



Wisconsin Contractors Institute

Cross Connection Control

2 CE Hours

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Cross Connection Control

Purpose of this course

The provisions of this section set forth the requirements for the protection of water within water supply systems when and where there is the possibility of contamination due to cross connections or backflow conditions.

Note: The Department of Natural Resources governs the operation and design of community water systems and under s. [NR 811.09](#) requires the supplier of water to develop and implement a comprehensive cross connection control program.

Materials

All devices, assemblies and mechanisms intended to protect water supplies relative to cross connection or backflow shall be of a type recognized and approved in accordance with ch. [SPS 384](#) and as described in sub. (4).

All methods including barometric loops and air gaps intended to protect water supplies relative to cross connection or backflow shall be constructed of materials suitable for water supply systems in accordance with ch. [SPS 384](#)

General Requirements

Water supply systems and the connection of each plumbing fixture, piece of equipment, appliance or nonpotable water piping system shall be designed, installed and maintained in such a manner to prevent the contamination of water supplies by means of cross connections.

Types of cross connection control.

1. Water supply systems shall be protected against contamination due to cross connections or backflow conditions by one of the methods or devices specified in Table 382.41-1 depending upon the situation or Table 382.41-2 depending upon the specific application or use, and the limitations specified in sub. (4).

2. For the situations described in par. (b) 3., cross connection control shall be provided as part of the fixture fitting outlet or in the water supply piping for the fixture fitting outlet.

Exam Questions:

1. This course outlines requirements for the for the protection of water within water supply systems when and where there is the possibility of contamination due to cross connections or _____.
 - a. Unbroken networks
 - b. Backflow conditions
 - c. Continuous flow
 - d. None of the above

2. All devices, assemblies and mechanisms intended to _____ water supplies relative to cross connection or backflow shall be of a type recognized and approved in accordance with ch. [SPS 384](#) and as described in sub. (4).
 - a. Protect
 - b. Maximize
 - c. Minimize
 - d. Deteriorate
3. Water supply systems and the connection of each _____ shall be designed, installed and maintained in such a manner to prevent the contamination of water supplies by means of cross connections.
 - a. Plumbing fixture
 - b. Piece of equipment or appliance
 - c. Nonpotable water piping system
 - d. All of the above

Classifications.

For the purposes of this section:

1. The designation of a high hazard or low hazard situation shall be determined on the basis of how a toxic or nontoxic solution is intended or recommended by the manufacturer of the solution to interface with the potable water supply system.

2. a. A continuous pressure situation shall be considered to exist when a pressure greater than atmospheric within the water supply system exists for more than 12 continuous hours.

b. A noncontinuous pressure situation shall be considered to exist if the conditions in subd. 2. a. do not occur.

3. A high hazard cross connection situation shall be considered to exist for a connection of the water supply system to:

a. Any part of the drain system; and

b. Any other piping system conveying water from nonpotable sources, including but not limited to lakes, rivers, streams or creeks.

4. Except as provided in subd. 5., a high hazard cross connection situation shall be considered to exist at:

a. A water supply hose bibb, faucet, wall hydrant, sill cock or other outlet which terminates with hose threads allowing a hose to be attached;

b. A water supply faucet, wall hydrant or other outlet which terminates with a serrated nipple allowing a hose to be attached;

c. A water supply faucet, hydrant or outlet serving a sink used for building maintenance in a public building;

d. A chemical pot-feeder or automatic chemical feeder is installed to serve a boiler, cooling tower or chilled water system; and

e. In the water supply piping connecting to the outlet of a fire hydrant for any purpose other than fire suppression

5. A cross connection shall not be considered to exist at the hose threaded outlet installed for the sole purpose of:

a. Draining a water supply system or any portion thereof;

b. Obtaining water quality samples of the water supply system or any portion thereof; or

c. Connecting individual residential automatic clothes washers.

6. a. A high hazard situation shall be considered to exist for the connection of 2 water supply systems one supplied by a public water supply and the other system supplied by a private well.

b. Except as provided in subd. 7., a low hazard situation shall be considered to exist for the connection of a piping system, including but not limited to automatic fire sprinkler systems, standpipe systems, and processing purposes, which provides potable water for nonrequired potable water uses.

