Educational Course Attendance Verification Form

Attendee's Name: _____ Date: _____

City:_____ State:_____ Zip:_____

Phone: (_____) _____ - _____ Cell: (_____) _____ - _____

Email address: _____

Attendee's Credential Number:_____

List the name of each credential held by attendee: _____

Course Title: **PEX Residential Plumbing Installation**

Credit Hours: _____ hrs.

To Be Completed By AdvancedConEd Personnel:

Course Password: _____

Course ID#: _____

Attendee passed the course with a greater than 70% score on: Date: _____

Instructor's Signature_____

Instructor's Credential #: _____

Payment Form

Payment Instructions:

If paying by credit card - please mail/e-mail (margarita@advancedconed.com) this form, the "Educational Course Attendance Verification Form" and the "Answer Sheet" as indicated below.

Please circle one: Visa MasterCard Discover AmEx

Name on Card: _____

16 digit account #: _____ - _____ - _____ - _____

Expiration Date: _____ / _____

3-Digit Security Code on back of Card: _____

(These are the last numbers located on the back of your card)

ZIP Code: _____ (The Zip Code where the monthly statement is mailed.)

Signature: _____

If paying by check – please mail this form, the "Educational Course Attendance Verification Form", the "Answer Sheet" and your check to:

AdvancedConEd
PO Box 140824
Tulsa, OK 74014

When submitting by mail, we recommend that you utilize a mail service which will give you a tracking number.

Questions – please call 918-804-5673 or e-mail margarita@advancedconed.com .

NOTE: This page will be destroyed after payment is confirmed if paying by credit card.

ANSWER SHEET

WI Course #18293 – PEX Residential Plumbing Installation

Name: _____ Credential Number: _____

Phone Number: (_____) _____ - _____

(Please circle your answers)

1)	A	B	C	D	16)	A	B	C	D	31)	A	B	C	D	46)	A	B	C	D
2)	A	B	C	D	17)	A	B	C	D	32)	A	B	C	D	47)	A	B	C	D
3)	A	B	C	D	18)	A	B	C	D	33)	A	B	C	D	48)	A	B	C	D
4)	A	B	C	D	19)	A	B	C	D	34)	A	B	C	D	49)	A	B	C	D
5)	A	B	C	D	20)	A	B	C	D	35)	A	B	C	D	50)	A	B	C	D
6)	A	B	C	D	21)	A	B	C	D	36)	A	B	C	D	51)	A	B	C	D
7)	A	B	C	D	22)	A	B	C	D	37)	A	B	C	D	52)	A	B	C	D
8)	A	B	C	D	23)	A	B	C	D	38)	A	B	C	D	53)	A	B	C	D
9)	A	B	C	D	24)	A	B	C	D	39)	A	B	C	D	54)	A	B	C	D
10)	A	B	C	D	25)	A	B	C	D	40)	A	B	C	D	55)	A	B	C	D
11)	A	B	C	D	26)	A	B	C	D	41)	A	B	C	D	56)	A	B	C	D
12)	A	B	C	D	27)	A	B	C	D	42)	A	B	C	D	57)	A	B	C	D
13)	A	B	C	D	28)	A	B	C	D	43)	A	B	C	D	58)	A	B	C	D
14)	A	B	C	D	29)	A	B	C	D	44)	A	B	C	D	59)	A	B	C	D
15)	A	B	C	D	30)	A	B	C	D	45)	A	B	C	D	60)	A	B	C	D

