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I affirm that I personally completed the entire text of the course. I also affirm that I completed the exam without assistance from any outside source. I understand that it is my responsibility to file or maintain my certificate of completion as required by the state or by the designation organization.

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Pipe-fitting Answer Key

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This course contains general EPA's SDWA federal rule requirements. Please be aware that each state implements water / sampling procedures/safety/ environmental / building regulations that may be more stringent than EPA's regulations. Check with your state environmental/health agency for more information. These rules change frequently and are often difficult to interpret and follow. Be careful to not be in non-compliance and do not follow this course for proper compliance.

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Pipefitting CEU Training Course Assignment

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You will have 90 days from the start of this course to complete in order to receive your Professional Development Hours (**PDHs**) or Continuing Education Unit (**CEU**). A score of 70 % is necessary to pass this course. We prefer if this exam is proctored. No intentional trick questions. If you should need any assistance, please email all concerns and the completed manual to info@tlch2o.com.

We would prefer that you utilize the enclosed answer sheet in the front, but if you are unable to do so, type out your own answer key. Please include your name and address on your Answer Key and make copy for yourself. You can e-mail or fax your Answer Key along with the Registration Form to TLC. **(S) Means answer may be plural or singular. Multiple Choice Section, One answer per question and please use the answer key.**

Hydraulic Principles Chapter 2

Hydraulics

- Hydraulics is a branch of engineering concerned mainly with moving liquids.
A. True B. False
- Which of the following terms includes the manner in which liquids act in tanks and pipes, deals with their properties, and explores ways to take advantage of these properties?
A. Pressure D. Hydraulics
B. Hydrostatics E. Flow
C. Hydrokinetics F. None of the Above
- Which of the following terms includes the consideration of liquids at rest, involves problems of buoyancy and flotation?
A. Pressure D. Hydraulics
B. Hydrostatics E. Flow
C. Hydrokinetics F. None of the Above
- Hydraulics is applied commonly to the study of _____, other liquids, and even gases when the effects of compressibility are small.
A. Fluids D. Mechanical properties of water
B. Hydrostatics E. Flow
C. Hydrokinetics F. None of the Above
- Hydraulics can be divided into two areas, which term and hydrokinetics?
A. Fluids D. Mechanical properties of water
B. Hydrostatics E. Flow
C. Hydrokinetics F. None of the Above
- Hydrostatics is based on the Greek word for water, and originally covered the study of the physical behavior of water at rest and in motion.
A. True B. False

7. Which of the following terms includes the behavior of all liquids, although it is primarily concerned with the motion of liquids?

- A. Fluids
- B. Hydrostatics
- C. Hydrokinetics
- D. Hydraulics
- E. Flow
- F. None of the Above

8. Which of the following terms includes the study of liquids in motion, is concerned with such matters as friction and turbulence generated in pipes by flowing liquids?

- A. Pressure
- B. Hydrostatics
- C. Hydrokinetics
- D. Hydraulics
- E. Flow
- F. None of the Above

9. Which of the following terms is about the pressures exerted by a fluid at rest?

- A. Pressure
- B. Hydrostatics
- C. Hydrokinetics
- D. Hydraulics
- E. Flow
- F. None of the Above

10. Which of the following terms is an excellent example of deductive mathematical physics, and in which the predictions agree closely with experiment?

- A. Pressure
- B. Hydrostatics
- C. Hydrokinetics
- D. Hydraulics
- E. Flow
- F. None of the Above

11. Which of the following terms is stated in that a fluid is a substance that cannot resist a shearing stress, so that pressures are normal to confining surfaces?

- A. Pressure
- B. Hydrostatics
- C. Hydrokinetics
- D. Hydraulics
- E. Flow
- F. None of the Above

12. According to the text, hydraulics may be the physical property that varies over the largest numerical range, competing with electrical resistivity.

- A. True
- B. False

Pressure

13. Water is incompressible, while air is very compressible.

- A. True
- B. False

14. Both air and water are considered to be?

- A. Absolute pressure
- B. Atmospheric pressure
- C. Fluid(s)
- D. Volume
- E. Shearing force
- F. None of the Above

15. Which of the following terms does water possess and air does not?

- A. Absolute pressure
- B. Atmospheric pressure
- C. Fluid(s)
- D. Volume
- E. Shearing force
- F. None of the Above

16. A fluid is a substance that cannot exert any permanent forces tangential to a boundary and any force that it exerts on a boundary must be normal to the boundary.

- A. True
- B. False

17. According to the text, a force is proportional to the _____, and is called a pressure.

- A. Pascal's Principle
- B. Hydrostatics
- C. Acting on the body of the fluid
- D. Permanent forces tangential
- E. Area on which it is exerted
- F. None of the Above

Water Pressure

18. The weight of a cubic foot of water is 62.4 pounds per square foot. The base can be subdivided into 144-square inches with each subdivision being subjected to a pressure of 0.433 psig. This is one of our key foundation for backflow prevention.

- A. True
- B. False

19. Which of the following terms are normally stated in terms of the height of a fluid?

- A. Friction
- B. Weight
- C. Pressure(s)
- D. Siphon
- E. Depth
- F. None of the Above

20. Water with a pressure head of 10 ft can provide the same _____ as an equal amount of water raised by 10 ft.

- A. Friction
- B. Weight
- C. Pressure(s)
- D. Siphon
- E. Energy
- F. None of the Above

Pressure and Force

21. Which of the following terms is the force that pushes water through pipes?

- A. Absolute pressure
- B. Pressure
- C. Fluid(s)
- D. Volume
- E. Shearing force
- F. None of the Above

22. Water pressure determines the flow of water from the tap.

- A. True
- B. False

23. _____ and force are used extensively in the study of fluid power.

- A. Absolute pressure
- B. Pressure
- C. Fluid(s)
- D. Volume
- E. Shearing force
- F. None of the Above

Volume and Velocity of Flow

24. Which of the following flow terms is passing a point in a given time is known as its volume of flow or flow rate?

- A. Pressure drop
- B. Friction head
- C. Volume of a liquid
- D. Velocity of flow
- E. Volume of flow
- F. None of the Above

25. Which of the following flow terms is usually expressed in gallons per minute (gpm) and is associated with relative pressures of the liquid, such as 5 gpm at 40 psi?