7. A cross connection situation shall not be considered to exist when a multipurpose piping system serves a one- or 2- family dwelling provided the sprinkler system is constructed of materials and joints suitable for water distribution systems as specified in ss. [SPS 384.30 \(4\) \(e\)](#) and [384.40](#), respectively

Exam Questions:

4. The designation of a high hazard or low hazard situation shall be determined on the basis of how a _____ or _____ solution is intended or recommended by the manufacturer of the solution to interface with the potable water supply system.

a. Concentrated, diluted

b. Soluble, insoluble

c. Toxic, nontoxic

d. Biodegradable, radioactive

5. A continuous pressure situation shall be considered to exist when a pressure greater than atmospheric within the water supply system exists for more than ____ continuous hours.

a. 8

b. 9

c. 10

d. 12

6. A _____ pressure situation shall be considered to exist if the conditions in subd. 2. a. do not occur.
 - a. Constant
 - b. High intensity
 - c. Noncontinuous
 - d. Perpetual
7. True or false? A high hazard cross connection situation shall be considered to exist for a connection of the water supply system to any part of the drain system.
 - a. True
 - b. False
8. Which of the following is a nonpotable water source:
 - a. Lakes
 - b. Rivers
 - c. Streams or creeks
 - d. All of the above
9. A high hazard cross connection situation shall be considered at which of the following:
 - a. Obtaining water quality samples of the water supply
 - b. A chemical pot-feeder or automatic chemical feeder is installed to serve a boiler
 - c. Connecting individual residential automatic clothes washers
 - d. All of the above
10. A cross connection shall not be considered to exist at the hose threaded outlet installed for the sole purpose of which of the following:
 - a. Terminating a serrated nipple allowing a hose to be attached
 - b. Building maintenance in a public building
 - c. Draining a water supply system
 - d. All of the above
11. A high hazard situation shall be considered to exist for the connection of ___ water supply systems, when one is supplied by a public water supply and the other system supplied by a private well.
 - a. 2
 - b. 3
 - c. 4
 - d. 5
12. Except as provided in subd. 7., a(n) _____ hazard situation shall be considered to exist for the connection of a piping system.
 - a. Intense
 - b. Severe
 - c. High
 - d. Low
13. A cross connection situation shall not be considered to exist when a multipurpose piping system serves a _____, provided the sprinkler system is constructed of materials and joints suitable for water distribution systems as specified.
 - a. Studio apartment

- b. One- or two- family dwelling
- c. Large office space
- d. Public building

Containment.

1. For sewerage treatment facilities which are required to conform with ch. NR 110, in addition to the cross connection control required for each potable water usage or water outlet, a reduced pressure principle backflow preventer shall be installed:

- a. In the water service to each building or structure within the complex;
- b. In the private water main upstream of all water services serving the facility; or
- c. In the water distribution system upstream of all water outlets and in the process piping network upstream of all points of use, if both a water distribution system and a process network is contained within the same building or structure.

2. For marinas, wharves and docks where potable water outlets are provided to serve boats or ships, in addition to the cross connection control required for each potable water outlet or usage, a reduced pressure principle backflow preventer shall be installed in the water supply system to limit backflow into the water supply source.

3. The installation of a cross connection control device in the water supply system for a building or structure shall not alleviate the requirement to provide cross connection control for the connection of each plumbing fixture, piece of equipment, appliance or other piping system.

Prohibitions.

The use of a toxic solution as a heat transfer fluid in single-wall heat exchanger for potable water is prohibited.

Existing automatic fire sprinkler systems.

An alteration, modification or addition to an existing automatic fire sprinkler shall necessitate conformance with this section, if the:

- 1. Existing water supply line to the existing sprinkler system is increased in diameter; or
- 2. Existing device or method which had been previously recognized to address cross connection concerns is to be removed or replaced.