61)	A	B	C	D	76)	A	B	C	D	91)	A	B	C	D	106)	A	B	C	D
62)	A	B	C	D	77)	A	B	C	D	92)	A	B	C	D	107)	A	B	C	D
63)	A	B	C	D	78)	A	B	C	D	93)	A	B	C	D	108)	A	B	C	D
64)	A	B	C	D	79)	A	B	C	D	94)	A	B	C	D	109)	A	B	C	D
65)	A	B	C	D	80)	A	B	C	D	95)	A	B	C	D	110)	A	B	C	D
66)	A	B	C	D	81)	A	B	C	D	96)	A	B	C	D	111)	A	B	C	D
67)	A	B	C	D	82)	A	B	C	D	97)	A	B	C	D	112)	A	B	C	D
68)	A	B	C	D	83)	A	B	C	D	98)	A	B	C	D	113)	A	B	C	D
69)	A	B	C	D	84)	A	B	C	D	99)	A	B	C	D	114)	A	B	C	D
70)	A	B	C	D	85)	A	B	C	D	100)	A	B	C	D	115)	A	B	C	D
71)	A	B	C	D	86)	A	B	C	D	101)	A	B	C	D	116)	A	B	C	D
72)	A	B	C	D	87)	A	B	C	D	102)	A	B	C	D	117)	A	B	C	D
73)	A	B	C	D	88)	A	B	C	D	103)	A	B	C	D	118)	A	B	C	D
74)	A	B	C	D	89)	A	B	C	D	104)	A	B	C	D	119)	A	B	C	D
75)	A	B	C	D	90)	A	B	C	D	105)	A	B	C	D	120)	A	B	C	D

@Aardvark Classes

PEX
Residential Plumbing
Installation Exercise

70% (84 correct answers) required for credit

$80.00 Fee

Slide 1

1) PEX is an innovative product that was developed in the _____ to address the problems associated with rigid plumbing systems.
   a) 1940s
   b) 1950s
   c) 1960s
   d) 1970s

2) The first residential PEX plumbing products were introduced in the early _____.
   a) 1940s
   b) 1950s
   c) 1960s
   d) 1970s

3) A _____ plumbing system consist of PEX tubing, brass and polymer fittings, copper crimp rings and stainless steel clamp systems, and additional PEX components used to assemble these systems.
   a) Copper
   b) Lead
   c) PEX
   d) Galvanized Steel

Slide 2

In addition to hot and cold water distribution, some applications for PEX Systems include:

4) Radiant Heating Systems
   a) True
   b) False

5) Snow and Ice Melt Systems
   a) True
   b) False

6) HVAC Systems
   a) True
   b) False

7) Turf Conditioning Systems
   a) True
   b) False

8) Missile Guidance Systems
   a) True
   b) False

9) Sewage Treatment Systems
   a) True
   b) False

10) Municipal Water Systems
   a) True
   b) False

11) Reverse Osmosis Systems
   a) True
   b) False

12) Deionized Water Systems
   a) True
   b) False

Slide 3

Some of the advantages of PEX are:

13) Environmentally sound
   a) True
   b) False

14) Rigid
   a) True
   b) False

15) Easy & safe to install
   a) True
   b) False

16) Reliable
   a) True
   b) False

17) Cost effective
   a) True
   b) False

18) Electrical ground
    a) True
    b) False

Slide 4

19) When installing a PEX plumbing system, you must first choose your _____.
    a) Color of pipe
    b) Method of Installation
    c) Pipe material
    d) Hot & cold system

20) The three most common types of PEX plumbing installation methods are:
    a) Conventional
    b) Home Run
    c) Multi-Port Tee
    d) All of the above

21) To minimize the amount of PEX pipe used in a PEX plumbing installation, the installer should select the _____ plumbing installation method.
    a) Conventional
    b) Home Run
    c) Multi-Port Tee
    d) All of the above

22) To minimize the number of PEX fittings used in a PEX plumbing installation, the installer should select the _____ _____ plumbing installation method.
    a) Conventional
    b) Home Run
    c) Multi-Port Tee
    d) All of the above

23) To minimize the hot water wait time in a PEX plumbing installation, the installer should select the _____ _____ plumbing installation method.
    a) Conventional
    b) Home Run
    c) Multi-Port Tee
    d) All of the above

24) To provide the best pressure stability with use of multiple fixtures in a PEX plumbing installation, the installer should select the _____ _____ plumbing installation method.
    a) Conventional
    b) Home Run
    c) Multi-Port Tee
    d) All of the above

Slides 5 & 6

25) The _____ or Trunk and Branch Method is the same method used in rigid plumbing systems.
    a) Conventional
    b) Home Run
    c) Multi-Port Tee
    d) All of the above

26) The _____ _____ or Parallel Method distributes water to each fixture from a centrally located manifold.
    a) Conventional
    b) Home Run
    c) Multi-Port Tee
    d) All of the above

