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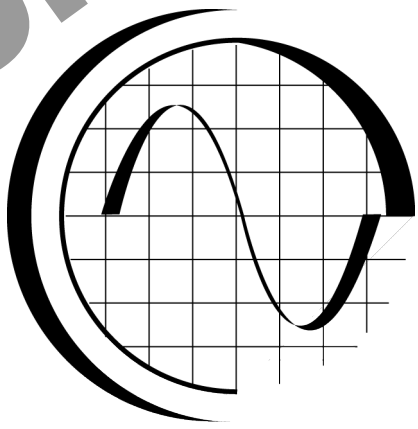
Based on the 2015 Edition.

ELECTRICAL SAFETY IN THE WORKPLACE — UNDERSTANDING NFPA 70E®

Lesson One

Article 90: Introduction and Purpose



TPC Training Systems
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21101

Lesson

1 Article 90: Introduction and Purpose

TOPICS

Introduction to *NFPA 70E*
Enforcement of *NFPA 70E*
National Electrical Code
Electrical Hazards
Purpose of *NFPA 70E*
Scope of *NFPA 70E*
Arrangement of *NFPA 70E*
Organization of *NFPA 70E*
Rules
Interpretation and Application

OBJECTIVES

After studying this lesson, you should be able to…

- Explain how and why *NFPA 70E* was created.
- State the purpose of *NFPA 70E*.
- Understand how OSHA can use *NFPA 70E* in enforcement actions.
- Explain which areas are covered by *NFPA 70E* and which are not covered.
- Explain how *NFPA 70E* is arranged and organized.
- State the differences among mandatory rules, permissive rules, and explanatory material.

KEY TECHNICAL TERMS

Occupational Safety and Health Act 1.02 act passed by Congress to help ensure workplace safety and health

OSHA 1.02 Occupational Safety and Health Administration

National Electrical Code (NEC) 1.03 standards for electrical installations

NFPA 70E 1.03 standard created to provide practical, safe working area for employees

NFPA 70E Handbook 1.07 provides *NFPA 70E* standards along with commentary and supplemental material

Arc flash 1.18 violent release of radiant energy in the form of heat and light

Arc blast 1.19 explosive event that occurs with arc flash

Mandatory rules 1.43 require or prohibit certain actions

Shall and shall not 1.43 terms used to indicate mandatory action

Permissive rules 1.44 actions that are allowed but not required

The electrical industry is one that plays a vital role in all of our everyday lives. It is also an industry that provides many jobs to an ever-growing workforce. Nearly everyone who works in any type of industry is exposed to both the benefits and the potential dangers of electricity. Unfortunately, many workers are injured or die every year as a result of electrical incidents that occur on the job. Therefore, it is essential that standards be established to increase the awareness of these dangers.

As a result of the need for improved electrical safety in the workplace, *NFPA 70E* was created to protect workers and establish additional electrical safety requirements for increased worker safety. Electrical safety is important not only for workers who perform electrical maintenance, but also for any worker who may have a potential exposure to electrical hazards.

This lesson begins by covering the creation and purpose of *NFPA 70E, Standard for Electrical Safety in the Workplace*. It also discusses other supporting agencies concerned with electrical safety as well as the overall format of *NFPA 70E*. As you move through this course, keep in mind that it is not intended to be used as a substitute for the *NFPA 70E* standard itself, but rather as an introduction to it. In addition, *NFPA 70E* requires in Article 110.2(B) that training on the electrical safety topics covered in the standard include a classroom or on-the-job component, or both.

Introduction to *NFPA 70E*

1.01 As industry has evolved, the need for electricity has greatly increased. Electricity impacts nearly every aspect of our lives. The ways in which we work, live, and play typically require electricity. With all the demands we place on the electrical industry, we have the responsibility to establish safety standards and awareness.

1.02 In response to the growing need for workplace safety, the *Occupational Safety and Health Act* was passed in 1970. The purpose of this Act was to ensure the establishment of safe and healthy working environments. This Act then led to the creation of the *Occupational Safety and Health Administration (OSHA)*, which is the federal government agency charged with enforcing workplace safety standards. OSHA may inspect workplaces for dangerous and unhealthy working conditions. OSHA may also investigate workplace accidents to determine the cause in order to prevent future accidents. And OSHA may issue citations to companies that are found not to be in compliance with its standards. OSHA standards are federal law, which employers and employees are legally required to follow.