Exam Questions:

- 14. For sewerage treatment facilities which are required to conform with chapter _____, in addition to the cross connection control required for each potable water usage or water outlet, a reduced pressure principle backflow preventer shall be installed in specific locations.
 - a. NR 343
 - b. NR 110

Air-gap Fittings for use with Plumbing Fixtures, Appliances, and Appurtenances (ASME A112.1.3)					X	X	X	X
Air Gaps (ASME A112.1.2)	X	X	X	X	X	X	X	X
Atmospheric Vacuum Breaker (CAN/CSA B64.1.1)						X		X
Backflow Preventers with Intermediate Atmospheric Vent (ASSE 1012)	X	X			X	X		
Barometric Loops					X	X	X	X
Dual Check Valve Type with Atmospheric Port Backflow Preventer (CAN/CSA B64.3)	X	X			X	X		
Hose Connection Backflow Preventers (ASSE 1052)	X ^a	X						
Hose Connection Vacuum Breakers (CAN/CSA B64.2 and B64.2.2)	X ^a	X						
Hose Connection Vacuum Breakers (ASSE 1011)	X ^a	X						
Pipe Applied Atmospheric Type Vacuum Breakers (ASSE 1001)						X		X
Pressure Vacuum Breaker Assembly (ASSE 1020)					X	X	X	X
Reduced Pressure Principle Backflow Preventers And Reduced Pressure Fire Protection Principle Backflow Preventers (ASSE 1013)	X	X	X	X	X	X	X	X
Reduced Pressure Principle Backflow Preventer (CAN/CSA B64.4)	X	X	X	X	X	X	X	X
Spill Resistant Vacuum Breaker (ASSE 1056 and CAN/CSA B64.1.3)					X	X	X	X
Vacuum Breaker (CAN/CSA B64.1.2)					X	X	X	X

Table 382.41-2

Acceptable Cross Connection Control Methods, Devices or Assemblies for Specific Applications

Methods or Assemblies (Standard)	Types of Application or Use
Backflow Preventer for Beverage Dispensing Machines (ASSE 1022)	Beverage dispensers
Chemical Dispensing Systems (ASSE 1055)	Chemical dispensing systems

Double Check Backflow Prevention Assemblies and Double Check Fire Protection Backflow Prevention Assemblies (ASSE 1015)	Automatic fire sprinkler systems and standpipe systems Water-based fire protection system
Double Check Detector Fire Protection Backflow Prevention Assemblies (ASSE 1048)	Automatic fire sprinkler systems and standpipe systems Water-based fire protection system
Double Check Detector Valve Type Backflow Preventer (CAN/CSA B64.5)	Automatic fire sprinkler systems and standpipe systems Water-based fire protection system
Dual Check Backflow Preventer Wall Hydrant — Freeze Resistant Type (ASSE 1053)	Hose threaded outlet connection
Hand Held Showers (ASSE 1014)	Hand held shower assemblies
Laboratory Faucet Type Vacuum Breakers (CAN/CSA B64.7)	Laboratory faucets
Laboratory Faucet Vacuum Breakers (ASSE 1035)	Laboratory faucets
Pressurized Flushing Devices (Flushometers) For Plumbing Fixtures (ASSE 1037)	Flushometer plumbing fixtures
Reduced Pressure Detector Fire Prevention Backflow Prevention Assemblies (ASSE 1047)	Automatic fire sprinkler systems
Trap Seal Primer Valves, Water Supply Fed (ASSE 1018)	Traps for drain systems
Vacuum Breaker Tees [s. SPS 382.41 (5) (j)]	Water treatment devices
Wall Hydrants, Frost Proof Automatic Draining Anti-Backflow Type (ASSE 1019), types A or B	Hose threaded outlet connections
Water Closet Flush Tank Ball Cocks (ASSE 1002)	Gravity water closet flush tanks

Exam Questions:

20. True or false? According to Table 382.41-1, air gaps are acceptable cross connection control methods for both continuous and noncontinuous high hazard backpressure.
- True
 - False
21. According to Table 382.41-1, barometric loops are acceptable cross connection control methods for which of the following:
- High hazard noncontinuous backpressure
 - Low hazard continuous backpressure
 - Low hazard continuous backsiphonage pressure
 - All of the above
22. According to Table 382.41-2, the appropriate application for trap seal primer valves is:
- Gravity water closet flush tanks
 - Hand held shower assemblies
 - Flushometer plumbing fixtures
 - Traps for drain systems

Limitations

A. Cross connection control devices shall be limited in use in accordance with the respective standard, unless otherwise specifically permitted under this subsection.

