(5)(iii)	When guards are removed from energized equipment, barriers shall be installed around the work area to prevent employees who are not working on the equipment, but who are in the area, from contacting the exposed live parts.	(iii)	Before guards are removed from energized equipment, the employer shall install barriers around the work area to prevent employees who are not working on the equipment, but who are in the area, from contacting the exposed live parts.
(u)(6)	"Substation entry."	(6)	Substation entry.
(u)(6)(i)	Upon entering an attended substation, each employee other than those regularly working in the station shall report his or her presence to the employee in charge in order to receive information on special system conditions affecting employee safety.	(i)	Upon entering an attended substation, each employee, other than employees regularly working in the station, shall report his or her presence to the employee in charge of substation activities to receive information on special system conditions affecting employee safety.
(u)(6)(ii)	The job briefing required by paragraph (c) of this section shall cover such additional subjects as the location of energized equipment in or adjacent to the work area and the limits of any deenergized work area.	(ii)	The job briefing required by paragraph (c) of this section shall cover information on special system conditions affecting employee safety, including the location of energized equipment in or adjacent to the work area and the limits of any deenergized work area.



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<b>1910.269(v)</b>	“Power generation.” This paragraph provides additional requirements and related work practices for power generating plants.	<b>(v)</b>	Power generation. This paragraph provides additional requirements and related work practices for power generating plants.
<b>(v)(1)</b>	“Interlocks and other safety devices.”	<b>(1)</b>	Interlocks and other safety devices.
<b>(v)(1)(i)</b>	Interlocks and other safety devices shall be maintained in a safe, operable condition.	<b>(i)</b>	Interlocks and other safety devices shall be maintained in a safe, operable condition.
<b>(v)(1)(ii)</b>	No interlock or other safety device may be modified to defeat its function, except for test, repair, or adjustment of the device.	<b>(ii)</b>	No interlock or other safety device may be modified to defeat its function, except for test, repair, or adjustment of the device.
<b>(v)(2)</b>	“Changing brushes.” Before exciter or generator brushes are changed while the generator is in service, the exciter or generator field shall be checked to determine whether a ground condition exists. The brushes may not be changed while the generator is energized if a ground condition exists.	<b>(2)</b>	Changing brushes. Before exciter or generator brushes are changed while the generator is in service, the exciter or generator field shall be checked to determine whether a ground condition exists. The brushes may not be changed while the generator is energized if a ground condition exists.
<b>(v)(3)</b>	“Access and working space.” Sufficient access and working space shall be provided and maintained about electric equipment to permit ready and safe operation and maintenance of such equipment.	<b>(v) (3)</b>	Access and working space. The employer shall provide and maintain sufficient access and working space about electric equipment to permit ready and safe operation and maintenance of such equipment <b>by employees</b> .
	Note: Guidelines for the dimensions of access and working space about electric equipment in generating stations are contained in American National Standard - National Electrical Safety Code, ANSI C2-1987. Installations meeting the ANSI provisions comply with paragraph (v)(3) of this section. An installation that does not conform to this ANSI standard will, nonetheless, be considered as complying with paragraph (v)(3) of this section if the employer can demonstrate that the installation provides ready and safe access based on the following evidence:	<b>[Ø]</b>	Note to paragraph (v)(3) of this section: American National Standard National Electrical Safety Code, ANSI/IEEE C2-2012 contains guidelines for the dimensions of access and working space about electric equipment in substations. Installations meeting the ANSI provisions comply with paragraph (v)(3) of this section. <b>The Occupational Safety and Health Administration will determine whether an installation that does not conform to this ANSI standard complies with paragraph (v)(3) of this section based on the following criteria:</b>
	[1] That the installation conforms to the edition of ANSI C2 that was in effect at the time the installation was made,	<b>(1)</b>	Whether the installation conforms to the edition of ANSI C2 that was in effect when the installation was made;
	[2] That the configuration of the installation enables employees to maintain the minimum approach distances required by paragraph (l)(2) of this section while they are working on exposed, energized parts, and	<b>(2)</b>	<b>Whether</b> the configuration of the installation enables employees to maintain the minimum approach distances, <b>established by the employer under paragraph (l)(3)(i) of this section, while the employees are working on exposed, energized parts, and;</b>



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	[3] That the precautions taken when work is performed on the installation provide protection equivalent to the protection that would be provided by access and working space meeting ANSI C2-1987.	(3)	Whether the precautions taken when employees perform work on the installation provide protection equivalent to the protection provided by access and working space meeting ANSI/IEEE C2-2012.
(v)(4)	“Guarding of rooms containing electric supply equipment.”	(v) (4)	Guarding of rooms and other spaces containing electric supply equipment.
(v)(4)(i)	Rooms and spaces in which electric supply lines or equipment are installed shall meet the requirements of paragraphs (v)(4)(ii) through (v)(4)(v) of this section under the following conditions:	(i)	Rooms and other spaces in which electric supply lines or equipment are installed shall meet the requirements of paragraphs (v)(4)(ii) through (v)(4)(v) of this section under the following conditions:
(v)(4)(i)(A)	If exposed live parts operating at 50 to 150 volts to ground are located within 8 feet of the ground or other working surface inside the room or space,	(A)	If exposed live parts operating at 50 to 150 volts to ground are within 2.4 meters (8 feet) of the ground or other working surface inside the room or other space,
(v)(4)(i)(B)	If live parts operating at 151 to 600 volts and located within 8 feet of the ground or other working surface inside the room or space are guarded only by location, as permitted under paragraph (v)(5)(i) of this section, or	(B)	If live parts operating at 151 to 600 volts to ground and located within 2.4 meters (8 feet) of the ground or other working surface inside the room or other space are guarded only by location, as permitted under paragraph (v)(5)(i) of this section, or
(v)(4)(i)(C)	If live parts operating at more than 600 volts are located within the room or space, unless:	(C)	If live parts operating at more than 600 volts to ground are within the room or other space, unless:
(v)(4)(i)(C)(1)	The live parts are enclosed within grounded, metal-enclosed equipment whose only openings are designed so that foreign objects inserted in these openings will be deflected from energized parts, or	(1)	The live parts are enclosed within grounded, metal-enclosed equipment whose only openings are designed so that foreign objects inserted in these openings will be deflected from energized parts, or
(v)(4)(i)(C)(2)	The live parts are installed at a height above ground and any other working surface that provides protection at the voltage to which they are energized corresponding to the protection provided by an 8-foot height at 50 volts.	(2)	The live parts are installed at a height, above ground and any other working surface, that provides protection at the voltage on the live parts corresponding to the protection provided by a 2.4-meter (8-foot) height at 50 volts.
(v)(4)(ii)	The rooms and spaces shall be so enclosed within fences, screens, partitions, or walls as to minimize the possibility that unqualified persons will enter.	(ii)	Fences, screens, partitions, or walls shall enclose the rooms and other spaces so as to minimize the possibility that unqualified persons will enter.

**[\*Note: In (v)(4), (iii)-(v) order has been revised: OLD = NEW: (iii)=(iv), (iv)=(v), (v)=(iii)]**

(v)(4)(iii)	Signs warning unqualified persons to keep out shall be displayed at entrances to the rooms and spaces.	(iii)	Unqualified persons may not enter the rooms or other spaces while the electric supply lines or equipment are energized.
(v)(4)(iv)	Entrances to rooms and spaces that are not under the observation of an attendant shall be kept locked.	(iv)	The employer shall display signs at entrances to the rooms and other spaces warning unqualified persons to keep out.

