

2018 NFPA 70E Standards for Electrical Safety in the Workplace Correspondence

Multiple Choice

Identify the choice that best completes the statement or answers the question.

- _____ 1. Often a culture existing in the work place workers are routinely allowed and expected to work on or near energized electrical circuits. This tendency to accept the risk of an electrical injury is _____ and must change.
- a. acceptable
 - b. unacceptable
 - c. tolerated
 - d. minimal
- _____ 2. A well informed client understands the _____ of energized work and the financial implication associated with an electrical incident.
- a. hazards
 - b. cost
 - c. consequences
 - d. laws
- _____ 3. De-energize and follow all of the necessary steps of the lockout / tagout program and establish an electrically _____ work condition unless the employer demonstrates a true need for energized work.
- a. sound
 - b. energized
 - c. unsafe
 - d. safe
- _____ 4. An arcing fault is a fault characterized by an electrical arc through the _____
- a. water
 - b. air
 - c. equipment
 - d. circuit
- _____ 5. On lower voltages typically found on bell, signal and low-voltage control work, the presence of voltage could be tested using the “_____ method.”
- a. tingle
 - b. touch
 - c. meter
 - d. taste
- _____ 6. The Bureau of Labor Statistics data for electric shock in non fatal cases involving days away from work for the period 1992-2001 indicate that there were an average of _____ cases annually in private industry.
- a. 100
 - b. 1000
 - c. 2726
 - d. 3000
- _____ 7. 29 CFR 1910.333(a)(1) states that live parts that operate at less than _____ volts to ground need not be de-energized if there will be no increased exposure to electrical burns or to explosion due to electrical arc.
- a. 50
 - b. 120
 - c. 240
 - d. 480
- _____ 8. Although arc-rated apparel might provide a level of protection against a thermal event that it is rated for many other hazards might be associated with an incident such as
- a. explosive effects
 - b. shrapnel
 - c. pressure wave
 - d. all the above
- _____ 9. OSHA requires employers to furnish each employee with a place of employment _____ recognized hazards that are causing or likely to cause death or serious physical injury.
- a. free from
 - b. removed
 - c. full of
 - d. minus any

Name: _____

ID: A

- _____ 10. NIOSH's Fatality Assessment and Control Evaluation (FACE) programs primary activities include:
- a. performing investigations of specific types of events to identify injury risks
 - b. conduct surveillance to identify occupational fatalities
 - c. Developing recommendations designed to control or eliminate identified risks
 - d. all the above
- _____ 11. There are many reasons why risks are taken sometimes , it could be _____ risk at other times, it maybe uninformed. Whatever the reason, it is not likely worth the risk.
- a. reasonable
 - b. calculated
 - c. acceptable
 - d. educated
- _____ 12. A _____ person must be able to "identify the hazards and reduce the associated risk."
- a. competent
 - b. educated
 - c. qualified
 - d. trained
- _____ 13. The placement of a lockout device on an energy-isolating device in accordance with an established procedure, ensuring that the energy - isolating device and the equipment being controlled cannot be operated until the lockout device is removed is OSHA definition of _____ in 1910.147(b)
- a. lockout
 - b. tagout
 - c. isolated
 - d. safe off
- _____ 14. Which does not effect the electric current on the human body.
- a. duration of contact
 - b. currents pathway through the body
 - c. contact and integral resistance of the body
 - d. type of the clothing worn
- _____ 15. The resistance of a wet hand holding pliers is _____
- a. 1000 to 3000 ohms
 - b. 2000 to 5000 ohms
 - c. 500 to 1500 ohms
 - d. 250 to 750 ohms
- _____ 16. Most people have a tingling sensation of _____ milliamps at 60hz AC.
- a. .5 to 3
 - b. 30 to 75
 - c. 3 to 10
 - d. 10 to 40
- _____ 17. The initial damage from an electrical shock may or may not be readily visible. The _____ can burn internal body parts in its path, yet leave the skin unaffected.
- a. voltage
 - b. current
 - c. electricity
 - d. blast
- _____ 18. When performing a shock risk assessment using NFPA 70E there are _____ general things to consider
- a. 2
 - b. 6
 - c. 4
 - d. 3
- _____ 19. The PPE requirements of 130.7 do not address protection against _____ other than exposure to the thermal effects of an arc flash.
- a. mental trauma
 - b. explosion
 - c. physical trauma
 - d. blast