B. 1. Except for a deck-mounted device, a pipe applied atmospheric vacuum breaker shall be installed such that the bottom of the device or the critical level mark on the device is at least 6" above all of the following:

- a. The flood level rim of the receptor serving the water supply port.
- b. The highest point downstream from the device where back-pressure would be created.
- c. The highest point of an injection or aspiration port.

2. A deck-mounted pipe applied atmospheric type vacuum breaker shall be installed such that the bottom of the device or the critical level mark on the device is at least one inch above all of the following:

- a. The flood level rim of the receptor serving the water supply port.
- b. The highest point downstream from the device where back-pressure would be created.
- c. The highest point of an injection or aspiration port

C. 1. a. The use of a hose connection backflow preventer, dual check backflow preventer wall hydrant-freeze resistant or a hose connection vacuum breaker in a continuous pressure situation shall be limited to campgrounds and marinas.

b. The use of a hose connection backflow preventer and a hose connection vacuum breaker shall be limited to the discharge side of a control valve such as a faucet or hose bibb

2. A hose connection backflow preventer and a hose connection vacuum breaker may not be employed in backpressure situations of more than 10 feet of water column.

D. A backflow preventer with intermediate atmospheric vent:

- 1. May not be employed in backpressure situations of more than 150 psig; and
- 2. May not serve boilers having a maximum steam pressure setting greater than 15 psig or a maximum water pressure setting greater than 30 psig.

E. 1. A reduced pressure principle backflow preventer and a reduced pressure detector backflow preventer may not be subjected to a backpressure greater than twice the rated working pressure of the device.

2. A reduced pressure principle backflow preventer and a reduced pressure detector backflow preventer which serve a water-based fire protection system may have a test outlet located between the number 2 check valve and the number 2 listed indicating control valve.

3. A reduced pressure principle backflow preventer and a reduced pressure detector backflow preventer which are 2" or smaller in size and which serve a water-based fire

protection system are not required to have a test cock on the number one listed indicating control valve.

F. A hand-held shower may not be employed in backpressure situations of more than 5 feet of water column.

G. 1. A double check backflow prevention assembly and a double check detector assembly backflow preventer may not be subjected to a backpressure greater than twice the rated working pressure of the device

2. A double check backflow prevention assembly and a double check detector assembly backflow preventer which serve a water-based fire protection system may have a test outlet located between the number 2 check valve and the number 2 listed indicating control valve.

3. A double check backflow prevention assembly and a double check detector assembly backflow preventer which are 2" or smaller in size and which serve a water-based fire protection system are not required to have a test cock on the number one listed indicating control valve.

H. A water supply fed trap seal primer valve shall be installed such that the bottom of the device or the critical level as marked on the device is at least 12" above:

1. The connection to the trap; and
2. The highest point downstream from the device where back-pressure would be created.

I. A vacuum breaker wall hydrant, freeze resistant automatic draining type or a freeze resistant sanitary yard hydrant, may not be employed in backpressure situations of more than 10 feet of water column.

K. 1. A pressure type vacuum breaker assembly shall be installed such that the bottom of the device or the critical level mark on the device is at least 12" above all of the following:

- a. The flood level rim of the receptor serving the water supply port.
- b. The highest point downstream from the device where back-pressure would be created.

c. The highest point of an injection or aspiration port.

2. A pressure vacuum breaker assembly shall be located only outside.

L. A laboratory faucet backflow preventer may not be employed in backpressure situations of more than 6 feet of water column.

M. The cross connection control device to serve a hose bibb or hydrant that penetrates an exterior wall of a heated structure may not prevent a hose bibb or hydrant from being freeze resistant automatic draining as required under s. [SPS 382.40 \(8\) \(a\)](#).

N. A spill resistant vacuum breaker shall be installed so that the bottom of the device or the critical level mark on the device is at least 12" above all of the following:

1. The flood level rim of the receptor serving the water supply port.
2. The highest point downstream from the device where back pressure would be created.
3. The highest point of an injection or aspiration port.