- A. Pressure drop
- B. Friction head
- C. Volume of a liquid
- D. Velocity of flow
- E. Volume of flow
- F. None of the Above

26. Which of the following flow terms is defined as the average speed at which the fluid moves past a given point, it is usually expressed in feet per second or feet per minute?
- A. Pressure drop D. Velocity of flow
 B. Friction head E. Volume of flow
 C. Volume of a liquid F. None of the Above
27. Which of the following flow terms is an important consideration in sizing the hydraulic lines?
- A. Pressure drop D. Velocity of flow
 B. Friction head E. Volume of flow
 C. Volume of a liquid F. None of the Above
28. Volume and friction head are often considered together, that is, with volume of input unchanged—the velocity of flow increases as the cross section or size of the pipe decreases.
- A. True B. False

Backflow Chapter 3

What is backflow? Reverse flow condition

29. Backflow is the undesirable reversal of flow of nonpotable water or other substances through a _____ and into the piping of a public water system or consumer's potable water system.
- A. Backflow D. Cross-connection
 B. Backpressure E. Indirect connection
 C. Backsiphonage F. None of the Above
30. Which of the following terms can occur when there is a stoppage of water supply due to nearby firefighting, a break in a water main?
- A. Backflow D. Cross-connection
 B. Backpressure E. Indirect connection
 C. Backsiphonage F. None of the Above
31. _____ is a type of backflow caused by a downstream pressure that is greater than the upstream or supply pressure in a public water system or consumer's potable water system.
- A. Backflow D. Cross-connection
 B. Backpressure E. Indirect connection
 C. Backsiphonage F. None of the Above
32. Which of the following terms can result from an increase in downstream pressure, a reduction in the potable water supply pressure, or a combination of both?
- A. Backflow D. Cross-connection
 B. Backpressure E. Indirect connection
 C. Backsiphonage F. None of the Above
33. Which of the following terms can have two forms-backpressure and backsiphonage?
- A. Backflow D. Cross-connection
 B. Backpressure E. Indirect connection
 C. Backsiphonage F. None of the Above

34. The basic mechanism for preventing backflow is a mechanical _____, which provides a physical barrier to backflow.

- A. High hazard installations
- B. Air gap
- C. Backflow preventer
- D. Backflow
- E. Device or method
- F. None of the Above

35. The principal types of mechanical backflow preventers are the reduced-pressure principle assembly, the _____, and the double check valve assembly.

- A. High hazard installations
- B. Air gap
- C. Vacuum breaker
- D. Backflow
- E. Device or method
- F. None of the Above

36. Which of the following terms is any temporary or permanent connection between a public water system or consumer's potable water system and any source or system containing nonpotable water or other substances?

- A. Backflow
- B. Backpressure
- C. Backsiphonage
- D. Cross-connection
- E. Indirect connection
- F. None of the Above

37. Which of the following terms is a type of backflow caused by a negative pressure in a public water system or consumer's potable water system?

- A. Backflow
- B. Backpressure
- C. Backsiphonage
- D. Cross-connection
- E. Indirect connection
- F. None of the Above

38. Which of the following terms can occur whenever the amount of water being used exceeds the amount of water being supplied, such as during water line flushing, firefighting, or breaks in water mains?

- A. Backflow
- B. Backpressure
- C. Backsiphonage
- D. Cross-connection
- E. Reductions
- F. None of the Above

39. Which of the following terms is a means or mechanism to prevent backflow?

- A. High hazard installations
- B. Air gap
- C. Backflow preventer
- D. Backflow
- E. Device or method
- F. None of the Above

40. According to the text, basic means of preventing backflow is an _____, which either eliminates a cross-connection or provides a barrier to backflow.

- A. High hazard installations
- B. Air gap
- C. Backflow preventer
- D. Backflow
- E. Device or method
- F. None of the Above

Types of Backflow Prevention Methods and Assemblies

41. _____ must either be physically disconnected or have an approved backflow prevention device installed to protect the public water system.

- A. Backflow
- B. Backpressure
- C. Backsiphonage
- D. Cross-connection
- E. Indirect connection
- F. None of the Above

42. The type of device selected for a particular installation depends on several factors.
A. True B. False
43. When the airflow is restricted, such as the case of an air gap located near a wall, the _____ separation must be increased.
A. Open receiving vessel D. Air gap
B. Backflow preventer E. Air break
C. Barrier to backflow F. None of the Above
44. An air gap is a physical disconnection between the free flowing discharge end of a potable water pipeline and the top of an?
A. Open receiving vessel D. Air gap
B. Backflow preventer E. Air break
C. Barrier to backflow F. None of the Above
45. Which of the following terms must be at least two times the diameter of the supply pipe and not less than one inch?
A. Open receiving vessel D. Air gap
B. Backflow preventer E. Air break
C. Barrier to backflow F. None of the Above
46. According to the text, an air break is a physical separation between the free flowing discharge end of a potable water supply pipeline, and the overflow rim of an open or non-pressure receiving vessel.
A. True B. False
47. According to the text, air gap separations must be vertically orientated a distance of at least twice the inside diameter of the supply, but never less than?
A. 1 inch D. Backflow
B. 2 inches E. Depends
C. 3 inches F. None of the Above
48. An obstruction around or near an _____ may restrict the flow of air into the outlet pipe and nullify the effectiveness of the air gap to prevent backsiphonage.
A. High hazard installations D. Air gap
B. Backflow preventer E. Air break
C. Barrier to backflow F. None of the Above
49. An air gap is acceptable for _____ and is theoretically the most effective protection.
A. High hazard installations D. Low pollutional hazards
B. Backflow preventer E. High pollutional concerns
C. Barrier to backflow F. None of the Above

Vacuum Breakers

50. Which of the following terms can have two types: atmospheric and pressure?
A. Downstream piping D. Hazard application(s)
B. Atmospheric vacuum breakers E. Backflow preventor(s)
C. Vacuum breaker(s) F. None of the Above

51. Both vacuum breakers devices primary purpose is to protect the water system from cross connections due to submerged inlets, such as irrigation systems and tank applications.

- A. True B. False

52. The difference between the two types is that the pressure vacuum breaker is spring loaded to assist the device's opening.