- _____ 20. The temperature of an electrical arc can reach approximately _____, which is about four times as hot as the surface of the sun.
- a. 67,000 degrees F
 - b. 35,000 degrees F
 - c. 3500 degrees F
 - d. 6000 degrees F
- _____ 21. Variables can affect an arc fault are
- a. system voltage
 - b. sustainability of the arc fault
 - c. Arc-gap spacing
 - d. all the above
- _____ 22. In NFPA 70E hierarchy of risk control methods in 110.1H(3), PPE is at what point in the list
- a. first
 - b. third
 - c. last
 - d. fourth
- _____ 23. The distance between a persons face and chest area and a prospective arc source is definition of:
- a. working distance
 - b. limited approach boundary
 - c. restricted approach boundary
 - d. safe work distance
- _____ 24. Temperatures generated by electric areas can burn flesh and ignite clothing at a distance of _____ feet or more
- a. 5
 - b. 3
 - c. 15
 - d. 10
- _____ 25. Skin temperature of 176 degree F for 0.1 second can cause _____ (second degree) burns
- a. incurable
 - b. curable
 - c. reversible
 - d. irreversible
- _____ 26. In NFPA 70E 105.3(B) responsibility, the employee _____ comply with the safety related work practices and procedures provided by the employer.
- a. may
 - b. will
 - c. can
 - d. shall
- _____ 27. The tremendous pressure blast from the _____ of conducting materials and superheating of air can fracture ribs, collapse lungs, and knock a worker down or throw him or her some distance.
- a. vaporization
 - b. expansion
 - c. burning
 - d. movement
- _____ 28. The eardrum rupture threshold is at _____ lb/ft²
- a. 85
 - b. 1000
 - c. 720
 - d. 400
- _____ 29. OSHA requires hearing protection for 85db and above. An increase of _____ is equivalent to doubling the sound level.
- a. 2db
 - b. 3db
 - c. 4db
 - d. 6db
- _____ 30. The faster the fault is cleared by the OCPD, the _____ the amount of energy released.
- a. higher
 - b. reduced
 - c. increased
 - d. lower

Name: _____

ID: A

- _____ 31. Incident energy _____ as distance from the arc source increases.
- a. increase
 - b. stays the same
 - c. decrease
 - d. magnifies
- _____ 32. If an arcing fault occurs in open air and not in an enclosure, the thermal energy impressed on the object is _____ proportioned to the square of the distance
- a. inversely
 - b. directly
 - c. adversely
 - d. squarely
- _____ 33. When using OCPD's that have a fixed opening time and that are not current-limiting, the _____ the available arcing current, the greater the resulting arc-flash energies released.
- a. lower
 - b. amount of
 - c. higher
 - d. increase in
- _____ 34. OSHA was signed into law on December 29, 1970 by _____
- a. Bill Clinton
 - b. Richard Nixon
 - c. George H. Bush
 - d. Jimmy Carter
- _____ 35. OSHA and its state partners have dramatically improved workplaces safety, reducing work related deaths and injuries by more than _____ percent
- a. 50
 - b. 80
 - c. 75
 - d. 65
- _____ 36. The section of the OSHA Act which deals with Training of Employees is _____
- a. 15
 - b. 8
 - c. 21
 - d. 6
- _____ 37. Part 1910 of the OSHA standards covers General Industry and Part _____ covers Construction
- a. 1926
 - b. 1909
 - c. 1930
 - d. 1940
- _____ 38. Subpart 1 of 1910 covers _____
- a. arc-flash gear
 - b. high voltage gloves
 - c. LOTO
 - d. PPE
- _____ 39. "OSHA is a shall, and _____ is the how"
- a. the JATC
 - b. PPE
 - c. NFPA 70E
 - d. 1926
- _____ 40. Part 1910, subparts, of the OSHA standards addresses electrical safety requirements that are necessary for the practical _____ of employees in their work place
- a. safety
 - b. safe guarding
 - c. supervision
 - d. welfare
- _____ 41. A _____ person shall use test equipment to test the circuit elements and electrical parts of equipment to which employees will be exposed and shall verify that the circuit elements and equipment parts are de-energized
- a. qualified
 - b. competent
 - c. representative
 - d. supervisory