Exam Questions:

23. Except for a deck-mounted device, a pipe applied atmospheric vacuum breaker shall be installed such that the bottom of the device or the critical level mark on the device is at least ___ inches above all specific points.
 - a. 6
 - b. 8
 - c. 10
 - d. 12
24. Except for a deck-mounted device, a pipe applied atmospheric vacuum breaker shall be installed such that the bottom of the device or the critical level mark on the device must be a certain height above which of the following:
 - a. The flood level rim of the receptor serving the water supply port
 - b. The highest point downstream from the device where backpressure would be created
 - c. The highest point of an injection or aspiration port
 - d. All of the above
25. The use of a hose connection backflow preventer, dual check backflow preventer wall hydrant-freeze resistant, or a hose connection vacuum breaker in a continuous pressure situation shall be limited to:
 - a. Offices and institutions
 - b. Campground and marinas
 - c. Schools and hospitals
 - d. Multi-family dwellings
26. The use of a hose connection backflow preventer and a hose connection vacuum breaker shall be limited to the _____ side of a control valve.
 - a. Supply
 - b. Packing
 - c. Discharge
 - d. Actuator
27. A backflow preventer with intermediate atmospheric vent may not be employed in backpressure situations of more than ___ psig.

- a. 30
 - b. 50
 - c. 100
 - d. 150
28. A backflow preventer with intermediate atmospheric vent may not serve boilers having a maximum steam pressure setting greater than ___ psig or a maximum water pressure setting greater than ___ psig.
- a. 10, 15
 - b. 15, 30
 - c. 30, 45
 - d. 45, 60
29. A reduced pressure principle backflow preventer and a reduced pressure detector backflow preventer may not be subjected to a backpressure greater than _____ the rated working pressure of the device.
- a. Half
 - b. Twice
 - c. Thrice
 - d. None of the above
30. A reduced pressure principle backflow preventer and a reduced pressure detector backflow preventer which serve a water-based fire protection system may have a test outlet located between the number ___ check valve and the number ___ listed indicating control valve.
- a. 1, 3
 - b. 2, 2
 - c. 3, 3
 - d. 4, 2
31. A reduced pressure principle backflow preventer and a reduced pressure detector backflow preventer which are ___ inches or smaller in size and which serve a water-based fire protection system are not required to have a test cock on the number one listed indicating control valve.
- a. 2
 - b. 3
 - c. 4
 - d. 5
32. A water supply fed trap seal primer valve shall be installed such that the bottom of the device or the critical level as marked on the device is at least ___ inches above specified points.
- a. 12
 - b. 14
 - c. 16
 - d. 18
33. A water supply fed trap seal primer valve shall be installed such that the bottom of the device or the critical level as marked on the device is at least a certain amount of inches

above the _____ point downstream from the device where backpressure would be created.

- a. Final
 - b. Lowest
 - c. Highest
 - d. Bottom
34. A vacuum breaker wall hydrant, freeze resistant automatic draining type or a freeze resistant sanitary yard hydrant, may not be employed in backpressure situations of more than ___ feet of water column.
- a. 10
 - b. 12
 - c. 14
 - d. 16
35. A pressure type vacuum breaker assembly shall be installed such that the bottom of the device or the critical level mark on the device is at least 12 inches above which of the following:
- a. The flood level rim of the receptor serving the water supply port
 - b. The highest point downstream from the device where backpressure would be created
 - c. The highest point of an injection or aspiration port
 - d. All of the above
36. True or false? A pressure vacuum breaker assembly shall be located only outside.
- a. True
 - b. False
37. A laboratory faucet backflow preventer may not be employed in backpressure situations of more than ___ feet of water column.
- a. 3
 - b. 4
 - c. 5
 - d. 6
38. The cross connection control device to serve a hose bibb or hydrant that penetrates an exterior wall of a _____ structure may not prevent a hose bibb or hydrant from being freeze resistant automatic draining.
- a. Pressurized
 - b. Heated
 - c. Cooled
 - d. Ventilated
39. A spill resistant vacuum breaker shall be installed so that the bottom of the device or the critical level mark on the device is at least 12 inches above which of the following:
- a. The flood level rim of the receptor serving the water supply port
 - b. The highest point downstream from the device where back pressure would be created
 - c. The highest point of an injection or aspiration port

- d. All of the above

Installation

A. An air gap for cross connection control shall conform to ASME A112.1.2

B. Cross connection control methods, devices and assemblies shall be installed in accordance with the manufacturer's written installation specifications and this chapter. The methods, devices and assemblies shall be accessible for inspection, testing, maintenance and replacement

C. Cross connection control devices shall be protected from freezing.

D. 1. A cross connection control device may not be located in uninhabitable spaces susceptible to flooding.

2. A cross connection control device which has one or more vent ports may not be located in a pit, vault or depression which is below the adjacent grade or floor level, even if the pit, vault or depression is provided with a drain at the bottom of the pit.