1.03 Even before the establishment of the Occupational Safety and Health Act, measures were in place to help ensure electrical safety. The *National Electrical Code (NEC)* established standards for safety in electrical installations. However, after the creation of OSHA, there was a need for a document that would work together with the *NEC* to improve electrical workplace safety for those who may be exposed to electrical hazards. In 1976, *NFPA 70E* was established by the National Fire Protection Association at the request of OSHA. *NFPA 70E* is a consensus standard. Essentially, OSHA lists electrical hazards to avoid; *NFPA 70E* is a "how-to-comply" document.

1.04 *NFPA 70E* spells out safety procedures for workers who may be subject to electrical hazards or the dangers of working with electrical equipment. The *NEC* and *NFPA 70E* can work hand in hand. The *NEC* sets the standards for how to install electrical systems that are safe. The *NFPA 70E* standard spells out safe work practices for those who install or maintain electrical systems. *NFPA 70E* does not contain detailed information on how to install electrical equipment. Rather, it contains information on how to work safely with and around electrical equipment.

1.05 An example of how *NFPA 70E* applies to workers who may be exposed to electrical hazards is shown in Fig. 1-1. In the photo, the door to a

Fig. 1-1. Open panelboard

panelboard is open. Safety measures must be established to protect the worker from electrical shock. *NFPA 70E* addresses this situation when work is being performed on or near energized conductors and circuits.

1.06 To understand how OSHA fits into all of this, consider another example. The *NEC* establishes the requirements for installing a disconnect switch for a piece of equipment (size and location, for example). OSHA sets the standard for lockout/tagout for any worker that services that piece of equipment. *NFPA 70E* expands upon the procedures a worker should follow in order to be safe. A typical lockout/tagout application is shown in Fig. 1-2.

1.07 *NFPA 70E* is a relatively short document consisting of about 100 pages of information. In an attempt to provide additional explanation for users of *NFPA 70E*, the *NFPA 70E Handbook* was created. The handbook includes all *NFPA 70E* standards along with commentary and supplemental materials that help the user gain a better understanding of how to apply the safety standards. The supplements in the handbook include additional information from *NFPA 70B*, which covers detailed information concerning maintenance of electrical equipment, and excerpts from the *NEC*. By using the *NFPA 70E* Handbook, you can gain a better understanding of the close relationship between the *NEC* and *NFPA 70E*.

1.08 *NFPA 70E* is organized into chapters and then divided into articles. As you move through this course, you will see references to these chapters and articles. The arrangement of *NFPA 70E* will be discussed in more detail later.

Enforcement of *NFPA 70E*

1.09 Confusion frequently arises regarding the *NFPA 70E* standard and its enforcement. Employers often wonder if compliance with *NFPA 70E* is required. Currently, OSHA has not incorporated *NFPA 70E* into its Code of Federal Regulations. However, OSHA does have a regulation that requires protective equipment when working where a potential electrical hazard exists. It has another that requires that an employer assess the workplace for hazards. In addition, OSHA has a General Duty clause that states:

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

1.10 These OSHA regulations are written in general terms, without details on how to comply with

Fig. 1-2. Lockout/tagout application

them. OSHA lists standards that "may be useful" in complying with its regulations; *NFPA 70E* is one of these standards. Suppose your facility were to experience an electric shock or arc-flash burn accident that resulted in a serious injury or death. If OSHA was to determine that compliance with *NFPA 70E* could have prevented the injury or death, it could cite your company for not complying with *NFPA 70E* to protect its employees.

National Electrical Code

1.11 As mentioned earlier, a close relationship exists between *NFPA 70E* and the *NEC*. Therefore, it is valuable to develop a good understanding of the *NEC* and how it relates to *NFPA 70E*. Both documents are produced by the National Fire Protection Association, an organization that provides codes and standards to minimize the risk of fire hazards.

1.12 The *NEC*, also known as *NFPA 70*, was implemented in 1897 and is now published every three years. The latest publication of the *NEC* is the 2014 edition. The *NEC* consists of nine chapters. Each chapter is divided into articles in the same manner as *NFPA 70E*. For example, Chapter 1 of the *NEC* contains Article 100 and Article 110. Under each of those articles there are sub-points, such as 110.1 and 110.2. The first four chapters pertain to general electrical installations. Chapters 5 through 7 pertain to special equipment and locations. Chapter 8 relates to communication systems, and Chapter 9 contains tables.