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(v)(4)(v) Unqualified persons may not enter the rooms or spaces while the electric supply lines or equipment are energized.	(v) (4) (v) The employer shall keep each entrance to a room or other space locked, unless the entrance is under the observation of a person who is attending the room or other space for the purpose of preventing unqualified employees from entering.
(v)(5) "Guarding of energized parts."	(5) Guarding of energized parts.
(v)(5)(i) Guards shall be provided around all live parts operating at more than 150 volts to ground without an insulating covering, unless the location of the live parts gives sufficient horizontal or vertical or a combination of these clearances to minimize the possibility of accidental employee contact.	(i) The employer shall provide guards around all live parts operating at more than 150 volts to ground without an insulating covering unless the location of the live parts gives sufficient clearance (horizontal, vertical, or both) to minimize the possibility of accidental employee contact.
<p>Note:  Guidelines for the dimensions of clearance distances about electric equipment in generating stations are contained in American National Standard - National Electrical Safety Code, ANSI C2-1987. Installations meeting the ANSI provisions comply with paragraph (v)(5)(i) of this section. An installation that does not conform to this ANSI standard will, nonetheless, be considered as complying with paragraph (v)(5)(i) of this section if the employer can demonstrate that the installation provides sufficient clearance based on the following evidence:</p>	<p>[Ø] Note to paragraph (v)(5)(i):  American National Standard National Electrical Safety Code, ANSI/IEEE C2-2002 contains guidelines for the dimensions of clearance distances about electric equipment in substations. Installations meeting the ANSI provisions comply with paragraph (v)(5)(i) of this section. The Occupational Safety and Health Administration will determine whether an installation that does not conform to this ANSI standard complies with paragraph (v)(5)(i) of this section based on the following criteria:</p>
[1] That the installation conforms to the edition of ANSI C2 that was in effect at the time the installation was made,	(1) Whether the installation conforms to the edition of ANSI C2 that was in effect when the installation was made;
[2] That each employee is isolated from energized parts at the point of closest approach, and	(2) Whether each employee is isolated from energized parts at the point of closest approach; and
[3] That the precautions taken when work is performed on the installation provide protection equivalent to the protection that would be provided by horizontal and vertical clearances meeting ANSI C2-1987.	(3) Whether the precautions taken when employees perform work on the installation provide protection equivalent to the protection provided by horizontal and vertical clearances meeting ANSI/IEEE C2-2002.
(v)(5)(ii) Except for fuse replacement or other necessary access by qualified persons, the guarding of energized parts within a compartment shall be maintained during operation and maintenance functions to prevent accidental contact with energized parts and to prevent tools or other equipment from being dropped on energized parts.	(ii) Except for fuse replacement and other necessary access by qualified persons, the employer shall maintain guarding of energized parts within a compartment during operation and maintenance functions to prevent accidental contact with energized parts and to prevent dropped tools or other equipment from contacting energized parts.

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(v)(5)(iii)	When guards are removed from energized equipment, barriers shall be installed around the work area to prevent employees who are not working on the equipment, but who are in the area, from contacting the exposed live parts.	(v) (5) (iii)	<b>Before</b> guards are removed from energized equipment, <b>the employer shall install</b> barriers around the work area to prevent employees who are not working on the equipment, but who are in the area, from contacting the exposed live parts.
(v)(6)	“Water or steam spaces.” The following requirements apply to work in water and steam spaces associated with boilers:	(6)	Water or steam spaces. The following requirements apply to work in water and steam spaces associated with boilers:
(v)(6)(i)	A designated employee shall inspect conditions before work is permitted and after its completion. Eye protection, or full face protection if necessary, shall be worn at all times when condenser, heater, or boiler tubes are being cleaned.	(i)	A designated employee shall inspect conditions before work is permitted and after its completion. Eye protection, or full face protection if necessary, shall be worn at all times when condenser, heater, or boiler tubes are being cleaned.
(v)(6)(ii)	Where it is necessary for employees to work near tube ends during cleaning, shielding shall be installed at the tube ends.	(ii)	Where it is necessary for employees to work near tube ends during cleaning, shielding shall be installed at the tube ends.
(v)(7)	“Chemical cleaning of boilers and pressure vessels.” The following requirements apply to chemical cleaning of boilers and pressure vessels:	(7)	Chemical cleaning of boilers and pressure vessels. The following requirements apply to chemical cleaning of boilers and pressure vessels:
(v)(7)(i)	Areas where chemical cleaning is in progress shall be cordoned off to restrict access during cleaning. If flammable liquids, gases, or vapors or combustible materials will be used or might be produced during the cleaning process, the following requirements also apply:	(i)	Areas where chemical cleaning is in progress shall be cordoned off to restrict access during cleaning. If flammable liquids, gases, or vapors or combustible materials will be used or might be produced during the cleaning process, the following requirements also apply:
(v)(7)(i)(A)	The area shall be posted with signs restricting entry and warning of the hazards of fire and explosion; and	(A)	The area shall be posted with signs restricting entry and warning of the hazards of fire and explosion; and
(v)(7)(i)(B)	Smoking, welding, and other possible ignition sources are prohibited in these restricted areas.	(B)	Smoking, welding, and other possible ignition sources are prohibited in these restricted areas.
(v)(7)(ii)	The number of personnel in the restricted area shall be limited to those necessary to accomplish the task safely.	(ii)	The number of personnel in the restricted area shall be limited to those necessary to accomplish the task safely.
(v)(7)(iii)	There shall be ready access to water or showers for emergency use.	(iii)	There shall be ready access to water or showers for emergency use.
	Note: See 1910.141 of this Part for requirements that apply to the water supply and to washing facilities.	[Ø]	Note to paragraph (v)(7)(iii): See § 1910.141 for requirements that apply to the water supply and to washing facilities.
(v)(7)(iv)	Employees in restricted areas shall wear protective equipment meeting the requirements of Subpart I of this Part and including, but not limited to, protective clothing, boots, goggles, and gloves.	(iv)	Employees in restricted areas shall wear protective equipment meeting the requirements of Subpart I of this part and including, but not limited to, protective clothing, boots, goggles, and gloves.
(v)(8)	“Chlorine systems.”	(8)	Chlorine systems.