27) The _____ Method combines the benefits of the Conventional and Home Run Methods.
    a) Conventional
    b) Home Run
    c) Multi-Port Tee
    d) All of the above

28) The _____ Method runs individual branch lines from smaller manifold located near groups of fixtures.
    a) Conventional
    b) Home Run
    c) Multi-Port Tee
    d) All of the above

29) The _____ _____Method provides a dedicated line from the manifold to the fixture which reduces the need for fittings behind the wall.
    a) Conventional
    b) Home Run
    c) Multi-Port Tee
    d) All of the above

30) Running PEX tubing in the _____ Method requires the installation of a main trunk line which branches to specific outlets.
    a) Conventional
    b) Home Run
    c) Multi-Port Tee
    d) All of the above

Slide 7

31) The minimum wall thickness of a ¾” PEX pipe is _____ inches.
    a) 0.875
    b) 0.671
    c) 0.097
    d) 0.018

32) The capacity per foot of a ¾” PEX pipe is _____ inches.
    a) 0.875
    b) 0.671
    c) 0.097
    d) 0.018

33) The average inside diameter of a 1” PEX pipe is _____ inches.
    a) 0.862
    b) 0.671
    c) 0.097
    d) 0.018

Slides 8 & 9

34) PEX tubing should not be exposed to or stored in direct ultraviolet light.
    a) True
    b) False

35) PEX tubing should not be exposed to direct flame.
    a) True
    b) False

36) PEX tubing can be used for electrical grounding.
    a) True
    b) False

37) PEX tubing can be installed near extreme heat.
    a) True
    b) False

38) PEX tubing should be painted with oil-based paints or lacquers.
    a) True
    b) False

39) PEX tubing should only be used in operating conditions that are consistent with pressure ratings that appear on the tubing and applicable standards.
    a) True
    b) False

40) PEX tubing that has been crushed or scratched can be repaired and placed back into the system.
    a) True
    b) False

41) PEX tubing should not be subjected to prolonged exposure to free chlorine concentrations greater than 4 ppm.
    a) True
    b) False

42) PEX should only be installed when the temperature is above 5 degrees F.
    a) True
    b) False

Slides 10 & 11

43) Polymer PEX fittings are a superior alternative to metallic fittings in areas with localized aggressive water chemistries.
    a) True
    b) False

44) Polymer PEX fittings should only be used in operating conditions that are consistent with temperature and pressure ratings of the tube as well as applicable standards.
    a) True
    b) False

45) Polymer PEX fittings should be painted.
    a) True
    b) False

46) Polymer PEX fittings can be left exposed to direct ultraviolet light.
    a) True
    b) False

47) Polymer PEX male pipe threads must only use PTFE tape as a thread sealant.
    a) True
    b) False

48) Polymer PEX fittings are compatible with cleaners, chemicals, solvents, sealants and glues.
    a) True
    b) False

49) Polymer PEX fittings can be insulated with spray foam insulations.
    a) True
    b) False

Slide 12 & 13

50) Brass PEX fittings have been proven a reliable joining method for PEX piping for over _____ years.
    a) 30
    b) 50
    c) 75
    d) 100

51) Only brass PEX fittings can be used in operating conditions that are consistent with _____ _____ _____ _____ as well as applicable standards.
    a) Temperature and pressure ratings
    b) Lead-free brass
    c) Temperature
    d) Water

52) Brass PEX fittings can be used in reverse osmosis systems.
    a) True
    b) False

53) Brass PEX fittings should not be used in areas with known localized aggressive water chemistries.
    a) True
    b) False

Slide 14

54) Lead-free brass can easily be sweated to copper tube or copper alloy components.
    a) True
    b) False

55) When sweating lead-free brass, use a flux that contains _____ and is suitable for potable water systems.
    e) Lead
    f) PEX
    g) Chlorine
    h) Water

56) When sweating lead-free brass, thoroughly clean the surface that will be sweated by wiping away any dirt and removing the surface oxide film with a _____, _____, or a _____.
    a) Wire brush
    b) Sandpaper
    c) Sanding Cloth
    d) All of the above