1.13 Prior to the 2009 edition, *NFPA 70E* actually contained many *NEC* articles in reference to electrical installations. However, since the *NEC* is so widely accepted nationally, it was decided that printing *NEC* requirements in *NFPA 70E* was no longer necessary. For this reason, it is a good idea to have a copy of both the *NEC* and a copy of *NFPA 70E* on hand in order to ensure both safe installations and safety for workers.

1.14 Even though the *NEC* articles have been removed from *NFPA 70E*, you can still find some of these articles in the *NFPA 70E* Handbook, in the supplement section as previously discussed. Supplement 1 in the handbook contains *NEC* articles that relate to safe electrical installations. If you are going to own only one book, the handbook version of *NFPA 70E* is a good choice since it combines the *NFPA 70E* information with related *NEC* articles.

1.15 In order to help further explain the relationship between the *NEC* and *NFPA 70E*, consider the following example. Article 110 in the *NEC* addresses the requirements for proper access and working spaces for maintaining electrical equipment. It lists the minimum distances necessary for a person to move safely around electrical equipment. Article 130 of *NFPA 70E* also addresses the need for working around electrical equipment, but it provides additional information concerning personal protective equipment (PPE) that a person should wear to avoid or minimize injury. As you can see, both the *NEC* and *NFPA 70E* address safe working distances from equipment. The goal of the *NEC* is to provide direction on how to make sure these safe distances are created when installing the equipment. *NFPA 70E* directs how to work in these areas with the proper personal safety equipment.

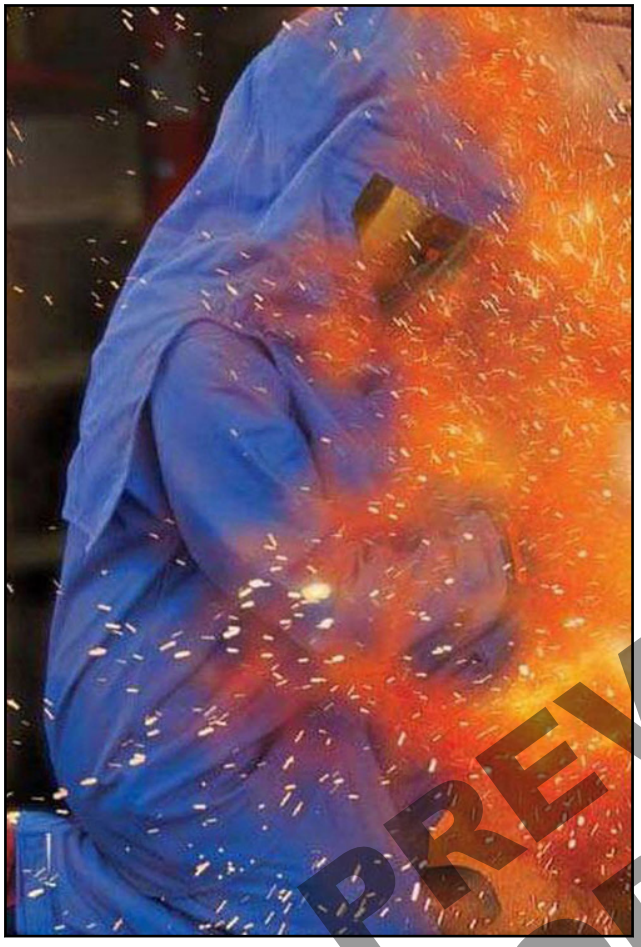
Electrical Hazards

1.16 It has long been known that electric shock is a hidden danger of working with electricity. Cell and tissue damage may occur along the current path as it passes through the body. Exposure to even low-voltage circuits can cause pain, injury, or death. *NFPA 70E* provides information on procedures to avoid electric shock.

1.17 About 20 years ago, OSHA began to recognize the fact that electrical hazards other than shock were causing a significant number of injuries and fatalities. *NFPA 70E* focuses attention on arc flash and arc blast in addition to electric shock. The 1995 edition of *NFPA 70E* was the first to specifically address arc flash and arc blast hazards with minimum approach distances. More attention continues to be given to these dangerous situations as more is learned about them.