- A. True B. False

53. Both vacuum breakers devices open the pipeline to atmosphere in the event of backsiphonage only.

- A. True B. False

54. Both vacuum breakers devices are approved for backpressure conditions.

- A. True B. False

55. Both vacuum breakers devices are only suitable for?

- A. High hazard installations D. Low hazard conditions
B. Backflow preventer E. High pollutional concerns
C. Barrier to backflow F. None of the Above

56. Which of the following terms may not be installed downstream of atmospheric vacuum breakers but are allowed on pressure vacuum breakers?

- A. Valve assembly D. Internally weighted
B. Test cocks E. Shut offs
C. Air inlet valve F. None of the Above

57. The devices must be installed above the highest?

- A. Downstream piping D. Hazard applications
B. Atmospheric vacuum breakers E. Mountain
C. Vacuum breakers F. None of the Above

58. Which of the following terms contains a float check, a check seat, and an air inlet port?

- A. Double check D. RP
B. Atmospheric vacuum breaker E. Backflow preventor(s)
C. Breaker(s) F. None of the Above

59. The atmospheric vacuum breaker allows air to enter the water line when the line pressure is reduced to a gauge pressure of zero or below.

- A. True B. False

60. Which of the following terms is not internally loaded?

- A. Air inlet valve D. Test cock
B. Check valve E. Atmospheric vacuum breakers
C. Device F. None of the Above

Plumbing Fittings Chapter 5 Water Service Pipe Installation - Underground Water Service.

61. Water service pipe shall be installed outside the?

- A. Contamination D. Maximum frost penetration of the local area
B. Water service pipe E. Center of the sanitary sewer
C. Foundation wall F. None of the Above

62. Water service and building drain or building sewer may be installed in which of the following terms with a minimum of 10 feet horizontal separation?

- A. An exterior wall
- B. Same trench
- C. Separate trenches
- D. Beneath a sanitary sewer or drain
- E. An underground potable water pipe
- F. None of the Above

63. According to the text, the water service and the building drain or building sewer may be installed in the same trench provided that the water service is placed on which of the following terms a minimum of 18 inches above the building drain or building sewer?

- A. A solid shelf
- B. Same trench
- C. Separate trenches
- D. Beneath a sanitary sewer or drain
- E. An underground potable water pipe
- F. None of the Above

64. The minimum depth for any water service pipe shall be at least 36 inches or the maximum frost penetration of the _____, whichever is of greater depth.

- A. Local area
- B. Water service pipe
- C. Foundation wall
- D. Maximum frost penetration of the local area
- E. Center of the sanitary sewer
- F. None of the Above

65. No water service pipe shall be installed or permitted outside of a building or in which of the following terms unless provisions are made to protect such pipe from freezing?

- A. An exterior wall
- B. Same trench
- C. Soil or waste lines
- D. Beneath a sanitary sewer or drain
- E. An underground potable water pipe
- F. None of the Above

66. Potable Water Piping and Sanitary Sewer Crossing Installation Requirements.

Where it is necessary for the potable water piping to pass above or below a sanitary sewer, such piping shall be installed with which of the following terms for a distance of 10 feet on either side from the center of the sanitary sewer?

- A. Contamination
- B. Water service pipe
- C. Foundation wall
- D. Maximum frost penetration of the local area
- E. Minimum vertical separation of 18 inches
- F. None of the Above

67. Where it is necessary for the potable water piping to pass beneath a _____, the sanitary sewer or drain shall be constructed of materials as specified in Approved Building Drainage/Vent Pipe for building drains, and shall extend on each side of the crossing to a distance of at least 10 feet as measured at right angles to the water line.

- A. An exterior wall
- B. Same trench
- C. Soil or waste lines
- D. Sanitary sewer or drain
- E. An underground potable water pipe
- F. None of the Above

Wet/Dry Bore:

68. When it is not possible to comply with subsection (b)(1) or (2), a pressure rated pipe approved for building drain material shall encase the water service pipe. The _____ shall be sealed with a casing seal and extend 10 feet on either side of the center of the sanitary sewer pipe?

- A. Stop-and-waste valves
- B. Potability of the water
- C. Air gap
- D. Supply outlet
- E. Auxiliary pressure (booster) system
- F. None of the Above

Stop-And-Waste Valve

69. Frost free hydrants and fire hydrants shall not be considered?
A. Stop-and-waste valves D. Supply outlet
B. Potability of the water E. Auxiliary pressure (booster) system
C. Air gap F. None of the Above

Potable Water Pumping and Storage Equipment

70. Potable water pumps, tanks, filters, and all other appliances and devices shall be protected against?
A. Relief valve D. Maximum allowable working pressure
B. Contamination E. Outside atmosphere
C. Deep seal F. None of the Above

Water Supply Tanks.

71. Which of the following terms shall be properly covered to prevent contamination of the water supply?
A. Stop-and-waste valves D. Supply outlet
B. Potability of the water E. Auxiliary pressure (booster) system
C. Potable water supply tanks F. None of the Above

Cleaning, Painting, Repairing Water Tanks.

72. A potable water supply tank used for which of the following terms shall not be lined, painted or repaired with any material which affects either the taste or the potability of the water?
A. Domestic purposes D. The supply outlet
B. Potability of the water E. Auxiliary pressure (booster) system
C. An air gap F. None of the Above

73. Tanks shall be disconnected from the system during such operations to prevent any which of the following terms from entering the system?
A. Foreign substance D. Auxiliary pressure systems
B. No restrictions E. An area of at least twice the size of the supply pipe
C. An air gap F. None of the Above

Potable Water Supply Tanks and Auxiliary Pressure Tanks

74. When the water pressure from the _____ is insufficient during periods of peak flow or due to the building height to supply all fixtures, the rate of supply shall be supplemented by a gravity tank or auxiliary pressure system.
A. Public water supply main D. Supply outlet
B. Potability of the water E. Auxiliary pressure (booster) system
C. An air gap F. None of the Above

75. Which of the following terms shall not substitute for adequate sizing of water distribution piping within the building?
A. Vacuum relief valve D. Auxiliary pressure systems
B. No restrictions E. An area of at least twice the size of the supply pipe
C. An air gap F. None of the Above

Tank Supply Inlet and Outlet.