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(v)(8)(i)	Chlorine system enclosures shall be posted with signs restricting entry and warning of the hazard to health and the hazards of fire and explosion.	(v) (8) (i)	Chlorine system enclosures shall be posted with signs restricting entry and warning of the hazard to health and the hazards of fire and explosion.
	Note: See Subpart Z of this Part for requirements necessary to protect the health of employees from the effects of chlorine.	[Ø]	Note to paragraph (v)(8)(i): See Subpart Z of this part for requirements necessary to protect the health of employees from the effects of chlorine.
(v)(8)(ii)	Only designated employees may enter the restricted area. Additionally, the number of personnel shall be limited to those necessary to accomplish the task safely.	(ii)	Only designated employees may enter the restricted area. Additionally, the number of personnel shall be limited to those necessary to accomplish the task safely.
(v)(8)(iii)	Emergency repair kits shall be available near the shelter or enclosure to allow for the prompt repair of leaks in chlorine lines, equipment, or containers.	(iii)	Emergency repair kits shall be available near the shelter or enclosure to allow for the prompt repair of leaks in chlorine lines, equipment, or containers.
(v)(8)(iv)	Before repair procedures are started, chlorine tanks, pipes, and equipment shall be purged with dry air and isolated from other sources of chlorine.	(iv)	Before repair procedures are started, chlorine tanks, pipes, and equipment shall be purged with dry air and isolated from other sources of chlorine.
(v)(8)(v)	The employer shall ensure that chlorine is not mixed with materials that would react with the chlorine in a dangerously exothermic or other hazardous manner.	(v)	The employer shall ensure that chlorine is not mixed with materials that would react with the chlorine in a dangerously exothermic or other hazardous manner.
(v)(9)	“Boilers.”	(9)	Boilers.
(v)(9)(i)	Before internal furnace or ash hopper repair work is started, overhead areas shall be inspected for possible falling objects. If the hazard of falling objects exists, overhead protection such as planking or nets shall be provided.	(i)	Before internal furnace or ash hopper repair work is started, overhead areas shall be inspected for possible falling objects. If the hazard of falling objects exists, overhead protection such as planking or nets shall be provided.
(v)(9)(ii)	When opening an operating boiler door, employees shall stand clear of the opening of the door to avoid the heat blast and gases which may escape from the boiler.	(ii)	When opening an operating boiler door, employees shall stand clear of the opening of the door to avoid the heat blast and gases which may escape from the boiler.
(v)(10)	“Turbine generators.”	(10)	Turbine generators.
(v)(10)(i)	Smoking and other ignition sources are prohibited near hydrogen or hydrogen sealing systems, and signs warning of the danger of explosion and fire shall be posted.	(i)	Smoking and other ignition sources are prohibited near hydrogen or hydrogen sealing systems, and signs warning of the danger of explosion and fire shall be posted.
(v)(10)(ii)	Excessive hydrogen makeup or abnormal loss of pressure shall be considered as an emergency and shall be corrected immediately.	(ii)	Excessive hydrogen makeup or abnormal loss of pressure shall be considered as an emergency and shall be corrected immediately.
(v)(10)(iii)	A sufficient quantity of inert gas shall be available to purge the hydrogen from the largest generator.	(iii)	A sufficient quantity of inert gas shall be available to purge the hydrogen from the largest generator.
(v)(11)	“Coal and ash handling.”	(11)	Coal and ash handling.
(v)(11)(i)	Only designated persons may operate railroad equipment.	(i)	Only designated persons may operate railroad equipment.

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(v)(11)(ii)	Before a locomotive or locomotive crane is moved, a warning shall be given to employees in the area.	(v) (11) (ii)	Before a locomotive or locomotive crane is moved, a warning shall be given to employees in the area.
(v)(11)(iii)	Employees engaged in switching or dumping cars may not use their feet to line up drawheads.	(iii)	Employees engaged in switching or dumping cars may not use their feet to line up drawheads.
(v)(11)(iv)	Drawheads and knuckles may not be shifted while locomotives or cars are in motion.	(iv)	Drawheads and knuckles may not be shifted while locomotives or cars are in motion.
(v)(11)(v)	When a railroad car is stopped for unloading, the car shall be secured from displacement that could endanger employees.	(v)	When a railroad car is stopped for unloading, the car shall be secured from displacement that could endanger employees.
(v)(11)(vi)	An emergency means of stopping dump operations shall be provided at railcar dumps.	(vi)	An emergency means of stopping dump operations shall be provided at railcar dumps.
(v)(11)(vii)	The employer shall ensure that employees who work in coal- or ash-handling conveyor areas are trained and knowledgeable in conveyor operation and in the requirements of paragraphs (v)(11)(viii) through (v)(11)(xii) of this section.	(vii)	The employer shall ensure that employees who work in coal- or ash-handling conveyor areas are trained and knowledgeable in conveyor operation and in the requirements of paragraphs (v)(11)(viii) through (v)(11)(xii) of this section.
(v)(11)(viii)	Employees may not ride a coal- or ash-handling conveyor belt at any time. Employees may not cross over the conveyor belt, except at walkways, unless the conveyor's energy source has been deenergized and has been locked out or tagged in accordance with paragraph (d) of this section.	(viii)	Employees may not ride a coal- or ash-handling conveyor belt at any time. Employees may not cross over the conveyor belt, except at walkways, unless the conveyor's energy source has been deenergized and has been locked out or tagged in accordance with paragraph (d) of this section.
(v)(11)(ix)	A conveyor that could cause injury when started may not be started until personnel in the area are alerted by a signal or by a designated person that the conveyor is about to start.	(ix)	A conveyor that could cause injury when started may not be started until personnel in the area are alerted by a signal or by a designated person that the conveyor is about to start.

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<p>(v)(11)(x) If a conveyor that could cause injury when started is automatically controlled or is controlled from a remote location, an audible device shall be provided that sounds an alarm that will be recognized by each employee as a warning that the conveyor will start and that can be clearly heard at all points along the conveyor where personnel may be present. The warning device shall be actuated by the device starting the conveyor and shall continue for a period of time before the conveyor starts that is long enough to allow employees to move clear of the conveyor system. A visual warning may be used in place of the audible device if the employer can demonstrate that it will provide an equally effective warning in the particular circumstances involved. Exception: If the employer can demonstrate that the system's function would be seriously hindered by the required time delay, warning signs may be provided in place of the audible warning device. If the system was installed before January 31, 1995, warning signs may be provided in place of the audible warning device until such time as the conveyor or its control system is rebuilt or rewired. These warning signs shall be clear, concise, and legible and shall indicate that conveyors and allied equipment may be started at any time, that danger exists, and that personnel must keep clear. These warning signs shall be provided along the conveyor at areas not guarded by position or location.</p>	<p>(v) (11) (x) If a conveyor that could cause injury when started is automatically controlled or is controlled from a remote location, an audible device shall be provided that sounds an alarm that will be recognized by each employee as a warning that the conveyor will start and that can be clearly heard at all points along the conveyor where personnel may be present. The warning device shall be actuated by the device starting the conveyor and shall continue for a period of time before the conveyor starts that is long enough to allow employees to move clear of the conveyor system. A visual warning may be used in place of the audible device if the employer can demonstrate that it will provide an equally effective warning in the particular circumstances involved. <b>However</b> if the employer can demonstrate that the system's function would be seriously hindered by the required time delay, warning signs may be provided in place of the audible warning device. If the system was installed before January 31, 1995, warning signs may be provided in place of the audible warning device until such time as the conveyor or its control system is rebuilt or rewired. These warning signs shall be clear, concise, and legible and shall indicate that conveyors and allied equipment may be started at any time, that danger exists, and that personnel must keep clear. These warning signs shall be provided along the conveyor at areas not guarded by position or location.</p>
<p>(v)(11)(xi) Remotely and automatically controlled conveyors, and conveyors that have operating stations which are not manned or which are beyond voice and visual contact from drive areas, loading areas, transfer points, and other locations on the conveyor path not guarded by location, position, or guards shall be furnished with emergency stop buttons, pull cords, limit switches, or similar emergency stop devices. However, if the employer can demonstrate that the design, function, and operation of the conveyor do not expose an employee to hazards, an emergency stop device is not required.</p>	<p>(xi) Remotely and automatically controlled conveyors, and conveyors that have operating stations which are not manned or which are beyond voice and visual contact from drive areas, loading areas, transfer points, and other locations on the conveyor path not guarded by location, position, or guards shall be furnished with emergency stop buttons, pull cords, limit switches, or similar emergency stop devices. However, if the employer can demonstrate that the design, function, and operation of the conveyor do not expose an employee to hazards, an emergency stop device is not required.</p>