1.18 An *arc flash* is a violent release of radiant energy in the form of heat and light, as shown in Fig. 1-3. It produces such tremendous heat that it can melt conductors and cause serious burns. The closer a person is to the arc as it occurs and the longer the exposure, the more serious the burns will be. An arc flash

Fig. 1-3. Arc flash



is generally the result of a major short circuit or ground fault.

1.19 An *arc blast* is an explosive event that occurs with an arc flash. It is caused by the extreme heating of the air surrounding the arc. Laboratory experiments have recorded pressures of over 2000 pounds per square foot during arc flash and blast events. A blast this powerful is capable of blowing out walls and causing significant injuries to a human body. It can send bullet-like molten particles through the air and even blow the victim to the ground.

Purpose of *NFPA 70E*

1.20 **Article 90.1.** This section discusses the purpose of *NFPA 70E*. It states that the standard's purpose is to reduce worker exposure to the hazards of electricity. Although it is impossible to eliminate all electrical hazards, there are steps you can take to help reduce the risk you encounter. The best scenario for safety is when electrical installations are in compliance with the *NEC*, the manufacturer's specifications are met, and all electrical systems are operating normally. When these conditions are not met, the risk of injury increases.

1.21 The purpose of the standard is to provide practical safeguarding techniques that reduce exposure to electricity. Keep in mind that *NFPA 70E* is not intended to be used by untrained individuals, because practicing the sound judgment that comes with education and experience is necessary to avoid injury. Only trained personnel should work on electrical circuits and equipment.

1.22 *NFPA 70E* applies to nearly all types of facilities, industrial workplaces, and construction worksites. It applies to employees as well as contract workers. Basically, any workplace that has the potential for electrical hazards should comply with the standards of *NFPA 70E*.

1.23 According to *NFPA 70E*, the best way to avoid electrical hazards is to create an electrically safe working condition in which all electric power is removed from the circuit or equipment. However, there are times when exposure to electrical energy is necessary in order to make repairs or installations. The training of workers who may be exposed to such hazards is another important aspect of *NFPA 70E*.

The Programmed Exercises on the following page will tell you how well you understand the material you have just read. Before starting the exercises, remove the Reveal Key from the back of your book. Read the instructions printed on the Reveal Key. Follow these instructions as you work through the Programmed Exercises.

1-1. Which United States federal government agency is charged with enforcing workplace safety standards?	1-1. OSHA Ref: 1.02
1-2. Safety standards for electrical installations are established in the _____.	1-2. *NATIONAL ELECTRICAL CODE (NEC)* Ref: 1.03
1-3. The *NFPA 70E Handbook* includes information from *NFPA 70B* as well as excerpts from the _____.	1-3. *NATIONAL ELECTRICAL CODE (NEC)* Ref: 1.07
1-4. Unlike *NFPA 70E*, OSHA standards are written in _____ terms.	1-4. GENERAL Ref: 1.10
1-5. Can OSHA enforcement officers use *NFPA 70E* as the basis for issuing citations during enforcement actions?	1-5. YES Ref: 1.10
1-6. A violent release of radiant energy in the form of heat and light is known as a(n) _____.	1-6. ARC FLASH Ref: 1.18
1-7. Pressures of over _____ pounds per square foot have been recorded during arc flash and blast events.	1-7. 2000 Ref: 1.19
1-8. Only _____ personnel should work on electrical circuits and equipment.	1-8. TRAINED or QUALIFIED Ref: 1.21

Scope of *NFPA 70E*

1.24 **Article 90.2.** The scope of *NFPA 70E* has a lot in common with that of the *NEC*. As discussed earlier, the *NEC* applies to electrical installations; *NFPA 70E* concerns electrical safety-related work practices in the workplace. Because it is so important that there be consistency between these two documents, the panels for both documents report to the same National Electrical Code Technical Correlating Committee.

1.25 The Technical Correlating Committee is responsible for seeing that the information included in *NFPA 70E* accurately relates to the information in the *NEC*. As you move through this course, you will see how the two documents relate.

1.26 **What is covered by *NFPA 70E*.** According to Article 90.2, this standard covers safety-related work practices related to electrical hazards. Included are actions performed during the installation, inspection, operation, and routine maintenance of electrical equipment and systems, as well as the removal of electrical equipment or conductors.