76. Which of the following terms to the tank shall have a minimum air gap of at least six (6) inches?

- A. Water supply inlet
- B. Potability of the water
- C. Gravity tank(s)
- D. Supply outlet
- E. Auxiliary pressure (booster) system
- F. None of the Above

Overflow For Water Supply Tanks.

77. Overflow pipes for which of the following terms shall be indirectly connected to the drainage system with an air gap of at least six (6) inches?

- A. Water supply inlet
- B. Potability of the water
- C. Gravity tank(s)
- D. Supply outlet
- E. Auxiliary pressure (booster) system
- F. None of the Above

78. Which of the following terms shall be full sized, unrestricted and screened with 24-mesh per inch stainless steel or bronze screen?

- A. Overflow pipes
- B. Potability of the water
- C. An air gap
- D. The supply outlet
- E. Auxiliary pressure (booster) system
- F. None of the Above

Size of Overflow.

79. Overflow drains for gravity water supply tanks shall have an area of at least twice the size of which of the following terms?

- A. Vacuum relief valve
- B. Restrictions
- C. Air gap
- D. Auxiliary pressure systems
- E. Supply pipe
- F. None of the Above

Demand Load.

80. _____ or water distribution piping, where the water in the piping may become stagnant, are prohibited. A developed length of more than 2 feet shall be considered a dead end.

- A. Peak demand
- B. Freezing
- C. An air chamber
- D. Unused sections of water service
- E. Water system
- F. None of the Above

Design of a Building Water Distribution System

81. Design and Installation. The design and installation of the hot and cold water building distribution systems shall provide a volume of water at the required rates and pressures to ensure the safe, efficient and satisfactory operation of fixtures, fittings, appliances and other connected devices during periods of?

- A. Water service demand load
- B. Peak use
- C. Any plumbing fixture
- D. Discharge side of the water meter
- E. Satisfactory operation
- F. None of the Above

82. No distribution pipe or pipes shall be installed or _____ or in an exterior wall unless provisions are made to protect such pipe from freezing.

- A. An exterior wall
- B. Same trench
- C. Soil or waste lines
- D. Sanitary sewer or drain
- E. Permitted outside of a building
- F. None of the Above

Minimum Water Pressure.

83. The minimum constant water service pressure on which of the following terms shall be at least 20 p.s.i.?
- A. Air chamber(s)
 - B. An auxiliary pressure system
 - C. Any plumbing fixture
 - D. The discharge side of the water meter
 - E. Satisfactory operation
 - F. None of the Above

Safety Devices

84. All equipment used for heating water or storing hot water shall be achieved by installing either a pressure relief valve and which of the following terms or by installing a combination pressure-temperature relief valve?
- A. Pressure relief valve(s)
 - B. Energy cut-off devices
 - C. Temperature relief valve
 - D. Combination pressure-temperature relief valve
 - E. Temperature sensing element
 - F. None of the Above

Pressure and Temperature Relief Valves.

85. Which of the following terms shall have an ASME relief rating to meet the pressure conditions specified on the equipment served?
- A. Pressure relief valve(s)
 - B. Energy cut-off devices
 - C. A check valve or shut-off valve
 - D. Combination pressure-temperature relief valve
 - E. Temperature sensing element
 - F. None of the Above

Temperature Relief Valves.

86. Temperature relief valves shall be installed so that the _____ is immersed in the hottest water within the top 6 inches of the tank.
- A. Pressure relief valve(s)
 - B. Energy cut-off devices
 - C. A check valve or shut-off valve
 - D. Combination pressure-temperature relief valve
 - E. Temperature sensing element
 - F. None of the Above

Combination Pressure-Temperature Relief Valves.

87. Combination pressure-temperature relief valves shall comply with the applicable requirements as listed in Appendix A, Table A for individual pressure and which of the following terms and shall be installed so that the temperature sensing element is immersed in the hottest water within the top 6 inches of the tank and have a test lever?
- A. Pressure relief valve(s)
 - B. Energy cut-off devices
 - C. A check valve or shut-off valve
 - D. Combination pressure-temperature relief valve
 - E. Individual temperature relief valves
 - F. None of the Above

Types of Joints

88. Caulked joints for which of the following terms shall be firmly packed with oakum or hemp and filled with molten lead?
- A. Bore and all chips
 - B. Brass or copper
 - C. Lead ring
 - D. Oakum or hemp and filled with molten lead
 - E. Cast iron hub-and-spigot pipe
 - F. None of the Above
89. Paint, varnish, or other coatings shall not be permitted on the jointing material until after a plumbing inspector has been given the opportunity to test and approve or disapprove the?
- A. Joint
 - B. Caulking ferrule
 - C. Wiped joints
 - D. Properly soldered together
 - E. Jointing material
 - F. None of the Above

Threaded/Screwed Joints.

90. All burrs shall be removed; pipe ends shall be reamed or filed to size of which of the following terms shall be removed?

- A. Bore and all chips
- B. Brass or copper
- C. Lead ring
- D. Oakum or hemp and filled with molten lead
- E. Cleaned bright
- F. None of the Above

91. Which of the following terms shall be insoluble in water and non-toxic?

- A. A proper flaring tool
- B. Caulking compound
- C. Wiped joints
- D. Pipe joints compound
- E. Jointing material compound
- F. None of the Above

92. Wiped Joints. Joints in lead pipe or fittings, or between lead pipefittings and brass or copper pipe ferrules, solder nipples, or traps shall be?

- A. Full-wiped joints
- B. Brass or copper
- C. Lead ring
- D. Oakum or hemp and filled with molten lead
- E. Caulking compound
- F. None of the Above

93. Which of the following terms shall have exposed surface on each side of the joint at least 3/4" and at least as thick as the material being joined.

- A. A proper flaring tool
- B. Caulking ferrule
- C. Wiped joints
- D. Properly soldered together
- E. Jointing material
- F. None of the Above

94. Wall or floor flange lead-wiped joints shall be made by using a lead ring or which of the following terms placed behind the joints at the wall or floor?

- A. Bore and all chips
- B. Brass or copper
- C. Lead ring
- D. Oakum or hemp and filled with molten lead
- E. Flange
- F. None of the Above

95. Which of the following terms between lead pipe and cast iron, steel or wrought iron shall be made by means of a caulking ferrule, soldering nipple, or bushing?