57) Lead-free brass does not transfer heat as rapidly as copper.
    a) True
    b) False

58) After sweating, all remaining flux residue must be cleaned from the PEX fitting and component before assembling the PEX piping.
   a) True
   b) False

Slides 15 - 18

59) _____ type of joining system uses a copper crimp ring that is compressed around the PEX piping to secure it to the fitting.
   a) Copper Crimp Ring
   b) Stainless Steel Clamp
   c) Cold Expansion with PEX Reinforced Ring
   d) Cold Expansion with Metal Compression Sleeve

60) With the Copper Crimp Ring system, position the crimp ring _____ to _____ from the end of the tube.
   a) 0 to $^1/_8$ inch
   b) $^1/_8$ to ¼ inch
   c) ¼ to ½ inch
   d) ½ to 1 inch

61) With the Copper Crimp Ring system, keep the tool at a _____ to the fitting and close it completely.
   a) 0^o angle
   b) 45^o angle
   c) 90^o angle
   d) 180^o angle

62) With the copper crimp ring system, it is OK to use a hose clamp if you run out of copper crimp rings.
   a) True
   b) False

63) With the Copper Crimp Ring system, the <u>minimum</u> crimped diameter of a ½" crimp ring is _____ inches.
   a) 0.500
   b) 0.700
   c) 0.945
   d) 0.960

64) With the Copper Crimp Ring system, the <u>maximum</u> crimped diameter of a ¾" crimp ring is _____ inches.
   a) 0.500
   b) 0.700
   c) 0.945
   d) 0.960

65) With the Copper Crimp Ring system, the variation in crimped ring diameter (out-of-round) should not exceed _____ inches.
   a) 0.005
   b) 0.006
   c) 0.007
   d) 0.008

66) _____ type of fittings will typically have a barbed or ribbed annular end.
   a) Sweat fittings
   b) Copper Crimp Ring and Stainless Steel Clamp
   c) Cold Expansion with PEX Reinforced Ring
   d) Cold Expansion with Metal Compression Sleeve

Slides 19 - 20

67) _____ type of joining system uses a stainless steel ring that is compressed around the PEX piping to secure it to the fitting.
   a) Copper Crimp Ring
   b) Stainless Steel Clamp
   c) Cold Expansion with PEX Reinforced Ring
   d) Cold Expansion with Metal Compression Sleeve

Slides 21 - 25

68) _____ style of joining system requires that the PEX piping, with a reinforcing PEX ring placed over the end of the pipe, is expanded before the fitting is inserted into the pipe end.
   a) Copper crimp ring
   b) Stainless steel clamp
   c) Cold expansion with PEX reinforced ring
   d) Cold expansion with metal compression sleeve

69) With the cold expansion with PEX reinforced ring style of joining system, the expanded pipe end is allowed to retract onto the fitting to form the _____ - the “memory” of the pipe allows it to tighten over the fitting.
   a) Seal
   b) Clamp
   c) Crimp
   d) Compression sleeve

70) The cold expansion with PEX reinforced ring style of joining system is also known as the _____ style.
   a) Zurn
   b) Uponor/Wirsbo
   c) Rehau
   d) ASTM

71) With the cold expansion with PEX reinforced ring system, position the PEX reinforcing ring no more than _____ from the end of the tube.
   a) $^{1}/_{16}$ inch
   b) $^{1}/_{8}$ inch
   c) ¼ inch
   d) ½ inch

72) With the cold expansion with PEX reinforced ring system, the tube is expanded and then the reinforcing ring is placed over the expanded portion of the tube.
   a) True
   b) False

73) With the cold expansion with PEX reinforced ring system, the reinforcing ring should be lubricated prior to being placed on the PEX tubing.
   a) True
   b) False

74) With the cold expansion with PEX reinforced ring system, the longer the tube is expanded, the longer it will take for the tube to form a seal on the fitting.
   a) True
   b) False

75) With the cold expansion with PEX reinforced ring system, the PEX tubing should be cut at a 45^{o} angle.
   a) True
   b) False