1.27 The first sub-point, 90.2(A)(1), specifies the installation of electrical conductors and equipment that connect to the electrical supply. This would include conductors installed for services, disconnects, panelboards, and branch circuits—in other words, any conductor that is connected to the supply side of the electricity source. Also included is equipment connected to the supply side of the electricity source. Coverage includes most public and private building structures. Figure 1-4 shows typical buildings in which *NFPA 70E* would apply, both during construction and after completion.

1.28 The areas covered by *NFPA 70E* and listed in 90.2(A)(2) are buildings used by electric utility companies but *not* involved in the generation of electricity. This could include office buildings, warehouses, and similar structures. Excluded from coverage by the standard are structures or facilities of the utility company that *are* a part of the generation of electricity. Examples include hydropower electrical generation stations, similar to the one shown in Fig. 1-5, and electrical unit substations, as shown in Fig. 1-6.

1.29 **What is not covered by *NFPA 70E*.** Article 90.2(B) describes which installations and locations are not covered by *NFPA 70E*. However, it is important to note that even though these listed areas are not covered, *NFPA 70E* can still be implemented by employers in these areas if they choose to do so. Nowhere in *NFPA 70E* does it restrict these areas from the standard. Its use is simply not required in these particular areas.

1.30 The first installations not covered are described in 90.2(B)(1). These include the following:

- ships and other watercraft
- railroad cars
- airplanes and automobiles.

Fig. 1-4. Typical structures covered by *NFPA 70E*

Fig. 1-5. Hydropower electrical generation plant

Fig. 1-6. Electrical unit substation

Although automobiles are excluded from *NFPA 70E*, recreational vehicles and motor homes are covered by the standard.

1.31 Under Article 90.2(B)(2), the railroad system is again mentioned and more detail is used to describe other parts of the railroading industry that are not covered. This includes any type of installations for electrical generation and transformation used in the railroad rolling stock. Communication wiring used in railroading is also mentioned as being excluded from *NFPA 70E*.

1.32 The next area not covered by *NFPA 70E* is discussed in Article 90.2(B)(3). These installations relate to communication equipment used by communication companies. This may include television station broadcast equipment or cellular phone transmission equipment. Any type of communication equipment that is solely controlled or operated by a communications company is exempt.

1.33 The final area of installations that are exempt from *NFPA 70E* can be found in Article 90.2(B)(4). As mentioned earlier, installations described here are those that are under the control of utility companies only. For example:

- metering equipment
- transmission stations
- communication systems
- equipment on easements or rights-of-way
- electrical generation facilities.

Arrangement of *NFPA 70E*

1.34 **Article 90.3.** This section of *NFPA 70E* discusses how the standard is arranged. Basically, it is written with an introduction followed by three chapters. Annex material is included after Chapter 3. As previously mentioned, each chapter is divided into articles.

1.35 The introduction, or Article 90 of *NFPA 70E*, explains the application of the standard, where it is to be used, and where it does not apply. It also describes the basic structure or layout of the standard. The introduction provides the groundwork for the remainder of the standard.

1.36 Chapter 1 of *NFPA 70E* deals with safety-related work practices. This chapter includes definitions of commonly used terms, information about electrical safety training, and instruction about safe work procedures. It also includes requirements for working with electrical hazards and the use of protective equipment. Chapter 1 generally applies to all workplaces because of its broad scope.

1.37 Chapter 2 pertains to safety-related maintenance requirements. This chapter describes safety concerning general maintenance as well as some specific equipment, such as fuses and controllers. Maintenance of equipment in hazardous locations is also discussed. Chapter 2 generally applies to all

Fig. 1-7. Molded-case circuit breakers

Fig. 1-8. Cranes and hoists are covered in 310.5(D)(9)

maintenance procedures in most workplaces. Figure 1-7 shows molded-case circuit breakers that are covered under Article 225.2.

1.38 Chapter 3 addresses safety requirements for special equipment. Included in this chapter is information concerning portable equipment, such as welding machines. A large portion of the chapter is dedicated to safe work practices when working with batteries. Chapter 3 is much more specific than the first two chapters because of the fact that it applies to special facilities or equipment. Figure 1-8 shows another example of special equipment covered in Chapter 3.

1.39 The remainder of *NFPA 70E* is annex material. Here, you will find a variety of resources and examples that help support the articles found in the three chapters. The annexes are a good place to find sample forms and checklists that will help establish safer work practices. Annex material is not mandatory, but is simply included to provide supplemental material and examples.