Name: _____

ID: A

- _____ 42. Test equipment should be tested on a know live circuit before and after testing de-energized circuits to insure it is working properly
- a. maybe
 - b. false
 - c. true
 - d. bad idea
- _____ 43. A device that utilizes a positive means such as a lock, either key or combination type, to hold an energized - isolating device in the safe position and prevent the energizing of a machine or equipment is the definition of
- a. lock out
 - b. tag out
 - c. energy isolating device
 - d. lockout device
- _____ 44. OSHA's lockout / tagout requirements are _____
- a. suggestions
 - b. guidelines
 - c. federal law
 - d. non-enforceable
- _____ 45. Article _____ of NFPA 70E addresses the application of safety-related work practices and procedures
- a. 100
 - b. 105
 - c. 130
 - d. 120
- _____ 46. Mandatory rules of the NFPA 70E standards identify action that are specifically required or _____
- a. mandated
 - b. suggested
 - c. enforced
 - d. prohibited
- _____ 47. What section of Article 110 in NFPA 70E covers awareness and Self-Discipline _____?
- a. A
 - b. B
 - c. C
 - d. D
- _____ 48. In NFPA 70E Article 110 , where is PPE in the hierarchy of risk control methods _____?
- a. first
 - b. last
 - c. second
 - d. fourth
- _____ 49. The training required by 110.2(A) shall be classroom, _____, or a combination of the two.
- a. computer based
 - b. practical
 - c. hands on
 - d. on-the-job
- _____ 50. One who has received training in and has demonstrated skills and knowledge in the construction and operation of electrical equipment and installations and the hazards involved, defines a _____
- a. qualified person
 - b. competent person
 - c. licensed electrician
 - d. safety supervisor
- _____ 51. Why is an operational test done? To make sure that the test instrument is _____
- a. not a cheap brand
 - b. working properly
 - c. the right model
 - d. the proper rating
- _____ 52. In Article 120.2 of NFPA 70E there are _____ subdivisions
- a. 5
 - b. 14
 - c. 9
 - d. 8
- _____ 53. The control of energy which requires that all sources of electrical energy shall be controlled in such a way as to minimize employee exposure to electrical hazards is covered in Article _____ of NFPA 70E.
- a. 120.2(D)
 - b. 120.2(C)
 - c. 120.2(F)
 - d. 110.2

Name: _____

ID: A

- _____ 54. Many of the provisions in Section _____ are similar to what OSHA sets forth in 1910.147 and 1910.333(b)(2)
- a. 120.3
 - b. 130.2
 - c. 130
 - d. 120.4
- _____ 55. Article _____ contains the provisions related to work involving electrical hazards
- a. 130
 - b. 120
 - c. 110
 - d. 200
- _____ 56. Working on energized work is addressed in 130.2(A) as additional hazards or increased risk, _____, equipment operating at less than 50 volts and normal operating condition.
- a. cost
 - b. impossible
 - c. can not shut down
 - d. infeasibility
- _____ 57. In NFPA 70E Table 130.4(D)(a), what is the restricted approach boundary for a voltage phase to phase of 165KV AC?
- a. 4ft 3 in.
 - b. 1ft
 - c. 2ft 9 in
 - d. 3ft 6 in
- _____ 58. A state in which an electrical conductor or circuit part has been disconnected from energized parts, locked / tagged in accordance with established standards tested to verify the absence of voltage and if necessary temporarily grounded for personal protection is a definition of:
- a. electrical safety program
 - b. flash risk assessment
 - c. electrically safe work condition
 - d. arc flash boundary
- _____ 59. In Table 130.5(C) is the operation of a CB, Switch, contactor or starter in a normal condition. Is there an estimated likelihood of an arc flash incident?
- a. yes
 - b. no
 - c. maybe
 - d. not sure
- _____ 60. OSHA _____ requires employees working in areas where there are potential electrical hazards shall be provided with, and shall use, electrical protective equipment that is appropriate for the specific parts of the body to be protected and for the work to be performed.
- a. 1920.335(a)(1)(i)
 - b. 1910.147
 - c. 1910.41
 - d. 1910.335(a)(1)(i)
- _____ 61. Equipment labels like the one in figure 6-8 give the Arc Flash Hazard Boundary CAL/CM2 incident energy at 1ft 6 in voltage _____ Restricted Approach Boundary
- a. working distance
 - b. PPE to use
 - c. Limited Approach Boundary
 - d. Working Clearance
- _____ 62. The maintenance, visual inspection and storage of PPE is covered in NFPA 70E _____
- a. 130.7(B)
 - b. 130.7(A)
 - c. 130.7(C)(A)
 - d. 1910.335
- _____ 63. NFPA 70E 130.7(C) is made of _____ categories.
- a. 10
 - b. 15
 - c. 12
 - d. 20