76) With the cold expansion with PEX reinforced ring system, rotation of the expander head in either direction after every expansion is necessary to provide smooth and even expansion of the tubing.
   a) True
   b) False

77) With the cold expansion with PEX reinforced ring system, upon removal of the expander tool, slide the tubing over the fitting until the tubing reaches the stop on the fitting.
   a) True
   b) False

78) With the cold expansion with PEX reinforced ring system, to ensure a proper connection, the PEX Ring must be seated up against the shoulder of the PEX fitting.
   a) True
   b) False

Slide 26 - 28

79) _____ type of joining system requires that the PEX piping is expanded before it is placed over the oversized fitting. The pipe shrinks down over the fitting insert, and then a metal compression sleeve is pulled over the connection, compressing the pipe over the fitting.
   a) Copper crimp ring
   b) Stainless steel clamp
   c) Cold expansion with PEX reinforced ring
   d) Cold expansion with metal compression sleeve

80) The cold expansion with metal compression sleeve style of joining system is also known as the _____ style.
   a) Zurn
   b) Uponor/Wirsbo
   c) Rehau
   d) ASTM

81) With the cold expansion with metal compression sleeve system, upon removal of the expander tool, slide the tubing over the fitting until the tubing reaches the last rib on the fitting.
   a) True
   b) False

82) With the cold expansion with metal compression sleeve system, the expanded PEX tube is slid over the fitting and then the compression ring is pulled over the expanded portion of the tube.
   a) True
   b) False

83) With the cold expansion with metal compression sleeve system, the maximum allowable gap between the edge of the compression sleeve and the collar of the cold-expansion fitting is 0.040 inch.
   a) True
   b) False

Slides 29 - 30

84) PEX tubing may be embedded within a concrete slab, so long as it is installed as a continuous run without fittings.
   a) True
   b) False

85) When PEX is embedded in concrete, it should be sleeved where it enters and leaves the slab.
   a) True
   b) False

Slides 31 – 36

86) Since PEX tubing expands or contracts one inch for every 100 feet of pipe for every 10° of temperature change, you must allow for expansion and contraction in long runs with a 12-inch offset.
   a) True
   b) False

87) Horizontal runs of PEX piping should be supported every 32 inches.
   a) 16
   b) 24
   c) 32
   d) 48

88) The minimum bend radius for PEX is _____ times the outside diameter of the tubing, when bending it with the natural curvature of the coil.
   a) 3
   b) 6
   c) 7.5
   d) 10

89) Protective sleeves or bushings should be used on PEX tubing when penetrating metal studs.
   a) True
   b) False

90) Nailing plates should be used when PEX tubing is passing through a stud within _____ inches of a nailing surface.
   a) 2
   b) 4
   c) 5
   d) 10

91) Insulation that is typically used in copper and CPVC installations would provide _____ protection for PEX tubing.
   a) Less
   b) More
   c) No
   d) Equivalent

92) PEX tube transfers heat at a _____ rate than copper tube.
   a) Faster
   b) Equivalent
   c) Much slower
   d) PEX tubing does not transfer heat

93) The site variables of relative humidity, ambient temperature and water temperature are all factors in the formation of condensation on any piping.
    a) True
    b) False

94) When using expanding foam to insulate tubing, contact the _____ _____ _____ for recommendations. While many expanding foams have been tested and have shown no adverse effects to PEX tubing, not all foams are the same.
    a) Plumbing inspector
    b) PEX tubing manufacturer
    c) General contractor
    d) Customer

95) Keep PEX tubing away from potential sources of _____.
    a) Expansion
    b) Drainage piping
    c) Fiberglass
    d) Heat

96) Maintain a minimum of _____ inches between PEX and any recessed light fixture.
    a) 6
    b) 12
    c) 18
    d) 24

97) If water is used for pressure testing and the building is unheated, the system should be _____ after testing to prevent freezing.
    a) Pressurized
    b) Drained
    c) Retested
    d) De-pressurized

Slide 37

98) At minimum, all connections must be pressure tested to the system's working pressure.
    a) True
    b) False

99) PEX tubing and fittings are safe for air and hydrostatic testing.
    a) True
    b) False