Organization of *NFPA 70E*

1.40 **Article 90.4.** This section describes the organization of *NFPA 70E*. It simply lists the chapters and annexes in order. *NFPA 70E* is organized in such a manner that it establishes a safe working environment first, then provides articles that address more specific requirements. For example, Chapter 1 establishes general safe work practices. Chapters 2 and 3 establish more detailed practices that build upon the requirements found in Chapter 1.

1.41 Although Article 90.4 is short, it provides a very good overview of how *NFPA 70E* is organized. Understanding *NFPA 70E* can be difficult, so developing a good knowledge of the standard's organization is important.

Rules

1.42 **Article 90.5.** This particular section is divided into three sub-sections and explains the difference between the rules of *NFPA 70E* and the explanatory material. Understanding the precise terminology of the standard is very important. Terms such as "shall" and "shall not" are used in *NFPA 70E*. Understanding how these rules apply in the standard is essential.

1.43 Article 90.5(A) identifies *mandatory rules* as those that require or prohibit certain actions. The terms "shall" and "shall not" are used to indicate a mandatory rule. A mandatory rule requires a person to take a specific action, or prohibits them from taking an action, based on the requirements of *NFPA 70E*.

1.44 Permissive rules are discussed in Article 90.5(B). *Permissive rules* are identified as actions that are allowed but are not required to be performed. Permissive rules are noted by the use of the terms "shall

be permitted" or "shall not be required." Permissive rules normally serve as other options or alternative practices that are allowed or permitted.

1.45 Article 90.5(C) refers to explanatory material. Explanatory material is reference material that supports the content of *NFPA 70E*. Articles may contain *Informational Notes*. These notes are special instructions or exceptions to the articles to which they are attached. For example, Article 110.4(E) has an Informational Note that instructs the reader to consult the *NEC* for further information about overcurrent protection.

1.46 Informational notes do not contain mandatory information and therefore are not enforceable. These notes are written and inserted to provide help in interpreting and applying the standard. Many other documents produced by OSHA and the NFPA also use Informational Notes to provide explanatory material.

1.47 Another common use of Informational Notes in the standard is to refer the reader to a particular Annex in *NFPA 70E*. The annex may provide an example or offer further information about the subject contained in the article. Always consider Informational Notes when reading or applying *NFPA 70E*.

Interpretation and Application

1.48 **Article 90.6.** This section addresses the need for uniformity of interpretation so that *NFPA 70E* is applied accurately. If an interpretation problem were to arise, there are procedures in place to find a solution according to the NFPA Regulations Governing Committee Projects.

1.49 Interpretations may be requested as either informal or formal. An *informal interpretation* is the personal opinion of a committee member or NFPA staff member, but it does not represent the official position of the Technical Committee. If an informal interpretation is requested, it usually comes from a member of the NFPA electrical engineering staff or a member of the National Electrical Code Committee. If you receive an informal interpretation of *NFPA 70E*, it will be accompanied by a disclaimer stating that it is not the official interpretation of the NFPA.

1.50 *Formal interpretations* represent the official position of the NFPA and are not the opinion of a single staff member.

1-9. The *NEC* applies to electrical _____. *NFPA 70E* concerns electrical _____ in the workplace.	1-9. INSTALLATIONS; SAFETY Ref: 1.24
1-10. Which of the following locations is(are) *not* covered by *NFPA 70E*? *Public buildings, electrical generation facilities, mobile homes, watercraft*	1-10. ELECTRICAL GENERATION FACILITIES and WATERCRAFT Ref: 1.29-1.33
1-11. Chapter 1 of *NFPA 70E* covers _____.	1-11. SAFETY-RELATED WORK PRACTICES Ref: 1.36
1-12. Chapter 2 of *NFPA 70E* is related to safety-related _____ requirements.	1-12. MAINTENANCE Ref: 1.37
1-13. Article 90.5(A) identifies _____ rules as those that require or prohibit certain actions.	1-13. MANDATORY Ref: 1.43
1-14. Article 90.5(B) identifies _____ rules as actions that are allowed but not required.	1-14. PERMISSIVE Ref: 1.44
1-15. *NFPA 70E* articles may include _____ Notes that direct the reader to explanatory material in an annex or outside the standard.	1-15. INFORMATIONAL Ref: 1.45
1-16. If a standard interpretation problem arises, you can request either a(n) _____ or a(n) _____ interpretation.	1-16. FORMAL, INFORMAL Ref: 1.48-1.50

Answer the following questions by marking an "X" in the box next to the best answer.