- _____ 64. Where in Article 130 is the Rubber Insulating Equipment Maximum Test Intervals Found?
a. Table 130.5(G) c. 130.7(C)(15)(a)
b. 130.7(C)(7) d. Table 130.7(C)(7)
- _____ 65. NFPA 70E 130.7(C)(9) covers the factors in selection of PPE such as layering, outer layers, _____, coverage, fit and interference.
a. under layers c. comfort
b. multi layering d. flammability
- _____ 66. Arc Flash suits head protection, face protection, hand protection, and foot protection are:
a. Clothing Material Characteristics c. Arc Flash Protective Equipment
b. Protective Clothing d. Standard PPE
- _____ 67. The rules for care and maintenance of arc-rated clothing and arc flash suits includes inspection manufactures instructions, storage, _____
a. maintenance c. fit
b. cleaning, repairing and fixing items d. resizing
- _____ 68. Using the Arc-Flash PPE Categories for AC system, what Arc-Flash PPE category is needed for metal-clad switch gear, 1KV through 15KV?
a. 1 c. 3
b. 2 d. 4
- _____ 69. In Table 130.7(c)(15)(c) Personal Protective Equipment, what does SR mean?
a. Selection required c. supervision required
b. shall require d. selective revision
- _____ 70. Safety Signs and Tags, Barricades, Attendants, and cutting, removing or rerouting of conductors are:
a. deterrents c. warnings
b. alerting techniques d. information
- _____ 71. In NFPA 70E 130.8 who determines if the overhead electrical lines are insulated for the lines operating voltage?
a. utility company c. qualified person
b. competent person d. foreman
- _____ 72. Any current in excess of the rated current of equipment or the ampacity of a conductor is a definition of _____
a. over voltage c. over current
b. over amperage d. over load
- _____ 73. Because of the low impedance path, a _____ bolted fault condition is typically considered the “worst case” or highest magnitude of fault current.
a. 2 phase c. solidly
b. single phase d. 3 phase
- _____ 74. A _____ relationship exist between the magnitude of the available fault (bolted) current and the arcing fault current.
a. Indirect c. direct
b. parallel d. inverse

- _____ 75. Even under controlled test conditions, arcing faults no two events are
- a. exactly alike
 - b. different
 - c. able to be calculated
 - d. generic
- _____ 76. When electrical systems are supplied from a utility or customer owned transformer, the amount of available fault current depends on the _____ and _____ of the transformer
- a. manufacture, style
 - b. size (KVA) impedance (%z)
 - c. voltage, Current
 - d. KVA , size
- _____ 77. _____ and _____ in a premise system that are operating at the time of a fault condition can contribute fault current in addition to the fault current the utility delivers
- a. transformer, motors
 - b. generator, motor
 - c. generators, transformers
 - d. solar panels, motors
- _____ 78. Using the formula $I_{sca} = \frac{TransFLA \times 100}{\text{divided}}$ the available fault current at the transformer secondary with a 3 phase 500KVA 480 volt secondary with 2% impedance
- a. 35000 A
 - b. 29500 A
 - c. 30050 A
 - d. 30000 A
- _____ 79. The conductor size, conductor material _____ whether the conduit is magnetic or non-magnetic and number of conductors per phase may also affect the available fault current
- a. conductor length
 - b. conductor insulation
 - c. conductor spacing
 - d. conductor installation
- _____ 80. Available fault currents can greatly _____ when transformer impedance is _____ or when transformer KVA increases
- a. increase, increase
 - b. decrease, decrease
 - c. decrease, increase
 - d. increase, decrease
- _____ 81. Information on the OCPDs (type) part number, ampere rating, voltage rating, interrupting ratings and settings _____ necessary to perform an available fault current study.
- a. is
 - b. is not
 - c. may be
 - d. will be
- _____ 82. Various methods have been developed to calculate the available fault current, but all are based on _____
- a. Norton's Theory
 - b. Pythagoreans Theory
 - c. NFPA 70E
 - d. Ohm's Law
- _____ 83. The _____ method uses equations to calculate the available fault current at the end of a run or conductor or busway
- a. point -to-point
 - b. line-to-line
 - c. reactive
 - d. inductive
- _____ 84. Figure _____ in the work book can be used for determining the transformer full-load amperage
- a. A-2
 - b. A-3
 - c. A-1
 - d. A-4
- _____ 85. The three most common circuit breaker types are MCCB, ICCB and _____
- a. MCC
 - b. MCICB
 - c. LVPCB
 - d. HVPCB