- A. Joints
- B. Caulking ferrule
- C. Wiped joints
- D. Properly soldered together
- E. Jointing material
- F. None of the Above

Soldered Joints.

96. The joints shall be _____ and made with approved lead free solder.

- A. Bore and all chips
- B. Brass or copper
- C. Lead ring
- D. Properly fluxed
- E. Cleaned bright
- F. None of the Above

97. Joints in copper water tubing shall be made with approved cast bronze or wrought copper pressure fittings?

- A. A proper flaring tool
- B. Caulking ferrule
- C. Wiped joints
- D. Properly soldered together
- E. Jointing material
- F. None of the Above

98. All solders or flux containing more than 0.2% lead shall bear a warning label which states that the solder or?

- A. Bore and all chips
- B. Brass or copper
- C. Lead ring
- D. Molten lead
- E. Flux
- F. None of the Above

Flared Joints.

99. Which of the following terms for plastic pipe and tubing and soft copper water tubing shall be made with approved fittings?

- A. Approved fitting(s)
- B. Flared joints
- C. Collar
- D. Are prohibited
- E. Are approved
- F. None of the Above

Hot-Poured Joints.

100. Hot-poured compound for clay or concrete sewer pipe shall not be which of the following terms and when poured against a dry surface?

- A. Approved fitting(s)
- B. Dry surface
- C. Water absorbent
- D. Prohibited
- E. Approved brazing filler metal
- F. None of the Above

Precast Joints.

101. Which of the following terms is inserted in the collar, it shall bind before contacting the base of the socket?

- A. Approved fitting(s)
- B. Dry surface
- C. Spigot end
- D. Bituminized fiber pipe
- E. Approved brazing filler metal
- F. None of the Above

Brazed Joints.

102. Brazed joints shall be made by first cleaning the surface to be joined down to the base metal, applying which of the following terms for such joints and for the filler metal?

- A. Approved fitting(s)
- B. Bituminized fiber pipe
- C. Brazing
- D. Flux approved
- E. Approved brazing filler metal
- F. None of the Above

103. The joint shall be made with a mechanical extraction tool and joined by?

- A. Approved fitting(s)
- B. Bituminized fiber pipe
- C. Brazing
- D. Flux approved
- E. Approved brazing filler metal
- F. None of the Above

Cement Mortar Joints.

104. Except for repairs, cement mortar joints are?

- A. Approved fitting(s)
- B. Dry surface
- C. Accepted
- D. Prohibited
- E. Approved
- F. None of the Above

Burned Lead (Welded).

105. (For drain, waste and vent system only) The thickness of which of the following terms shall be at least as thick as the lead being joined?

- A. Weld
- B. Bituminized fiber pipe
- C. Brazing
- D. Flux approved
- E. Approved brazing filler metal
- F. None of the Above

Bituminized Fiber Pipe Joints.

106. Joints in bituminized fiber pipe shall be made with which of the following terms of the same composition as the pipe?

- A. Weld
- B. Bituminized fiber pipe
- C. Brazing
- D. Tapered type couplings
- E. Approved brazing filler metal
- F. None of the Above

Plastic Pipe Joints

107. Every joint in plastic piping shall be made with approved fittings by either solvent welded or fusion welded connections, compression fittings, approved insert fittings, metal clamps and screws of corrosion resistant material, or?

- A. Adaptor fittings
- B. Compression fittings
- C. Solvent welded
- D. Threaded joints
- E. Thermal welded joints and fittings
- F. None of the Above

Joints and Fittings in Plastic Pipe.

108. Which of the following terms and joints shall be in accordance with the manufacturer's recommendations?

- A. Clamps
- B. Potable water piping fittings
- C. Slip joints
- D. Ground joint connections
- E. Threaded or flanged joints
- F. None of the Above

109. Polyethylene (PE) pipe shall be installed only with compression fittings, insert and clamp type fittings or?

- A. Adaptor fittings
- B. Compression fittings
- C. Solvent welded
- D. Threaded joints
- E. Thermal welded joints and fittings
- F. None of the Above

110. Which of the following terms shall be of corrosion resistant material, the inside diameter of any insert fitting shall not be less than the minimum allowable size for water service/distribution piping?

- A. Clamps
- B. Fittings and joints
- C. Slip joints
- D. Ground joint connections
- E. Threaded or flanged joints
- F. None of the Above

111. Polyvinyl chloride pipe shall be installed with which of the following terms joints only?

- A. Adaptor fittings
- B. Compression fittings
- C. Solvent welded
- D. Solvent welded or flanged
- E. Thermal welded joints and fittings
- F. None of the Above

112. The primer and solvent cement used shall be in accordance with the manufacturer's recommendation for?

- A. Polyvinyl chloride piping
- B. Fittings and joints
- C. Slip joints
- D. Ground joint connections
- E. Threaded or flanged joints
- F. None of the Above

113. Polybutylene pipe shall be installed only with insert and clamp type fittings, compression type, flanged type, or?

- A. Adaptor fittings
- B. Compression fittings
- C. Solvent welded
- D. Threaded joints
- E. Thermal welded joints and fittings
- F. None of the Above

Joints in Plastic Drainage.

114. Which of the following terms in plastic drainage piping or vent piping within a building shall be solvent welded?

- A. Joints
- B. Fittings and joints
- C. Slip joints
- D. Ground joint connections
- E. Threaded or flanged joints
- F. None of the Above

115. The solvent cement shall be specific for the type of piping material, which of the following terms are acceptable if accessible?

- A. Adaptor fittings
- B. Compression fittings
- C. Solvent welded
- D. Threaded joints
- E. O-ring expansion joints
- F. None of the Above

Ground Joint Connections.

116. Which of the following terms shall not be used in any inaccessible drainage piping?

- A. Clamps
- B. Fittings and joints
- C. Slip joints
- D. Ground joint connections
- E. Threaded or flanged joints
- F. None of the Above

No-Hub Soil Pipe Joints.

117. Shielded joints for no-hub cast iron soil pipe shall be made with an elastomeric gasket covered by either a stainless steel shield secured by 2 or more stainless steel bands or clamps, or covered by _____ secured with stainless steel nuts and bolts.