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(v)(11)(xi)(A) Emergency stop devices shall be easily identifiable in the immediate vicinity of such locations.	(v) (11) (xi) (A) Emergency stop devices shall be easily identifiable in the immediate vicinity of such locations.
(v)(11)(xi)(B) An emergency stop device shall act directly on the control of the conveyor involved and may not depend on the stopping of any other equipment.	(B) An emergency stop device shall act directly on the control of the conveyor involved and may not depend on the stopping of any other equipment.
(v)(11)(xi)(C) Emergency stop devices shall be installed so that they cannot be overridden from other locations.	(C) Emergency stop devices shall be installed so that they cannot be overridden from other locations.
(v)(11)(xii) Where coal-handling operations may produce a combustible atmosphere from fuel sources or from flammable gases or dust, sources of ignition shall be eliminated or safely controlled to prevent ignition of the combustible atmosphere.	(xii) Where coal-handling operations may produce a combustible atmosphere from fuel sources or from flammable gases or dust, sources of ignition shall be eliminated or safely controlled to prevent ignition of the combustible atmosphere.
Note: Locations that are hazardous because of the presence of combustible dust are classified as Class II hazardous locations. See 1910.307 of this Part.	[Ø] Note to paragraph (v)(11)(xii): Locations that are hazardous because of the presence of combustible dust are classified as Class II hazardous locations. See § 1910.307.
(v)(11)(xiii) An employee may not work on or beneath overhanging coal in coal bunkers, coal silos, or coal storage areas, unless the employee is protected from all hazards posed by shifting coal.	(xiii) An employee may not work on or beneath overhanging coal in coal bunkers, coal silos, or coal storage areas, unless the employee is protected from all hazards posed by shifting coal.
(v)(11)(xiv) An employee entering a bunker or silo to dislodge the contents shall wear a body harness with lifeline attached. The lifeline shall be secured to a fixed support outside the bunker and shall be attended at all times by an employee located outside the bunker or facility.	(xiv) An employee entering a bunker or silo to dislodge the contents shall wear a body harness with lifeline attached. The lifeline shall be secured to a fixed support outside the bunker and shall be attended at all times by an employee located outside the bunker or facility.
(v)(12) "Hydroplants and equipment." Employees working on or close to water gates, valves, intakes, forebays, flumes, or other locations where increased or decreased water flow or levels may pose a significant hazard shall be warned and shall vacate such dangerous areas before water flow changes are made.	(12) Hydroplants and equipment. Employees working on or close to water gates, valves, intakes, forebays, flumes, or other locations where increased or decreased water flow or levels may pose a significant hazard shall be warned and shall vacate such dangerous areas before water flow changes are made.



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<p><b>1910.269(w)</b> “Special conditions.”</p> <p><b>(w)(1)</b> “Capacitors.” The following additional requirements apply to work on capacitors and on lines connected to capacitors.</p> <p style="padding-left: 20px;">Note: See paragraphs (m) and (n) of this section for requirements pertaining to the deenergizing and grounding of capacitor installations.</p> <p><b>(w)(1)(i)</b> Before employees work on capacitors, the capacitors shall be disconnected from energized sources and, after a wait of at least 5 minutes from the time of disconnection, short-circuited.</p> <p><b>(w)(1)(ii)</b> Before the units are handled, each unit in series-parallel capacitor banks shall be short-circuited between all terminals and the capacitor case or its rack. If the cases of capacitors are on ungrounded substation racks, the racks shall be bonded to ground.</p> <p><b>(w)(1)(iii)</b> Any line to which capacitors are connected shall be short-circuited before it is considered deenergized.</p> <p><b>(w)(2)</b> “Current transformer secondaries.” The secondary of a current transformer may not be opened while the transformer is energized. If the primary of the current transformer cannot be deenergized before work is performed on an instrument, a relay, or other section of a current transformer secondary circuit, the circuit shall be bridged so that the current transformer secondary will not be opened.</p> <p><b>(w)(3)</b> “Series streetlighting.”</p> <p><b>(w)(3)(i)</b> If the open-circuit voltage exceeds 600 volts, the series streetlighting circuit shall be worked in accordance with paragraph (q) or (t) of this section, as appropriate.</p>	<p><b>(w)</b> Special conditions.</p> <p><b>(1)</b> Capacitors. The following additional requirements apply to work on capacitors and on lines connected to capacitors.</p> <p><b>[Ø]</b> Note to paragraph (w)(1): See paragraphs (m) and (n) of this section for requirements pertaining to the deenergizing and grounding of capacitor installations.</p> <p><b>(i)</b> Before employees work on capacitors, <b>the employer shall disconnect the capacitors</b> from energized sources and short circuit the capacitors. <b>The employer shall ensure that the employee short circuiting the capacitors waits at least 5 minutes from the time of disconnection before applying the short circuit,</b></p> <p><b>(ii)</b> <b>Before employees handle the units, the employer shall short circuit</b> each unit in series-parallel capacitor banks between all terminals and the capacitor case or its rack. If the cases of capacitors are on ungrounded substation racks, <b>the employer shall bond the racks to ground.</b></p> <p><b>(iii)</b> <b>The employer shall</b> short circuit any line connected to capacitors before the line is treated as deenergized.</p> <p><b>(2)</b> Current transformer secondaries. <b>The employer shall ensure that employees do not open</b> the secondary of a current transformer while the transformer is energized. <b>If the employer cannot deenergize the primary of the current transformer before employees perform</b> work on an instrument, a relay, or other section of a current transformer secondary circuit, <b>the employer shall bridge the circuit so that the current transformer secondary does not experience an open-circuit condition.</b></p> <p><b>(3)</b> Series streetlighting.</p> <p><b>(w) (3) (i)</b> If the open-circuit voltage exceeds 600 volts, <b>the employer shall ensure that employees work on</b> series streetlighting circuits in accordance with paragraph (q) or (t) of this section, as appropriate.</p>
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(w)(3)(ii)	A series loop may only be opened after the streetlighting transformer has been deenergized and isolated from the source of supply or after the loop is bridged to avoid an open-circuit condition.	(w) (3) (ii)	Before any employee opens a series loop, the employer shall deenergize the streetlighting transformer and isolate it from the source of supply or shall bridge the loop to avoid an open-circuit condition.
(w)(4)	"Illumination." Sufficient illumination shall be provided to enable the employee to perform the work safely.	(4)	Illumination. The employer shall provide sufficient illumination to enable the employee to perform the work safely.
(w)(5)	"Protection against drowning."	(5)	Protection against drowning.
(w)(5)(i)	Whenever an employee may be pulled or pushed or may fall into water where the danger of drowning exists, the employee shall be provided with and shall use U.S. Coast Guard approved personal flotation devices.	(i)	Whenever an employee may be pulled or pushed, or might fall, into water where the danger of drowning exists, the employer shall provide the employee with, and shall ensure that the employee uses, a U.S. Coast Guard-approved personal flotation device.
(w)(5)(ii)	Each personal flotation device shall be maintained in safe condition and shall be inspected frequently enough to ensure that it does not have rot, mildew, water saturation, or any other condition that could render the device unsuitable for use.	(ii)	The employer shall maintain each personal flotation device in safe condition and shall inspect each personal flotation device frequently enough to ensure that it does not have rot, mildew, water saturation, or any other condition that could render the device unsuitable for use.
(w)(5)(iii)	An employee may cross streams or other bodies of water only if a safe means of passage, such as a bridge, is provided.	(iii)	An employee may cross streams or other bodies of water only if a safe means of passage, such as a bridge, is available.
(w)(6)	"Employee protection in public work areas."	(6)	Employee protection in public work areas.
(w)(6)(i)	Traffic control signs and traffic control devices used for the protection of employees shall meet the requirements of 1926.200(g)(2) of this Chapter.	(i)	Traffic-control signs and traffic-control devices used for the protection of employees shall meet § 1926.200(g)(2) of this chapter.
(w)(6)(ii)	Before work is begun in the vicinity of vehicular or pedestrian traffic that may endanger employees, warning signs or flags and other traffic control devices shall be placed in conspicuous locations to alert and channel approaching traffic.	(ii)	Before employees begin work in the vicinity of vehicular or pedestrian traffic that may endanger them, the employer shall place warning signs or flags and other traffic-control devices in conspicuous locations to alert and channel approaching traffic.
(w)(6)(iii)	Where additional employee protection is necessary, barricades shall be used.	(iii)	The employer shall use barricades where additional employee protection is necessary.
(w)(6)(iv)	Excavated areas shall be protected with barricades.	(iv)	The employer shall protect excavated areas with barricades.
(w)(6)(v)	At night, warning lights shall be prominently displayed.	(v)	The employer shall display warning lights prominently at night.