- _____ 86. Modern circuit breakers use primarily three different over current trip technologies: Thermal, _____, and electronic
- a. solid-state
 - b. energy-reducing
 - c. instantaneous
 - d. magnetic
- _____ 87. Long-time over current protection trip type circuit breaker may have two dial settings(1) _____ and (2) time to interrupt
- a. ampere rating
 - b. short-time delay
 - c. delay time
 - d. ground fault time delay
- _____ 88. Both ICCB's and LVPCB's have a _____ stored energy system for opening and closing. Pumping the handle charges the spring.
- a. single-step
 - b. two-step
 - c. multi-step
 - d. three-step
- _____ 89. MCCB have an ampere rating range from 15 to _____ with voltage rating from 120 to _____ VAC
- a. 600,480
 - b. 2500,480
 - c. 2000,600
 - d. 2500,600
- _____ 90. _____ are devices that can only be used for the motor branch circuit short circuit and ground fault protection as per 430.52(C)(3)
- a. Moldedcase circuit breaker
 - b. Motor circuit protector
 - c. Fuses
 - d. Instantaneous Trip Circuit Breaker
- _____ 91. A _____ is not an over current protective device
- a. MCCB
 - b. fuse
 - c. molded case switch
 - d. ICCB
- _____ 92. For 600-volt and less electrical distribution systems and utilization equipment power circuits, there are two broad categories of fuses: _____ limiting fuses and _____ limiting fuses
- a. current, instantaneous
 - b. non-current, voltage
 - c. high voltage, low voltage
 - d. current, non-current
- _____ 93. A _____ is an overall mounted electrical distribution assembly for use in commercial and industrial applications. It provides circuit control and over current protection for light, heat or power circuit
- a. switch board
 - b. low voltage switch gear
 - c. panel board
 - d. metal enclosure switch gear
- _____ 94. The arc flash hazard created during an arc flash event is _____ dependant on the OCPD that is protecting the downstream equipment, or the protecting OCPD
- a. not
 - b. indirectly
 - c. totally
 - d. directly
- _____ 95. When conducting an arc flash risk assessment in accordance with 130.5 the _____ of maintenance may affect the assessment results in at least two ways as outlined in 130.5(B)
- a. lack
 - b. period
 - c. safety related
 - d. condition

- ____ 96. Improper or inadequate maintenance can result in increased fault clearing time of the overcurrent protective device, thus increasing the _____
- a. arc fault
 - b. fault energy
 - c. incident energy
 - d. approach boundary
- ____ 97. In NFPA 70E Article 130.5(B) when estimating the likelihood of severity, the electrical equipment operating condition and condition of _____
- a. installation
 - b. maintenance
 - c. OCPD
 - d. the environment
- ____ 98. NFPA 70E does not provide specific actions to take if the protecting OCPD is maintained inadequately or improperly, Article 110.1(A) informational note No. ____ and 110.1(C) give additional insight
- a. 1
 - b. 2
 - c. 3
 - d. 4
- ____ 99. Figure 9-2 in the work book shows that the arc flash boundary for properly maintained equipment is 47 in. and goes to _____ inches for unmaintained equipment
- a. 60
 - b. 100
 - c. 125
 - d. 127
- ____ 100. Article 130.5(F) has two methods for determining the arc flash PPE:(1)the arc flash PPE category (2) the _____ method.
- a. likelihood and severity
 - b. limited approach
 - c. incident energy analysis
 - d. shock risk assessment
- ____ 101. Using Table 130.7(C)(15)(a) Arc flash PPE Categories for AC, what Arc Flash category is need for 600 VAC MCC?
- a. 2
 - b. 4
 - c. 1
 - d. 3
- ____ 102. What is the arc-flash boundary for the 600 VAC MCC in question 101?
- a. 12 in
 - b. 3 ft
 - c. 5 ft
 - d. 14 ft
- ____ 103. 30 Cycle fault clearing time is typical for insulated case circuit breakers rated less than _____ with an instantaneous integral trip or rely operated trip.
- a. 1000 amperes
 - b. 1000 volts
 - c. 600 volts
 - d. 600 amperes
- ____ 104. NFPA 70E does not contain requirements on how to determine the protecting OCPD fault clearing time when conducting an arc flash risk assessment, but provides some guidance in an informational note to _____
- a. Table 130.7(C)(7)
 - b. Table 130.7(C)(14)
 - c. Table 130.7(C)(15)(a)
 - d. Table 130.7(C)(15)(c)
- ____ 105. Incident energy and arc flash Boundary Calculation method are located in Annex _____ of NFPA 70E
- a. D
 - b. A
 - c. B
 - d. C