- A. Adaptor fittings
- B. Compression fittings
- C. Solvent welded
- D. Threaded joints
- E. Cast iron couplings
- F. None of the Above

Compression Type Joints.

118. The pipe shall comply with the specifications contained in ASTM A-74 with regard to which of the following terms dimensions and tolerances?

- A. Hub and spigot
- B. Fittings and joints
- C. Slip joints
- D. Ground joint connections
- E. Threaded or flanged joints
- F. None of the Above

119. Which of the following terms for copper water tube or brass tube shall be made with brass ferrules and ground joint connections?

- A. Compression type joints
- B. Fittings and joints
- C. Slip joints
- D. Ground joint connections
- E. Threaded or flanged joints
- F. None of the Above

Special Joints

120. Copper Tubing to Screwed Pipe Joints. Which of the following terms from copper tubing to threaded pipe shall be made by the use of a cast bronze or wrought copper adaptor fitting?

- A. Joints
- B. Fittings and joints
- C. Slip joints
- D. Ground joint connections
- E. Threaded or flanged joints
- F. None of the Above

Slip Joints.

121. In drainage and water piping, which of the following terms may be used on the inlet side of the trap or in the trap seal, and on the exposed fixture supply?

- A. Clamps
- B. Fittings and joints
- C. Slip joints
- D. Ground joint connections
- E. Threaded or flanged joints
- F. None of the Above

122. Which of the following terms shall not be used in any inaccessible piping?

- A. Clamps
- B. Fittings and joints
- C. Slip joints
- D. Ground joint connections
- E. Threaded or flanged joints
- F. None of the Above

123. Which of the following terms are permitted, provided they meet the following specifications: they are installed by being pushed onto copper or CPVC?

- A. The expansion joint
- B. Push-on angle stop valves
- C. Stainless steel bands
- D. Grooved type mechanical couplings
- E. Compression type couplings
- F. None of the Above

124. Which of the following terms material shall conform to the type piping on which it is installed?

- A. The expansion joint
- B. Metal tabs
- C. Stainless steel bands
- D. Grooved type mechanical couplings
- E. Compression type couplings
- F. None of the Above

125. Which of the following terms shall not be used in unexposed water piping except for water services, water meter yokes and stop box connections?

- A. The expansion joint
- B. Metal tabs
- C. Stainless steel bands
- D. Grooved type mechanical couplings
- E. Compression type couplings
- F. None of the Above

Grooved Type Mechanical Couplings.

126. Which of the following terms, may be used in potable water and roof drain piping, such couplings shall not be used in waste, soil or vent piping?

- A. The expansion joint
- B. Metal tabs
- C. Stainless steel bands
- D. Grooved type mechanical couplings
- E. Compression type couplings
- F. None of the Above

Use of Joints

127. Clay Sewer Pipe. Joints in vitrified clay pipe or between such pipe and metal pipe shall be made with a neoprene gasket and?

- A. Proper adaptor fittings
- B. Flared joints
- C. Stainless steel bands
- D. Neoprene gasket and stainless steel bands
- E. Plastic pipe
- F. None of the Above

128. Concrete Sewer Pipe. Joints in concrete sewer pipe or between such pipe and metal pipe shall be made with which of the following terms and stainless steel bands?

- A. Proper adaptors
- B. Wiped joints
- C. Unions
- D. Stop box connections
- E. Neoprene gasket
- F. None of the Above

Screw Pipe to Cast Iron.

129. Which of the following terms between wrought iron, steel, brass, or copper pipe, and cast iron pipe shall be either caulked or threaded joints?

- A. Proper adaptor fittings
- B. Flared joints
- C. Appropriate type adaptor
- D. Joints
- E. Plastic pipe
- F. None of the Above

Lead to Cast Iron, Wrought Iron or Steel.

130. Which of the following terms between lead and cast iron, wrought iron, or steel pipe shall be made by means of wiped joints to a caulking ferrule, soldering nipple, or brushing.

- A. Proper adaptors
- B. Wiped joints
- C. Unions
- D. Stop box connections
- E. Joints
- F. None of the Above

Copper Water Tube.

131. Which of the following terms in copper tubing shall be made with cast bronze or wrought copper pressure fittings, properly soldered or brazed, or by means of compression or flared joints?

- A. Proper adaptor fittings
- B. Flared joints
- C. Appropriate type adaptor
- D. Neoprene gasket and stainless steel bands
- E. Joints
- F. None of the Above

132. Which of the following terms and compression fittings shall not be installed underground except for water services, water meter yokes and stop box connections?

- A. Proper adaptors
- B. Flared joints
- C. Unions
- D. Stop box connections
- E. Stainless steel bands
- F. None of the Above

Plastic Pipe.

133. Joints between plastic pipe and which of the following terms shall be made only with an appropriate type adaptor?

- A. Proper adaptor fittings
- B. Flared joints
- C. Appropriate type adaptor
- D. Neoprene gasket and stainless steel bands
- E. Non-plastic material
- F. None of the Above

Plastic-Commingling.

134. There shall be no commingling of which of the following terms within the same plumbing system except through the use of proper adaptors?

- A. Proper adaptors
- B. Wiped joints
- C. Unions
- D. Plastic materials
- E. Stainless steel bands
- F. None of the Above

135. Plastic pipe shall not be installed in which of the following terms or chase that contains uninsulated hot water?

- A. Proper adaptor fittings
- B. Flared joints
- C. Appropriate type adaptor
- D. Any tunnel
- E. Plastic pipe
- F. None of the Above

Unions

136. Which of the following terms may be used in the drainage and venting system when accessibly located above ground?

- A. Proper adaptors
- B. Wiped joints
- C. Unions
- D. Stop box connections
- E. Stainless steel bands
- F. None of the Above

137. Which of the following terms shall be installed in a water supply system within 5 feet of regulating equipment, water heaters, water conditioning tanks, water conditioning equipment, pumps?

- A. Proper adaptors
- B. Wiped joints
- C. Unions
- D. Stop box connections
- E. Stainless steel bands
- F. None of the Above

Drainage System.

138. Unions may be used in the trap seal and on the inlet and outlet side of the trap. Unions shall have metal to metal seats except that which of the following terms may have plastic to plastic seats?

- A. Proper adaptors
- B. Wiped joints
- C. Unions
- D. Plastic unions
- E. Stainless steel bands
- F. None of the Above

Water Supply System.