100) If water is used for pressure testing, test pressure shall be at least equal to normal operating pressure but not less than _____ psi and not more than _____ psi. Test duration should not be less than 15 minutes.
    a) 25/100
    b) 40/225
    c) 50/200
    d) 100/200

101) If air is used for pressure testing, use a pressure no less than _____ psi but not more than _____ psi. The most common test pressure is 100 psi. The system shall be tested for a minimum of 15 minutes and the pressure shall not drop more than 8 psi in one hour.
   a) 25/100
   b) 40/125
   c) 50/200
   d) 100/200

Slide 39 - 40

102) PEX tubing is approved for water distribution only and should not be used for distribution of liquid petroleum (LP) or natural gas.
   a) True
   b) False

103) It is acceptable to run PEX tube next to normal HVAC ductwork, provided the tubing cannot be cut or abraded by sharp edges on the ductwork.
   a) True
   b) False

104) PEX must be kept at least 6 inches away from the exhaust vent of a gas-fired water heater.
   a) True
   b) False

105) PEX may be connected directly to electric water heaters for residential plumbing applications.
   a) True
   b) False

106) It is acceptable to mix polybutylene and PEX components.
   a) True
   b) False

Slides 48 - 54

107) PEX utilizes NSF International as its _____ party listing agency for NSF and ASTM standard compliance for the majority of our products.
   a) First
   b) Second
   c) Third
   d) Forth

108) NSF Standard _____ is the standard that establishes minimum health effects requirements for the chemical contaminants and impurities that are indirectly imparted to drinking water from products, components, and material used in drinking water systems.
   a) 14
   b) 45
   c) 61
   d) 845

109) NSF Standard 61– Annex _____ is the annex to NSF Standard 61 that tests for the amount of lead in a product for conformance to California and Vermont low lead legislation.
   a) D
   b) F
   c) G
   d) L

110) NSF Standard _____ establishes physical, performance, and health effects requirements for plastic piping system components and related materials.
   a) 14
   b) 45
   c) 61
   d) 845

111) NSF-pw indicates compliance to NSF Standards 61 and 14 and is included in the print string on PEX tube.
   a) True
   b) False

112) cNSFus-pw indicates compliance to NSF Standards 61 and 14 as well as compliance to Canadian and U.S. standards referenced in the respective national plumbing codes.
   a) True
   b) False

113) cNSFus-pw-G indicates compliance to ASTM Standards 954 and 855 including Annex G (low lead) as well as compliance to Canadian and U.S. standards referenced in the respective national plumbing codes.
   a) True
   b) False

114) ASTM _____ is the standard that specifies the material properties and the dimensions for PEX tube and the standard number is included in the print string on PEX tube.
   a) F 876
   b) F 877
   c) A 1807
   d) F 1807

115) ASTM _____ is the standard that specifies the performance requirements for a PEX system, tube and fittings together and the standard number is included in the print string on PEX tube.
   a) F 876
   b) F 877
   c) A 1807
   d) F 1807

116) ASTM _____ is the standard for brass or copper insert and crimp fittings and the standard number is included in the print string on PEX tube.
   a) F 876
   b) F 877
   c) A 1807
   d) F 1807

117) ASTM _____ is the standard for plastic insert and crimp fittings and the standard number is included in the print string on PEX tube.
   a) F 876
   b) F 877
   c) A 1807
   d) F 2159

118) ASTM _____ is the standard for "Cold Expansion Fittings" as sold by Wirsbo/Uponor and the standard number is included in the print string on PEX tube.
   a) F 2080
   b) F 2098
   c) A 2050
   d) F 1960

119) ASTM _____ is the standard for "Cold Expansion Fittings with Metal Compression Sleeves" as sold by Rehau and the standard number is included in the print string on PEX tube.
   a) F 2080
   b) F 2098
   c) A 2050
   d) F 1960

120) ASTM _____ is the standard for a "Stainless Steel Clamp" to be used in place of a copper crimp ring for brass or copper insert fittings meeting the requirements of F 1807 or plastic insert fittings meeting the requirements of ASTM F 2159 and the standard number is included in the print string on PEX tube.
   a) F 2080
   b) F 2098
   c) A 2050
   d) F 1960