- _____ 106. The _____ IEEE 1584 Guide for Performing Arc-Flash Hazard Calculations is currently the most up-to-date and widely used industry consensus standard on the topic for Kilovolts
- a. 2018
 - b. 2002
 - c. 2005
 - d. 2017
- _____ 107. The 2002 IEEE 1584 includes three broad methods that can be referred to as basic equations, _____ fuse equating, and simplified circuit breaker equations
- a. modified
 - b. basic
 - c. complex
 - d. simplified
- _____ 108. Using IEEE 1584 simplified fuse equating for the specific fuse ampere rating to calculate the AFB and incident energy at _____ working distance.
- a. 18 inches
 - b. 24 inches
 - c. 405mm
 - d. 500mm
- _____ 109. Using D46 in NFPA 70E the testing was performed with 600V of a distance of 455mm which is equivalent to _____ inches
- a. 17
 - b. 16
 - c. 18
 - d. 20
- _____ 110. What does AFB stand for?
- a. Available Fault Boundary
 - b. Arc Flash Boundary
 - c. Available Flash Burn
 - d. Arc Flash Burn
- _____ 111. According to NFPA 70E Article 130.5(G) the incident energy analysis shall take into consideration the _____ of the OCPD and its fault clearing time, including its condition of maintenance
- a. manufacturer
 - b. model
 - c. analysis
 - d. characteristics
- _____ 112. NFPA 70E Article 130.5(G) states that the incident energy analysis shall be updated when changes occur in the electrical distribution system that could affect the result of the analysis and it _____ also be reviewed for accuracy at intervals not to exceed 5 years
- a. shall
 - b. can
 - c. will
 - d. may
- _____ 113. The state of electrical equipment considering the manufacturer's instructions, recommendation and applicable industry codes, standards and recommended practices is the definition of _____
- a. condition of recondition
 - b. condition of equipment
 - c. condition of maintenance
 - d. maintenance plan
- _____ 114. Chapter 2 of NFPA 70E covers Safety-Related _____
- a. maintenance requirements
 - b. equipment inspections
 - c. work practices
 - d. working conditions
- _____ 115. IEEE has proven through studies to significantly reduce _____ rates and results in increased reliability and reduction in repair costs.
- a. arc flash
 - b. electrical failure
 - c. arc blast
 - d. incident risk

Name: _____

ID: A

- ____ 116. Which of the following sections in NFPA 70E Chapter 2 does not address OCPD maintenance?
- a. 205.4
 - b. 225.1
 - c. 225.3
 - d. 210.6
- ____ 117. In NFPA 70E section 205.4 it states that "Maintenance, tests and inspections shall be ____."
- a. performed
 - b. limited
 - c. documented
 - d. done
- ____ 118. According to NFPA 70E 205.3 the _____ or his representative is responsible for maintenance and documentation.
- a. owner
 - b. AHJ
 - c. contractor
 - d. general contractor
- ____ 119. Good housekeeping such as ensuring electrical equipment interiors are clean and free of dust, dirt, animals, tools, loose parts or conductor trimmings, is an important _____ item.
- a. inspection
 - b. and required
 - c. maintenance
 - d. unimportant
- ____ 120. Improper or lack of maintenance on OCPD can lead to higher _____ energy that may have been determined as part of an arc-flash risk assessment
- a. arc blast incident
 - b. available fault
 - c. arc-flash incident
 - d. incident
- ____ 121. If the incident energy for an actual arc-flash event is higher than the incident energy calculated as part of the arc-flash risk assessment, the electrical worker may not be wearing _____
- a. the proper gloves
 - b. sufficient PPE
 - c. boots
 - d. pants
- ____ 122. If the incident energy is higher, the _____ boundary increases.
- a. limited approach
 - b. restricted
 - c. danger
 - d. arc-flash
- ____ 123. Using Figure 10-1, if the available fault current is 24KA, an upstream protective device that could operate and clear the fault in .010 second would result in a incident energy of _____
- a. 4.46 cal/cm²
 - b. 2.23cal/cm²
 - c. 4.21 cal/cm²
 - d. 4.81 cal/cm²
- ____ 124. Using Figure 10-1, if the available fault current is 38KA, an upstream protective device that could operate and clear the fault in .67 second would result in a incident energy of _____
- a. 54.67 cal/cm²
 - b. 68.81 cal/cm²
 - c. 105.83 cal/cm²
 - d. 61.38 cal/cm²
- ____ 125. Circuit breakers lubricated at the manufacture will stay lubricated for the life of the circuit breaker
- a. true
 - b. NA
 - c. false
 - d. maybe
- ____ 126. The open / close indicator in a properly maintained circuit breaker probably means that it is open or closed
- a. true
 - b. ?
 - c. false
 - d. maybe