139. Unions in the water supply system shall be metal to metal with ground seats, except that plastic to metal unions may utilize durable, non-toxic, impervious?

- A. Proper adaptors
- B. Wiped joints
- C. Gaskets
- D. Metal to metal with ground seats
- E. Stainless steel bands
- F. None of the Above

140. Unions between copper pipe/tubing and dissimilar metals shall either be made with a brass converter fitting or be?

- A. Proper adaptors
- B. Wiped joints
- C. A dielectric type union
- D. Metal to metal with ground seats
- E. Stainless steel bands
- F. None of the Above

Water Distribution System Chapter 8 - System Elements

141. Distribution mains function is to carry water from the water source or treatment works to users, these are the pipelines that make up the?

- A. Increase water pressure
- B. Distribution tree
- C. Complete gridiron system
- D. Distribution system
- E. Arterial system
- F. None of the Above

142. Arterial mains are interconnected with smaller distribution mains to form a complete gridiron system and are for?

- A. Increasing water pressure
- B. Tree system
- C. Complete gridiron system
- D. Distribution mains of large size
- E. Fire protection
- F. None of the Above

143. Storage reservoirs are structures used to store water and _____ the supply or pressure in the distribution system.

- A. Increase water pressure
- B. Equalize
- C. Complete gridiron system
- D. Main line isolation
- E. Provide a reserve pressure
- F. None of the Above

144. Booster stations are used to _____ from storage tanks for low-pressure mains.

- A. Increase water pressure
- B. Equalize
- C. Complete gridiron system
- D. Boost flow
- E. Provide a reserve pressure
- F. None of the Above

Gate Valves

145. In the distribution system, gate valves are used when a straight-line flow of fluid and?

- A. Principally
- B. Dependability
- C. Repair or replacement
- D. Minimum flow restriction
- E. Stops or allows
- F. None of the Above

146. In the distribution system, or on a residential job, gate valves are so-named because the part that either _____ flow through the valve acts somewhat like a gate.

- A. Fully drawn up
- B. Dependability
- C. Repair or replacement
- D. Minimum flow restriction
- E. Stops or allows
- F. None of the Above

147. If the valve is wide open, the gate is _____ into the valve bonnet.

- A. Fully drawn up
- B. Dependable
- C. Repair or replacement
- D. Minimum flow restriction
- E. Stops or allows
- F. None of the Above

148. There is little pressure drop or flow restriction through the valve. Gate valves are not suitable for?

- A. Copper lines
- B. Dependability
- C. PRV
- D. Throttling purposes
- E. Pressure drops
- F. None of the Above

149. The control of flow is easy because of the valve's design.

- A. True
- B. False

Ball Valves

150. Most ball valves require only a 180-degree turn to either completely open or close the valve.

- A. True B. False

151. According to the text, some ball valves are operated by planetary gears.

- A. True B. False

152. Ball valves should be either fully-on or fully-off, some ball valves also contain a swing check located within the ball to give the valve a check valve feature.

- A. True B. False

Valve Exercising

153. Valve exercising should be done to locate inoperable due to freezing or build-up of rust or corrosion and done once per year to detect _____ and to prevent valves from becoming

- A. Malfunctioning valves D. Minimum flow restriction
B. Dependability E. Stops or allows
C. Repair or replacement F. None of the Above

154. A valve inspection should include drawing valve location maps to show distances to the _____ from specific reference.

- A. Valve(s) D. House
B. Stoneline E. Telephone pole
C. Monument F. None of the Above

155. Service connections are used to _____ or other plumbing systems to the distribution system mains.

- A. Be isolated D. Limits the expansion
B. Connect individual buildings E. Decreases in size
C. By laying out F. None of the Above

If Excessive Torque is Needed to Work the Valve

156. One cause of a valve failing to open are variations in the temperature and/or pressure of the?

- A. High pressure side D. Valve sealing surfaces
B. Working fluid E. Length of exposure
C. Closing torque applied F. None of the Above

System Layouts

Tree System

157. Newer water systems are frequently expanded with planning and developed into a tree-like system.

- A. True B. False

158. The Tree system consists of a single main that _____ as it leaves the source and progresses through the area originally served.

- A. Be isolated D. Limits the expansion
B. Connect individual buildings E. Decreases in size
C. By laying out F. None of the Above

159. Smaller pipelines _____ the main and divide again, much like the trunk and branches of a tree.

- A. Branch off
- B. Are manifolded to
- C. Connect
- D. Limit the expansion
- E. Decrease
- F. None of the Above

160. According to the text, there are several advantages gained by laying out water mains in a loop or grid, with feeder and distributor mains interconnecting at roadway intersections and other regular intervals.

- A. True
- B. False

Friction Loss

161. The damaged section can be isolated and the remainder of the system will still carry pressure, water will not be distributed if a single section fails.

- A. True
- B. False

162. During periods of peak fire flow demand, there will be less impact from _____ in water mains as the velocity within any given section of main.

- A. Carrying capacity
- B. Friction loss
- C. Pressure
- D. Static pressure
- E. Total pressure
- F. None of the Above

Types of Pipes Used in the Water Distribution Field

Plastic Pipe (PVC)

163. Plastic pipe has seen extensive use available in different lengths and sizes; it is lighter than steel or copper and requires no special tools to install.

- A. True
- B. False

164. Plastic pipe has complete resistance to corrosion; and, in addition, it can be installed aboveground or below ground, has several advantages over metal pipe: it is flexible; it has superior resistance to?

- A. Ease of installation
- B. An excellent combination
- C. Chemical resistance
- D. Rupture from freezing
- E. Complete resistance to corrosion
- F. None of the Above

165. PVC pipes are made of tough, strong thermoplastic material that has _____ of physical and chemical properties.

- A. Ease of installation
- B. An excellent combination
- C. Chemical resistance
- D. Array
- E. Complete resistance to corrosion
- F. None of the Above

166. PVC's chemical resistance and _____ make it an excellent material for application in various mechanical systems.

- A. Ease of installation
- B. Greater resistance
- C. Chemical resistance
- D. Design strength
- E. Complete resistance to corrosion
- F. None of the Above

167. According to the text, often polyvinyl chloride is further chlorinated to obtain a stiffer design, a higher level of impact resistance, and a _____ to extremes of temperature.