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(w)(7) “Backfeed.” If there is a possibility of voltage backfeed from sources of cogeneration or from the secondary system (for example, backfeed from more than one energized phase feeding a common load), the requirements of paragraph (l) of this section apply if the lines or equipment are to be worked as energized, and the requirements of paragraphs (m) and (n) of this section apply if the lines or equipment are to be worked as deenergized.	(w) (7) Backfeed. When there is a possibility of voltage backfeed from sources of cogeneration or from the secondary system (for example, backfeed from more than one energized phase feeding a common load), the requirements of paragraph (l) of this section apply if employees will work the lines or equipment as energized, and the requirements of paragraphs (m) and (n) of this section apply if employees will work the lines or equipment as deenergized.
(w)(8) “Lasers.” Laser equipment shall be installed, adjusted, and operated in accordance with 1926.54 of this Chapter.	(8) Lasers. The employer shall install, adjust, and operate laser equipment in accordance with § 1926.54 of this chapter.
(w)(9) “Hydraulic fluids.” Hydraulic fluids used for the insulated sections of equipment shall provide insulation for the voltage involved.	(9) Hydraulic fluids. Hydraulic fluids used for the insulated sections of equipment shall provide insulation for the voltage involved.

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<b>1910.269(x)</b> “Definitions.”	<b>(x)</b> Definitions.
“Affected employee.”	Affected employee.
An employee whose job requires him or her to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires him or her to work in an area in which such servicing or maintenance is being performed.	An employee whose job requires him or her to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires him or her to work in an area in which such servicing or maintenance is being performed.
“Attendant.”	Attendant.
An employee assigned to remain immediately outside the entrance to an enclosed or other space to render assistance as needed to employees inside the space.	An employee assigned to remain immediately outside the entrance to an enclosed or other space to render assistance as needed to employees inside the space.
“Authorized employee.”	Authorized employee.
An employee who locks out or tags out machines or equipment in order to perform servicing or maintenance on that machine or equipment. An affected employee becomes an authorized employee when that employee’s duties include performing servicing or maintenance covered under this section.	An employee who locks out or tags out machines or equipment in order to perform servicing or maintenance on that machine or equipment. An affected employee becomes an authorized employee when that employee’s duties include performing servicing or maintenance covered under this section.
“Automatic circuit recloser.”	Automatic circuit recloser.
A self-controlled device for interrupting and reclosing an alternating current circuit with a predetermined sequence of opening and reclosing followed by resetting, hold-closed, or lockout operation.	A self-controlled device for <b>automatically</b> interrupting and reclosing an alternating-current circuit, with a predetermined sequence of opening and reclosing followed by resetting, hold closed, or lockout.
“Barricade.”	Barricade.
A physical obstruction such as tapes, cones, or A-frame type wood or metal structures <del>intended to provide</del> a warning about and to limit access to a hazardous area.	A physical obstruction such as tapes, cones, or A-frame type wood or metal structures <b>that provides</b> a warning about, and limits access to, a hazardous area.
“Barrier.”	Barrier.
A physical obstruction <del>which is intended to prevent</del> contact with energized lines or equipment or to prevent unauthorized access to a work area.	A physical obstruction <b>that prevents</b> contact with energized lines or equipment or prevents unauthorized access to a work area.
“Bond.”	Bond.
The electrical interconnection of conductive parts designed to maintain a common electrical potential.	The electrical interconnection of conductive parts designed to maintain a common electric potential.
“Bus.”	Bus.
A conductor or a group of conductors that serve as a common connection for two or more circuits.	A conductor or a group of conductors that serve as a common connection for two or more circuits.

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"Bushing."	(x) Bushing.
An insulating structure, including a through conductor or providing a passageway for such a conductor, with provision for mounting on a barrier, conducting or otherwise, for the purposes of insulating the conductor from the barrier and conducting current from one side of the barrier to the other.	An insulating structure that includes a through conductor or that provides a passageway for such a conductor, and that, when mounted on a barrier, insulates the conductor from the barrier for the purpose of conducting current from one side of the barrier to the other.
"Cable."	Cable.
A conductor with insulation, or a stranded conductor with or without insulation and other coverings (single-conductor cable), or a combination of conductors insulated from one another (multiple-conductor cable).	A conductor with insulation, or a stranded conductor with or without insulation and other coverings (single-conductor cable), or a combination of conductors insulated from one another (multiple-conductor cable).
"Cable sheath."	Cable sheath.
A conductive protective covering applied to cables.	A conductive protective covering applied to cables.
Note: A cable sheath may consist of multiple layers of which one or more is conductive.	[Ø] Note to the definition of "cable sheath": A cable sheath may consist of multiple layers one or more of which is conductive.
"Circuit."	Circuit.
A conductor or system of conductors through which an electric current is intended to flow.	A conductor or system of conductors through which an electric current is intended to flow.
"Clearance (between objects)."	Clearance (between objects).
The clear distance between two objects measured surface to surface.	The clear distance between two objects measured surface to surface.
"Clearance (for work)."	Clearance (for work).
Authorization to perform specified work or permission to enter a restricted area.	Authorization to perform specified work or permission to enter a restricted area.
"Communication lines. (See Lines, communication.)"	Communication lines. (See Lines; Communication lines.)
"Conductor."	Conductor.
A material, usually in the form of a wire, cable, or bus bar, used for carrying an electric current.	A material, usually in the form of a wire, cable, or bus bar, used for carrying an electric current.
	Contract employer.
	An employer, other than a host employer, that performs work covered by this section under contract.
"Covered conductor."	Covered conductor.
A conductor covered with a dielectric having no rated insulating strength or having a rated insulating strength less than the voltage of the circuit in which the conductor is used.	A conductor covered with a dielectric having no rated insulating strength or having a rated insulating strength less than the voltage of the circuit in which the conductor is used.