- _____ 127. Some indications that equipment is not properly maintained are: environment in which equipment is located, discoloration of the OCPD and _____ of the equipment.
- a. manufacturer
 - b. use
 - c. labeling
 - d. age
- _____ 128. If the task is to open a disconnect or rack-out a circuit breaker, which has had a lack of or poor maintenance, using a _____ operator or _____ racking device maybe a more appropriate approach
- a. young, remote
 - b. remote, remote
 - c. remote, manual
 - d. manual, remote
- _____ 129. Careful and accurate _____ of all maintenance activities provides a valuable historical reference on the electrical equipment's condition of maintenance overtime.
- a. labeling
 - b. changes
 - c. documentation
 - d. marking
- _____ 130. The four factors that determine the frequency that lubrication should be renewed: continuous current rating, number of close-open operations, time since the most recent renewal and _____
- a. operating environment
 - b. documentation
 - c. type of lubricant
 - d. an incident
- _____ 131. Any circuit breaker that has interrupted a fault should be _____ prior to being placed back into operation
- a. evaluated
 - b. serviced
 - c. marked
 - d. reconditioned
- _____ 132. A molded case circuit breaker must be operated both open and closed with sufficient _____ to ensure that its main contacts are cleaned by wiping action and that the lubrication materials within its mechanism remain evenly spread
- a. times
 - b. actuation
 - c. force
 - d. frequency
- _____ 133. Fuses lack _____ exterior parts, so physical maintenance is very minimal.
- a. maintainable
 - b. actuatable
 - c. moving
 - d. lubricated
- _____ 134. NFPA 70B provides some frequency of maintenance guidelines as well as guidelines for setting up an _____ program
- a. maintenance
 - b. preventative maintenance
 - c. electrical preventative maintenance
 - d. electrical maintenance
- _____ 135. Designing for safety provides the opportunity to eliminate or _____ electrical hazards before a worker ever becomes exposed to them.
- a. lessens
 - b. removes
 - c. mitigates
 - d. minimizes
- _____ 136. Choosing and installing over current protective devices is an important safety design consideration in regard to arc flash and _____
- a. PPE
 - b. available fault current
 - c. arc blast
 - d. safety

- _____ 137. The magnitude of the arcing fault current and the length of _____ the arcing fault current flows are directly related to the arc-flash energy released.
- a. time
 - b. amount
 - c. period
 - d. duration
- _____ 138. The level of arc-flash hazard for a piece of equipment having a specific available fault current is directly related to the protecting OCPD's _____ characteristics
- a. manufactures
 - b. time-current
 - c. fault current
 - d. tripping
- _____ 139. In the design stage, the selection of specific OCPD time current characteristics along with the fault current will determine the _____
- a. incident energy
 - b. trip time
 - c. arc fault
 - d. arcing time
- _____ 140. In OSHA 1910.333(a) safety related work practices shall be employed to prevent electric shock or other injuries resulting from either _____ or indirect electrical contacts when work is performed near or on equipment or circuits which are or may be energized
- a. intentional
 - b. unwanted
 - c. direct
 - d. unintended
- _____ 141. The faster an OCPD clears an arcing fault, the less the _____
- a. arc-blast
 - b. incident energy
 - c. damage
 - d. available fault current
- _____ 142. Over current protective devices that are current-limiting offer _____ arc flash mitigation when available arcing fault current is in the current-limiting range of a current-limiting OCPD
- a. greater
 - b. less
 - c. more
 - d. superior
- _____ 143. Fuses and circuit breakers that are evaluated to be current-limiting per their respective UL product standards are marked on the product as _____
- a. current-reducing
 - b. fault-limiting
 - c. current-limiting
 - d. arc-limiting
- _____ 144. As part of the UL product standards evaluation criteria, current-limiting fuses or current-limiting circuit breakers must perform to specific levels of maximum energy _____ limits
- a. voltage
 - b. let-thru
 - c. current
 - d. fault
- _____ 145. Devices that are not _____ and marked as current-limiting may not significantly reduce the level of fault current, and they may take longer to interrupt.
- a. labeled
 - b. listed
 - c. identified
 - d. limited
- _____ 146. If the arcing fault current is in the current-limiting range of current-limiting fuses, the incident energy released during an arcing fault typically does not increase the fault current _____
- a. remains the same
 - b. decreases
 - c. increases
 - d. drops