- A. Ease of installation
- B. Greater resistance
- C. Chemical resistance
- D. Design strength
- E. Complete resistance to corrosion
- F. None of the Above

168. A CPVC pipe can be used only in cold-water systems with temperatures up to 110°F.

- A. True
- B. False

169. Which of the following terms and economy makes plastic pipe popular for use in either water distribution and supply systems or sewer drainage systems?

- A. Ease of installation
- B. Working pressure
- C. Chemical resistance
- D. Stamped on the outside
- E. Complete resistance to corrosion
- F. None of the Above

170. You will want to date and collect coupons or tap cut-outs to determine the condition of the pipe or?

- A. Ease of installation
- B. Measure the corrosion
- C. Chemical resistance
- D. Measure the shock load
- E. Determine the C Factor
- F. None of the Above

Plastic Pipe (PVC)

171. A main advantage of PVC piping is its lightweight, allowing for?

- A. Easy installation
- B. Measure the corrosion
- C. Chemical resistance
- D. Measure the shock load
- E. Determine the C Factor
- F. None of the Above

172. Since PVC is non-metallic, a tracer wire must be installed with the PVC water main so that it can be located after burial.

- A. True
- B. False

173. The National Sanitation Foundation currently lists most brands of PVC pipe as being acceptable for potable water use, this information should be stamped on the outside of the pipe, along with _____ and temperature, diameter and pipe manufacturer.

- A. Ease of installation
- B. Working pressure
- C. Chemical resistance
- D. Date and time
- E. Expiration
- F. None of the Above

174. PVC pipe will have the highest C Factor of all the above pipes, the higher the C factor the?

- A. Long life
- B. Rougher the interior
- C. Been in use for a long time
- D. Smoother the pipe
- E. Ability to withstand shock loads
- F. None of the Above

Cast Iron (CIP)

175. CIP can be found in diameters from 3" to 48".

- A. True
- B. False

176. Advantages of CIP are its long life, ability to withstand shock loads and to withstand working pressures up to 120 psi.

- A. True
- B. False

Ductile Iron Pipe (DIP)

177. DIP can be purchased in 4" to 45" diameters and lengths of 18' to 20'.

- A. True B. False

178. DIP was developed to _____ associated with cast iron pipe.

- A. Overcome the breakage problems D. Provide a High C Factor
B. Withstand shock loads E. Be nearly indestructible
C. Extend the life F. None of the Above

179. DIP's main advantage is that it is _____ by internal or external pressures.

- A. Overcome the breakage problems D. Provide a High C Factor
B. Withstand shock loads E. Nearly indestructible
C. Extend the life F. None of the Above

180. It is protected from highly corrosive soils by wrapping the pipe in plastic sheeting prior to installation, this practice can greatly _____ of this type of pipe.

- A. Overcome the breakage problems D. Provide a High C Factor
B. Withstand shock loads E. Be nearly indestructible
C. Extend the life F. None of the Above

Steel Pipe

181. Steel pipe is available in various diameters and in 20' or 21' lengths; its main advantage is the ability to form it into a variety of shapes.

- A. True B. False

182. Steel pipe's advantage is that it is able withstand corrosion by both soil and water.

- A. True B. False

183. Steel pipe is usually galvanized or dipped in coal-tar enamel and wrapped with coal-tar impregnated felt to reduce?

- A. Corrosion problems D. Good yielding
B. Bending E. Confusion with other pipes
C. Costs F. None of the Above

184. From a health standpoint coal-tar products are undergoing scrutiny and it is recommended that the appropriate regulatory agencies be contacted prior to use of this material.

- A. True B. False

Asbestos Cement Pipe (ACP)

185. ACP is available in diameters from 3" to 36" and in 13' lengths.

- A. True B. False

186. ACP main advantages are its ability to _____ and its excellent hydraulic flow characteristics due to its smoothness.

- A. Withstand corrosion D. Transfer less friction
B. Lower C factor E. Brittle and is easily broken
C. Withstand corrosion F. None of the Above

187. ACP main disadvantage is that it is _____ during construction or by shock loading.
A. Very light weight D. Transfer less friction
B. Lower C factor E. Brittle and is easily broken
C. Unable to withstand corrosion F. None of the Above

188. According to the text, ACP has some concern regarding the possible release of asbestos fibers in corrosive water and there has much debate over the health effects of ingested asbestos.
A. True B. False

189. Precautionary measures must be taken to protect water utility workers when cutting, tapping or otherwise handling this type of pipe.
A. True B. False

Galvanized Pipe

190. Galvanized pipe is commonly used for the water distributing pipes inside a building to supply hot and cold water to?

A. The fixtures D. To copper fittings
B. Water distributing pipes E. The water heater
C. Inside and outside F. None of the Above

191. Galvanized pipe is manufactured in 21-ft lengths and is coated with zinc the outside only.
A. True B. False

192. Pipe sizes are based on nominal inside diameters, these diameters vary with the thickness of the pipe.
A. True B. False

193. According to the text, outside pipe diameters remain constant so that pipe can be?
A. Hooked to Cpex D. Soldered to copper fittings
B. Flanged E. Threaded for standard fittings
C. Connected to Sharkbites F. None of the Above

Copper

194. According to the text, copper is one of the least widely used materials for tubing, this is because it does not rust and is highly resistant to any bending.
A. True B. False

195. K pipe has the thickest walls.
A. True B. False

196. Copper pipe M has the thinnest walls.
A. True B. False

197. Soldering allows all the tubing and fittings to be set in place before the joints are finished.
A. True B. False

198. Type K copper tubing is available in either rigid or flexible and is primarily used for _____ in the water distribution systems.

- A. Exposed lines
- B. Underground service
- C. Rigid (hard temper)
- D. Straight lengths
- E. DVW
- F. None of the Above

199. Hard temper tubing is available in 40- or 60-ft coils, while soft tubing comes in 12- and 20-ft straight lengths.

- A. True
- B. False

200. Type L copper tubing is also available in either hard or soft temper and either in coils or?

- A. Exposed lines
- B. Widely used
- C. Easier installation
- D. Straight lengths
- E. Water distribution systems
- F. None of the Above