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“Current-carrying part.”	(x) Current-carrying part.
A conducting part intended to be connected in an electric circuit to a source of voltage. Non-current-carrying parts are those not intended to be so connected.	A conducting part intended to be connected in an electric circuit to a source of voltage. Non-current-carrying parts are those not intended to be so connected.
“Deenergized.”	Deenergized.
Free from any electrical connection to a source of potential difference and from electric charge; not having a potential different from that of the earth.	Free from any electrical connection to a source of potential difference and from electric charge; not having a potential that is different from the potential of the earth.
Note: The term is used only with reference to current-carrying parts, which are sometimes energized (alive).	[Ø] Note to the definition of “deenergized”: The term applies only to current-carrying parts, which are sometimes energized (alive).
“Designated employee (designated person).”	Designated employee (designated person).
An employee (or person) who is designated by the employer to perform specific duties under the terms of this section and who is knowledgeable in the construction and operation of the equipment and the hazards involved.	An employee (or person) who is assigned by the employer to perform specific duties under the terms of this section and who has sufficient knowledge of the construction and operation of the equipment, and the hazards involved, to perform his or her duties safely.
“Electric line truck.”	Electric line truck.
A truck used to transport personnel, tools, and material for electric supply line work.	A truck used to transport personnel, tools, and material for electric supply line work.
“Electric supply equipment.”	Electric supply equipment.
Equipment that produces, modifies, regulates, controls, or safeguards a supply of electric energy.	Equipment that produces, modifies, regulates, controls, or safeguards a supply of electric energy.
“Electric supply lines. (See Lines, electric supply.)”	Electric supply lines. (See Lines; Electric supply lines.)
“Electric utility.”	Electric utility.
An organization responsible for the installation, operation, or maintenance of an electric supply system.	An organization responsible for the installation, operation, or maintenance of an electric supply system.
“Enclosed space.”	Enclosed space.
A working space, such as a manhole, vault, tunnel, or shaft, that has a limited means of egress or entry, that is designed for periodic employee entry under normal operating conditions, and that under normal conditions does not contain a hazardous atmosphere, but that may contain a hazardous atmosphere under abnormal conditions.	A working space, such as a manhole, vault, tunnel, or shaft, that has a limited means of egress or entry, that is designed for periodic employee entry under normal operating conditions, and that, under normal conditions, does not contain a hazardous atmosphere, but may contain a hazardous atmosphere under abnormal conditions.

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Note: Spaces that are enclosed but not designed for employee entry under normal operating conditions are not considered to be enclosed spaces for the purposes of this section. Similarly, spaces that are enclosed and that are expected to contain a hazardous atmosphere are not considered to be enclosed spaces for the purposes of this section. Such spaces meet the definition of permit spaces in 1910.146 of this Part, and entry into them must be performed in accordance with that standard.	<b>[Ø]</b> Note to the definition of “enclosed space”: The Occupational Safety and Health Administration does not consider spaces that are enclosed but not designed for employee entry under normal operating conditions to be enclosed spaces for the purposes of this section. Similarly, the Occupational Safety and Health Administration does not consider spaces that are enclosed and that are expected to contain a hazardous atmosphere to be enclosed spaces for the purposes of this section. Such spaces meet the definition of permit spaces in § 1910.146, and entry into them must conform to that standard.
“Energized (alive, live).”	<b>(x)</b> Energized (alive, live).
Electrically connected to a source of potential difference, or electrically charged so as to have a potential significantly different from that of earth in the vicinity.	Electrically connected to a source of potential difference, or electrically charged so as to have a potential significantly different from that of earth in the vicinity.
“Energy isolating device.”	Energy isolating device.
A physical device that prevents the transmission or release of energy, including, but not limited to, the following: a manually operated electric circuit breaker, a disconnect switch, a manually operated switch, a slide gate, a slip blind, a line valve, blocks, and any similar device with a visible indication of the position of the device. (Push buttons, selector switches, and other control-circuit-type devices are not energy isolating devices.)	A physical device that prevents the transmission or release of energy, including, but not limited to, the following: a manually operated electric circuit breaker, a disconnect switch, a manually operated switch, a slide gate, a slip blind, a line valve, blocks, and any similar device with a visible indication of the position of the device. (Push buttons, selector switches, and other control-circuit-type devices are not energy isolating devices.)
“Energy source.”	Energy source.
Any electrical, mechanical, hydraulic, pneumatic, chemical, nuclear, thermal, or other energy source that could cause injury to personnel.	Any electrical, mechanical, hydraulic, pneumatic, chemical, nuclear, thermal, or other energy source that could cause injury to <b>employees</b> .
	<b>Entry (as used in paragraph (e) of this section).</b>
	The action by which a person passes through an opening into an enclosed space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.
“Equipment (electric).”	Equipment (electric).
A general term including material, fittings, devices, appliances, fixtures, apparatus, and the like used as part of or in connection with an electrical installation.	A general term including material, fittings, devices, appliances, fixtures, apparatus, and the like used as part of or in connection with an electrical installation.



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	"Exposed."	(x)	Exposed, Exposed to contact (as applied to energized parts).
	Not isolated or guarded.		Not isolated or guarded.
			Fall restraint system.
			A fall protection system that prevents the user from falling any distance.
			First-aid training.
			Training in the initial care, including cardiopulmonary resuscitation (which includes chest compressions, rescue breathing, and, as appropriate, other heart and lung resuscitation techniques), performed by a person who is not a medical practitioner, of a sick or injured person until definitive medical treatment can be administered.
	"Ground."		Ground.
	A conducting connection, whether intentional or accidental, between an electric circuit or equipment and the earth, or to some conducting body that serves in place of the earth.		A conducting connection, whether planned or unplanned, between an electric circuit or equipment and the earth, or to some conducting body that serves in place of the earth.
	"Grounded."		Grounded.
	Connected to earth or to some conducting body that serves in place of the earth.		Connected to earth or to some conducting body that serves in place of the earth.
	"Guarded."		Guarded.
	Covered, fenced, enclosed, or otherwise protected, by means of suitable covers or casings, barrier rails or screens, mats, or platforms, designed to minimize the possibility, under normal conditions, of dangerous approach or accidental contact by persons or objects.		Covered, fenced, enclosed, or otherwise protected, by means of suitable covers or casings, barrier rails or screens, mats, or platforms, designed to minimize the possibility, under normal conditions, of dangerous approach or inadvertent contact by persons or objects.
	Note: Wires which are insulated, but not otherwise protected, are not considered as guarded.	[Ø]	Note to the definition of "guarded": Wires that are insulated, but not otherwise protected, are not guarded.
	"Hazardous atmosphere"		Hazardous atmosphere.
	<del>means</del> an atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue (that is, escape unaided from an enclosed space), injury, or acute illness from one or more of the following causes:		An atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue (that is, escape unaided from an enclosed space), injury, or acute illness from one or more of the following causes:
(x)(1)	Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL);	(1)	Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL);
(x)(2)	Airborne combustible dust at a concentration that meets or exceeds its LFL;	(2)	Airborne combustible dust at a concentration that meets or exceeds its LFL;