E. 1. Vent ports of cross connection control devices shall be positioned:

- a. Away from areas where toxic gases and fumes may accumulate;
- b. Downward or protected to protect the ports from falling debris; and
- c. So as to drain dry.

2. Cross connection control devices or assemblies shall be so located that any vent ports are provided with an air gap so as to comply with s. [SPS 382.33](#) or ASME A112.1.3.

3. a. If a reduced pressure principle backflow preventer or a reduced pressure detector backflow preventer is located within a building, a drain or receptor shall be provided to receive the discharge from the vent ports of the device. If a floor drain is to receive the discharge from the vent ports of a reduced pressure principle backflow preventer or a reduced pressure detector backflow preventer, the flow or pathway of the discharge may not create a nuisance.

b. Where drain piping is provided for the discharge from a vent port, an air gap in accordance with par. (a) shall be provided between the vent port and the drain piping.

c. Where a receptor is provided for the discharge from a vent port, an air gap in accordance with par. (a) shall be provided between the vent port and the receptor.

F. The installation of a reduced pressure principle backflow preventer, a reduced pressure fire protection principle backflow preventer, a reduced pressure detector backflow preventer, a reduced pressure detector fire protection backflow prevention assembly, a double check backflow prevention assembly, a double check detector assembly backflow preventer, a

pressure vacuum breaker assembly and a spill resistant vacuum beaker shall conform to all of the following limitations:

1. The minimum distance between the floor, surface or platform which is to provide access and the lowest point of the assembly may not be less than 12”.

2. The maximum distance between the floor, surface or platform which is to provide access and the lowest point of the assembly may not be more than 7 feet.

3. The minimum distance between a ceiling or other obstruction and the highest point of the assembly may not be less than 18”.

4. The minimum distance between a wall or other obstruction and the back and ends of the assembly may not be less than 4”.

5. The minimum distance between a wall or other obstruction and the front of the assembly may not be less than 24”.

G. The discharge outlet of local waste piping serving a cross connection control device shall be visible and not be located within a concealed space.

H. No control valve may be placed downstream from a pipe applied atmospheric type vacuum breaker or a laboratory faucet backflow preventer.

I. A barometric loop to provide cross connection control for backsiphonage shall be formed by creating a loop in the potable water supply piping upstream to the source of cross connection.

1. The loop shall extend at least 35 feet above:

a. The highest point downstream from the loop where backpressure would be created; and

b. The point of discharge.

2. No outlets for potable water use shall be installed downstream of the peak of the loop.

J. Vacuum breaker tees shall be assembled such that:

1. The bottom of the horizontal portion of the tee is installed at least one inch above the flood level rim of the receptor;

2. The inside diameter of the tee is equal to or greater than the inside diameter of the drain piping from the water treatment device;

3. The tee is installed in such a position that the discharge will not create a nuisance;

4. The piping upstream of the tee is of a type suitable for water distribution in accordance with s. [SPS 384.30 \(4\) \(e\)](#)

5. The vent portion of the tee is equal to or greater than the inside diameter of the drain piping from the water treatment device; and
6. The vent port of the tee is:
 - a. Positioned away from areas where toxic gases and fumes may accumulate; and
 - b. Constructed to protect the port from falling debris.

K. A chemical dispensing system shall be connected to the water distribution system in either of the following manners:

1. The fixture supply shall be individually connected to the water distribution system.
2. The fixture supply shall be installed with a pressure bleed- ing device. The pressure bleeding device shall create a visually free flow of water through the atmosphere from the faucet connection into the fixture drain.