1-1. *NFPA 70E* was established to

- ☐ a. explain how to comply with established safety standards
- ☐ b. list federal laws that employees are required to follow
- ☐ c. serve as a guide for inspecting a workplace
- ☐ d. spell out installation procedures for electrical equipment

1-2. The *NFPA 70E Handbook* was created to

- ☐ a. give details of the General Duty clause
- ☐ b. introduce new equipment maintenance requirements
- ☐ c. provide additional explanation of *NFPA 70E*
- ☐ d. take the place of the *NEC*

1-3. Which of the following statements best summarizes OSHA's General Duty clause?

- ☐ a. Employers must comply with *NFPA 70E*
- ☐ b. Employers must furnish a hazard-free workplace
- ☐ c. OSHA gives authority to NFPA to set standards
- ☐ d. OSHA will inspect workplaces on a regular basis

1-4. *NEC* references

- ☐ a. are included in *NFPA 70E*
- ☐ b. are included in the *NFPA 70E Handbook*
- ☐ c. are unrelated to *NFPA 70E*
- ☐ d. were removed from the *NFPA 70E Handbook* in 2009

1-5. An arc flash event is generally the result of

- ☐ a. an equipment short circuit or ground fault
- ☐ b. improper equipment maintenance
- ☐ c. improperly installed equipment
- ☐ d. the use of outdated equipment

1-6. According to Article 90.1, the purpose of *NFPA 70E* is to

- ☐ a. distinguish between company and contract workers in safety matters
- ☐ b. eliminate the need for educated and experienced workers
- ☐ c. ensure that power is always removed before work is begun
- ☐ d. reduce worker exposure to electrical hazards

1-7. Which of the following locations is *not* covered by *NFPA 70E*?

- ☐ a. Office building
- ☐ b. Railroad car
- ☐ c. Recreational vehicle
- ☐ d. Warehouse

1-8. Chapter 3 of *NFPA 70E* addresses safety requirements for

- ☐ a. contract workers
- ☐ b. equipment installation
- ☐ c. communications companies
- ☐ d. special equipment

1-9. *NFPA 70E* rules that require or prohibit certain actions are called _____ rules.

- ☐ a. compulsory
- ☐ b. essential
- ☐ c. mandatory
- ☐ d. permissive

1-10. Informational Notes in *NFPA 70E*

- ☐ a. are enforceable by law
- ☐ b. include special instructions
- ☐ c. point out essential rules
- ☐ d. restate OSHA rulings

SUMMARY

In recent years, more and more emphasis has been placed upon establishing electrical safety in the workplace. For many years, the *NEC* has served industry well by providing requirements for safe electrical installations. However, there was a growing need for more than just electrical installation requirements. Electrical safety in the workplace also needed to be considered to ensure that workers would be safe both during the installation process and while performing electrical maintenance. *NFPA 70E* was created to establish such workplace safety standards.

***NFPA 70E* and the *NEC* work in harmony to provide a standard of electrical safety. The difference between the two documents is this: the *NEC* focuses on safe electrical installations, while *NFPA 70E* focuses on worker safety during installation and maintenance of electrical systems and equipment. The importance of electrical safety in the workplace cannot be overstated. Careful application of *NFPA 70E* and the *NEC* can mean the difference between life and death.**

Answers to Self-Check Quiz

1-1. a. Explain how to comply with established safety standards. Ref: 1.03

1-2. c. Provide additional explanation of *NFPA 70E*. Ref: 1.07

1-3. b. Employers must furnish a hazard-free workplace. Ref: 1.09

1-4. b. Are included in the *NFPA 70E Handbook*. Ref: 1.13, 1.14

1-5. a. An equipment short circuit or ground fault. Ref: 1.18

1-6. d. Reduce worker exposure to electrical hazards. Ref: 1.20

1-7. b. Railroad car. Ref: 1.30

1-8. d. Special equipment. Ref: 1.38

1-9. c. Mandatory. Ref: 1.43

1-10. b. Include special instructions. Ref: 1.45

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