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<p>Note: This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet (1.52 m) or less.</p>	<p>[0] Note to the definition of “hazardous atmosphere” (2): This concentration may be approximated as a condition in which the dust obscures vision at a distance of <b>1.52 meters (5 feet)</b> or less.</p>
(x)(3) Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent;	(3) Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent;
(x)(4) Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published in Subpart G, “Occupational Health and Environmental Control”, or in Subpart Z, “Toxic and Hazardous Substances,” of this Part and which could result in employee exposure in excess of its dose or permissible exposure limit;	(4) Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published in Subpart G, Occupational Health and Environmental Control, or in Subpart Z, Toxic and Hazardous Substances, of this part and which could result in employee exposure in excess of its dose or permissible exposure limit;
<p>Note: An atmospheric concentration of any substance that is not capable of causing death, incapacitation, impairment of ability to self-rescue, injury, or acute illness due to its health effects is not covered by this provision.</p>	<p>[0] Note to the definition of “hazardous atmosphere” (4): An atmospheric concentration of any substance that is not capable of causing death, incapacitation, impairment of ability to self-rescue, injury, or acute illness due to its health effects is not covered by this provision.</p>
(x)(5) Any other atmospheric condition that is immediately dangerous to life or health.	(5) Any other atmospheric condition that is immediately dangerous to life or health.
<p>Note: For air contaminants for which OSHA has not determined a dose or permissible exposure limit, other sources of information, such as Material Safety Data Sheets that comply with the Hazard Communication Standard, 1910.1200 of this Part, published information, and internal documents can provide guidance in establishing acceptable atmospheric conditions.</p>	<p>[0] Note to the definition of “hazardous atmosphere” (5): For air contaminants for which the Occupational Safety and Health Administration has not determined a dose or permissible exposure limit, other sources of information, such as Material Safety Data Sheets that comply with the Hazard Communication Standard, § 1910.1200, published information, and internal documents can provide guidance in establishing acceptable atmospheric conditions.</p>
“High-power tests.”	High-power tests.
Tests in which fault currents, load currents, magnetizing currents, and line-dropping currents are used to test equipment, either at the equipment’s rated voltage or at lower voltages.	<b>Tests in which the employer uses fault currents</b> , load currents, magnetizing currents, and line-dropping currents to test equipment, either at the equipment's rated voltage or at lower voltages.
“High-voltage tests.”	High-voltage tests.
Tests in which voltages of approximately 1000 volts are used as a practical minimum and in which the voltage source has sufficient energy to cause injury.	Tests in which <b>the employer uses voltages of approximately 1,000 volts</b> as a practical minimum and in which the voltage source has sufficient energy to cause injury.

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“High wind.”	(x) High wind.
A wind of such velocity that the following hazards would be present:	A wind of such velocity that <b>one or more of</b> the following hazards would be present:
[1] An employee would be exposed to being blown from elevated locations, or	<b>(1) The wind could blow an employee from an elevated location,</b>
[2] An employee or material handling equipment could lose control of material being handled, or	<b>(2) The wind could cause an employee or equipment handling material to lose control of the material, or</b>
[3] An employee would be exposed to other hazards not controlled by the standard involved.	<b>(3) The wind would expose an employee to other hazards not controlled by the standard involved.</b>
Note: Winds exceeding 40 miles per hour (64.4 kilometers per hour), or 30 miles per hour (48.3 kilometers per hour) if material handling is involved, are normally considered as meeting this criteria unless precautions are taken to protect employees from the hazardous effects of the wind.	<b>[Ø]</b> Note to the definition of “high wind”: <b>The Occupational Safety and Health Administration normally considers winds exceeding 64.4 kilometers per hour (40 miles per hour), or 48.3 kilometers per hour (30 miles per hour) if the work involves material handling, as meeting this criteria, unless the employer takes precautions to protect employees from the hazardous effects of the wind.</b>
	<b>Host employer.</b>
	<b>An employer that operates, or that controls the operating procedures for, an electric power generation, transmission, or distribution installation on which a contract employer is performing work covered by this section.</b>
	<b>[Ø]</b> Note to the definition of “host employer”: <b>The Occupational Safety and Health Administration will treat the electric utility or the owner of the installation as the host employer if it operates or controls operating procedures for the installation. If the electric utility or installation owner neither operates nor controls operating procedures for the installation, the Occupational Safety and Health Administration will treat the employer that the utility or owner has contracted with to operate or control the operating procedures for the installation as the host employer. In no case will there be more than one host employer.</b>
“Immediately dangerous to life or health (IDLH)”	Immediately dangerous to life or health (IDLH).
means any condition that poses an immediate or delayed threat to life or that would cause irreversible adverse health effects or that would interfere with an individual’s ability to escape unaided from a permit space.	Any condition that poses an immediate or delayed threat to life or that would cause irreversible adverse health effects or that would interfere with an individual's ability to escape unaided from a permit space.

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<p>Note: Some materials - hydrogen fluoride gas and cadmium vapor, for example - may produce immediate transient effects that, even if severe, may pass without medical attention, but are followed by sudden, possibly fatal collapse 12-72 hours after exposure. The victim “feels normal” from recovery from transient effects until collapse. Such materials in hazardous quantities are considered to be “first immediately” dangerous to life or health.</p>	<p>[Ø] Note to the definition of “immediately dangerous to life or health”: Some materials—hydrogen fluoride gas and cadmium vapor, for example—may produce immediate transient effects that, even if severe, may pass without medical attention, but are followed by sudden, possibly fatal collapse 12-72 hours after exposure. The victim “feels normal” from recovery from transient effects until collapse. Such materials in hazardous quantities are considered to be “immediately” dangerous to life or health.</p>
“Insulated.”	(x) Insulated.
Separated from other conducting surfaces by a dielectric (including air space) offering a high resistance to the passage of current.	Separated from other conducting surfaces by a dielectric (including air space) offering a high resistance to the passage of current.
<p>Note: When any object is said to be insulated, it is understood to be insulated for the conditions to which it is normally subjected. Otherwise, it is, within the purpose of this section, uninsulated.</p>	<p>[Ø] Note to the definition of “insulated”: When any object is said to be insulated, it is understood to be insulated for the conditions to which it normally is subjected. Otherwise, it is, for the purpose of this section, uninsulated.</p>
“Insulation (cable).”	Insulation (cable).
That which is relied upon to insulate the conductor from other conductors or conducting parts or from ground.	Material relied upon to insulate the conductor from other conductors or conducting parts or from ground.
	Isolated.
	Not readily accessible to persons unless special means for access are used.
“Line-clearance tree trimmer.”	Line-clearance tree trimmer.
An employee who, through related training or on-the-job experience or both, is familiar with the special techniques and hazards involved in line-clearance tree trimming.	An employee who, through related training or on-the-job experience or both, is familiar with the special techniques and hazards involved in line-clearance tree trimming.
<p>Note 1: An employee who is regularly assigned to a line-clearance tree-trimming crew and who is undergoing on-the-job training and who, in the course of such training, has demonstrated an ability to perform duties safely at his or her level of training and who is under the direct supervision of a line-clearance tree trimmer is considered to be a line-clearance tree trimmer for the performance of those duties.</p>	<p>[Ø] Note 1 to the definition of “line-clearance tree trimmer”: An employee who is regularly assigned to a line-clearance tree-trimming crew and who is undergoing on-the-job training and who, in the course of such training, has demonstrated an ability to perform duties safely at his or her level of training and who is under the direct supervision of a line-clearance tree trimmer is considered to be a line-clearance tree trimmer for the performance of those duties.</p>