Exam Questions:

40. An air gap for cross connection control shall conform to ASME _____.
 - a. A342.5.1
 - b. A231.2.6
 - c. A112.1.2
 - d. A213.2.1
41. True or false? Cross connection control devices do not need to be protected from freezing.
 - a. True
 - b. False
42. A cross connection control device may not be located in _____ spaces susceptible to flooding.
 - a. Populated
 - b. Residential
 - c. Inhabitable
 - d. Uninhabitable
43. True or false? When a pit, vault or depression is provided with a drain at the bottom of the pit, a cross connection control device which has one or more vent ports may be located in the aforementioned locations.
 - a. True
 - b. False
44. Vent ports of cross connection control devices shall be positioned:
 - a. Away from areas where toxic gases and fumes may accumulate
 - b. Downward or protected to protect the ports from falling debris
 - c. So as to drain dry

- d. All of the above
45. Cross connection control devices or assemblies shall be so located that any _____ are provided with an air gap so as to comply with s. [SPS 382.33](#) or ASME A112.1.3.
- a. Vent ports
 - b. Drains
 - c. Control devices
 - d. Pits
46. True or false? If a reduced pressure principle backflow preventer or a reduced pressure detector backflow preventer is located within a building, a drain or receptor shall be provided to receive the discharge from the vent ports of the device.
- a. True
 - b. False
47. If a floor drain is to receive the discharge from the vent ports of a(n) _____ pressure principle backflow preventer or a reduced pressure detector backflow preventer, the flow or pathway of the discharge may not create a nuisance.
- a. Increased
 - b. Augmented
 - c. Reduced
 - d. Amplified
48. Where drain piping is provided for the discharge from a vent port, an air gap in accordance with par. (a) shall be provided between the vent port and the:
- a. Receptor
 - b. Drain piping
 - c. Pressure detector
 - d. Backflow preventer
49. Where a receptor is provided for the discharge from a vent port, an air gap in accordance with par. (a) shall be provided between the vent port and the:
- a. Receptor
 - b. Drain piping
 - c. Pressure detector
 - d. Backflow preventer

Questions 50-54 pertain to the installation of the following: a reduced pressure principle backflow preventer, a reduced pressure fire protection principle backflow preventer, a reduced pressure detector backflow preventer, a reduced pressure detector fire protection backflow prevention assembly, a double check backflow prevention assembly, a double check detector assembly backflow preventer, a pressure vacuum breaker assembly and a spill resistant vacuum beaker.

50. The minimum distance between the floor, surface or platform which is to provide access and the lowest point of the assembly may not be less than ____ inches.
- a. 8
 - b. 9
 - c. 10

- d. 12
51. The maximum distance between the floor, surface or platform which is to provide access and the lowest point of the assembly may not be more than ___ feet.
- a. 4
 - b. 5
 - c. 6
 - d. 7
52. The minimum distance between a ceiling or other obstruction and the highest point of the assembly may not be less than ___ inches.
- a. 18
 - b. 20
 - c. 22
 - d. 24
53. The minimum distance between a wall or other obstruction and the back and ends of the assembly may not be less than ___ inches.
- a. 4
 - b. 5
 - c. 6
 - d. 10
54. The minimum distance between a wall or other obstruction and the front of the assembly may not be less than ___ inches.
- a. 24
 - b. 26
 - c. 28
 - d. 30
55. True or false? The discharge outlet of local waste piping serving a cross connection control device shall be visible and be located within a concealed space.
- a. True
 - b. False
56. No control valve may be placed _____ from a pipe applied atmospheric type vacuum breaker or a laboratory faucet backflow preventer.
- a. 10 feet
 - b. 20 feet
 - c. Downstream
 - d. Upstream
57. A barometric loop to provide cross connection control for _____ shall be formed by creating a loop in the potable water supply piping upstream to the source of cross connection.
- a. Condensate return
 - b. Steam holding
 - c. Back pressure
 - d. Backsiphonage

58. The barometric loop shall extend at least ____ feet above the highest point downstream from the loop where backpressure would be created and the point of discharge.
- 35
 - 40
 - 45
 - 50
59. True or false? No outlets for potable water use shall be installed downstream of the peak of the loop.
- True
 - False
60. Vacuum breaker tees shall be assembled such that the bottom of the horizontal portion of the tee is installed at least ____ inch(es) above the flood level rim of the receptor.
- 1
 - 1½
 - 2
 - 2½