- ____ 147. Class J, CF, RKI, CC and T fuses offer the best practical _____ protection
- a. arc-fault
 - b. voltage-limiting
 - c. arc-blast
 - d. current-limiting
- ____ 148. The reliability of OCPD's in retaining consistent fault-clearing performance over the system life cycle directly impacts _____
- a. arc-fault hazards
 - b. arc-flash hazards
 - c. arc-blast hazards
 - d. arc-vault hazards
- ____ 149. The opening time of OCPD's is a critical factor for the resultant arc-flash _____ released when an arcing fault occurs
- a. hazard
 - b. blast
 - c. energy
 - d. wave
- ____ 150. Current-limiting fuses are reliable and retain their ability to _____ as originally deigned under fault conditions.
- a. open
 - b. close
 - c. maintain
 - d. work
- ____ 151. Circuit breakers are mechanical OCPD's that require periodic exercise, inspection, testing and possible _____ or replacement
- a. reconditioning
 - b. maintenance
 - c. remanufacturing
 - d. lubrication
- ____ 152. A fuse of a given class _____ be inserted info mountings design for another class.
- a. can
 - b. may
 - c. cannot
 - d. should
- ____ 153. If an incident energy calculation has been done, performed for a circuit based on a fuse of a specific type and manufacture, it is recommended that replacement should be a fuse of the _____ type and manufacture
- a. similar
 - b. same
 - c. model
 - d. class
- ____ 154. With the Energy-Reducing Maintenance Switching is added to a fusible switch, the result can significantly lower _____ energy levels for a wide range of arcing fault currents from low magnitude to higher magnitude
- a. fault
 - b. arcing
 - c. arcing-fault
 - d. incident
- ____ 155. When the ERMS on a circuit breaker is switched "on" if an arcing event occurs on a circuit which the circuit breaker protects and the arcing fault current is above the ERMS current pick up, the circuit breaker trips without _____ delay.
- a. intentional
 - b. any
 - c. a timed
 - d. wide
- ____ 156. Adjustable instantaneous trip settings allow adjustment of the _____ level at which the circuit breaker will start to operate in its instantaneous mode
- a. voltage
 - b. current
 - c. arcing
 - d. fault

- _____ 157. Low Voltage power circuit breakers with short-time delay (and no instantaneous trip) are used on feeds and mains so that _____ breakers can clear a fault without tripping the larger upstream circuit breaker.
- a. upstream
 - b. adjacent
 - c. inline
 - d. downstream
- _____ 158. The amount of time an OCPD with a short-time delay takes to open, the greater the _____ energy due to arcing faults.
- a. incident
 - b. arcing
 - c. arc fault
 - d. circuit
- _____ 159. Zone-selective interlocking is an option for some circuit breaker systems where circuit breaker _____ with each other and the time-current functions of the circuit breaker and dynamically modified based on the location of the fault condition
- a. coordinate
 - b. discuss
 - c. communicate
 - d. talk
- _____ 160. Over current relays are more commonly used on _____ and high voltage systems.
- a. low
 - b. medium
 - c. mid
 - d. main
- _____ 161. _____ relays can be utilized in conjunction with an interrupting disconnect device to mitigate incident energy levels by limiting the time of the fault.
- a. Over current
 - b. Selective coordination
 - c. Shunt trip
 - d. Arc-flash
- _____ 162. _____ equipment typically has the greatest high-intensity incident energy due to the line-side connection being protected upstream by a slow operating utility OCPD
- a. Service
 - b. Feeder
 - c. Service entrance
 - d. Utility
- _____ 163. Generally a single main service disconnect provides for safer work practices than the _____ rule for service entrance as permitted in NEC 230.71
- a. six-disconnect
 - b. golden
 - c. 3-5-4
 - d. four-disconnect
- _____ 164. Whenever system changes occur in a premise or changes are made by the _____ that might increase the available fault currents, the existing OCPD's must be reevaluated to determine whether they have a sufficient interrupting rating.
- a. electrical contractor
 - b. maintenance
 - c. plant manager
 - d. utility
- _____ 165. The maximum fault current that a fuse or circuit breaker is rated to interrupt at rated voltage is a definition of:
- a. arc rating
 - b. arc fault rating
 - c. interrupting rating
 - d. current rating
- _____ 166. OCPD that attempts to interrupt a fault current beyond its interrupting rating can present an arc-flash and _____
- a. arc-blast
 - b. arc-fault
 - c. explosion
 - d. incident energy

Name: _____

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- ____ 167. Selective coordination is considered the act of _____ a fault circuit from the remainder of the electrical system, thereby eliminating unnecessary power outages.
- a. stopping
 - b. isolating
 - c. removing
 - d. eliminating
- ____ 168. The arc-flash incident can be reduced by the use of _____ opening and closing of larger circuit breakers.
- a. automatically
 - b. machine to
 - c. distance
 - d. remotely
- ____ 169. After the event occurs which opens a OCPD, the cause should be _____ corrected before re-energizing the circuit.
- a. replaced
 - b. reset
 - c. identified
 - d. tested