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<p>Note 2: A line-clearance tree trimmer is not considered to be a “qualified employee” under this section unless he or she has the training required for a qualified employee under paragraph (a)(2)(ii) of this section. However, under the electrical safety-related work practices standard in Subpart S of this Part, a line-clearance tree trimmer is considered to be a “qualified employee”. Tree trimming performed by such “qualified employees” is not subject to the electrical safety-related work practice requirements contained in 1910.331 through 1910.335 of this Part. (See also the note following 1910.332(b)(3) of this Part for information regarding the training an employee must have to be considered a qualified employee under 1910.331 through 1910.335 of this part.)</p>	<p>[Ø] Note 2 to the definition of “line-clearance tree trimmer”: A line-clearance tree trimmer is not considered to be a “qualified employee” under this section unless he or she has the training required for a qualified employee under paragraph (a)(2)(ii) of this section. However, under the electrical safety-related work practices standard in Subpart S of this part, a line-clearance tree trimmer is considered to be a “qualified employee”. Tree trimming performed by such “qualified employees” is not subject to the electrical safety-related work practice requirements contained in §§ 1910.331 through 1910.335 of this part. (See also the note following § 1910.332(b)(3) of this part for information regarding the training an employee must have to be considered a qualified employee under §§ 1910.331 through 1910.335 of this part.)</p>
<p>“Line-clearance tree trimming.”</p>	<p>(x) Line-clearance tree trimming.</p>
<p>The pruning, trimming, repairing, maintaining, removing, or clearing of trees or the cutting of brush that is within <del>10 feet (305 cm)</del> of electric supply lines and equipment.</p>	<p>The pruning, trimming, repairing, maintaining, removing, or clearing of trees, or the cutting of brush, that is within <b>the following distance</b> of electric supply lines and equipment:</p> <p>(1) For voltages to ground of 50 kilovolts or less—3.05 meters (10 feet);</p> <p>(2) For voltages to ground of more than 50 kilovolts—3.05 meters (10 feet) plus 0.10 meters (4 inches) for every 10 kilovolts over 50 kilovolts.</p>
<p>“Lines.</p>	<p>Lines.</p>
<p>[1] Communication lines.”</p>	<p>(1) Communication lines.</p>
<p>The conductors and their supporting or containing structures which are used for public or private signal or communication service, and which operate at potentials not exceeding 400 volts to ground or 750 volts between any two points of the circuit, and the transmitted power of which does not exceed 150 watts. If the lines are operating at less than 150 volts, no limit is placed on the transmitted power of the system. Under certain conditions, communication cables may include communication circuits exceeding these limitations where such circuits are also used to supply power solely to communication equipment.</p>	<p>The conductors and their supporting or containing structures which are used for public or private signal or communication service, and which operate at potentials not exceeding 400 volts to ground or 750 volts between any two points of the circuit, and the transmitted power of which does not exceed 150 watts. If the lines are operating at less than 150 volts, no limit is placed on the transmitted power of the system. Under certain conditions, communication cables may include communication circuits exceeding these limitations where such circuits are also used to supply power solely to communication equipment.</p>

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Note: Telephone, telegraph, railroad signal, data, clock, fire, police alarm, cable television, and other systems conforming to this definition are included. Lines used for signaling purposes, but not included under this definition, are considered as electric supply lines of the same voltage.	[Ø] Note to the definition of “communication lines”: Telephone, telegraph, railroad signal, data, clock, fire, police alarm, cable television, and other systems conforming to this definition are included. Lines used for signaling purposes, but not included under this definition, are considered as electric supply lines of the same voltage.
[2] “Electric supply lines”.	(x) (2) Electric supply lines.
Conductors used to transmit electric energy and their necessary supporting or containing structures. Signal lines of more than 400 volts are always supply lines within this section, and those of less than 400 volts are considered as supply lines, if so run and operated throughout.	Conductors used to transmit electric energy and their necessary supporting or containing structures. Signal lines of more than 400 volts are always supply lines within this section, and those of less than 400 volts are considered as supply lines, if so run and operated throughout.
“Manhole.”.	Manhole.
A subsurface enclosure which personnel may enter and which is used for the purpose of installing, operating, and maintaining submersible equipment or cable	A subsurface enclosure that personnel may enter and that is used for installing, operating, and maintaining submersible equipment or cable.
“Manhole steps.”	
<del>A series of steps individually attached to or set into the walls of a manhole structure.</del>	
“Minimum approach distance.”	Minimum approach distance.
The closest distance an employee is permitted to approach an energized or a grounded object.	The closest distance an employee may approach an energized or a grounded object.
	[Ø] Note to the definition of “minimum approach distance”: Paragraph (l)(3)(i) of this section requires employers to establish minimum approach distances.
	Personal fall arrest system.
	A system used to arrest an employee in a fall from a working level.
“Qualified employee (qualified person).”	Qualified employee (qualified person).
One knowledgeable in the construction and operation of the electric power generation, transmission, and distribution equipment involved, along with the associated hazards.	An employee (person) knowledgeable in the construction and operation of the electric power generation, transmission, and distribution equipment involved, along with the associated hazards.
Note 1: An employee must have the training required by paragraph (a)(2)(ii) of this section in order to be considered a qualified employee.	[Ø] Note 1 to the definition of “qualified employee (qualified person)”: An employee must have the training required by (a)(2)(ii) of this section to be a qualified employee.

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Note 2: Except under paragraph (g)(2)(v) of this section, an employee who is undergoing on-the-job training and who, in the course of such training, has demonstrated an ability to perform duties safely at his or her level of training and who is under the direct supervision of a qualified person is considered to be a qualified person for the performance of those duties.	[Ø] Note 2 to the definition of “qualified employee (qualified person)”: Except under (g)(2)(iv)(C)(2) and (g)(2)(iv)(C)(3) of this section, an employee who is undergoing on-the-job training and who has demonstrated, in the course of such training, 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 a qualified person for the performance of those duties.
	(x) Statistical sparkover voltage.
	A transient overvoltage level that produces a 97.72-percent probability of sparkover (that is, two standard deviations above the voltage at which there is a 50-percent probability of sparkover).
	Statistical withstand voltage.
	A transient overvoltage level that produces a 0.14-percent probability of sparkover (that is, three standard deviations below the voltage at which there is a 50-percent probability of sparkover).
“Step bolt.”	
A bolt or rung attached at intervals along a structural member and used for foot placement during climbing or standing.	
“Switch.”	Switch.
A device for opening and closing or for changing the connection of a circuit. In this section, a switch is <del>understood to be</del> manually operable, unless otherwise stated.	A device for opening and closing or for changing the connection of a circuit. In this section, a switch is manually operable, unless otherwise stated.
“System operator.”	System operator.
A qualified person designated to operate the system or its parts.	A qualified person designated to operate the system or its parts.
“Vault.”	Vault.
An enclosure, above or below ground, which personnel may enter and which is used for the purpose of installing, operating, or maintaining equipment or cable.	An enclosure, above or below ground, that personnel may enter and that is used for installing, operating, or maintaining equipment or cable.
“Vented vault.”	Vented vault.
A vault that has provision for air changes using exhaust flue stacks and low level air intakes operating on differentials of pressure and temperature providing for airflow which precludes a hazardous atmosphere from developing.	A vault that has provision for air changes using exhaust-flue stacks and low-level air intakes operating on pressure and temperature differentials that provide for airflow that precludes a hazardous atmosphere from developing.



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<p>“Voltage.”</p> <p>The effective (rms) potential difference between any two conductors or between a conductor and ground. Voltages are expressed in nominal values unless otherwise indicated. The nominal voltage of a system or circuit is the value assigned to a system or circuit of a given voltage class for the purpose of convenient designation. The operating voltage of the system may vary above or below this value.</p>	<p>(x) Voltage.</p> <p>The effective (root mean square, or rms) potential difference between any two conductors or between a conductor and ground. This section expresses voltages in nominal values, unless otherwise indicated. The nominal voltage of a system or circuit is the value assigned to a system or circuit of a given voltage class for the purpose of convenient designation. The operating voltage of the system may vary above or below this value.</p>
	Work-positioning equipment.
	A body belt or body harness system rigged to allow an employee to be supported on an elevated vertical surface, such as a utility pole or tower leg, and work with both hands free while leaning.