RECIRCULATING SAND FILTER SYSTEM COMPONENT QUIZ (PART 1)

6 Hours of CEU credits for the following credentials: **Fee $55.00**

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1. Print these pages.
2. Circle the correct answers and transfer to the answer sheet on the last page.
3. Page down to the last page for the verification forms and mailing instructions.
4. Download Manual-Click Here

INFLUENT FLOWS AND LOADS
Table 1

1. The design wastewater flow (DWF) from one and two-family dwellings must be?
   A. ≤ 2250 gal/per day
   B. ≤ 150 gal/day/bedroom
   C. = Design wastewater flow (DWF)
   D. 150% of estimated wastewater flow in accordance with Table 4 of this manual or s. Comm 83.43 (6), Wis. Adm. Code
2. The design wastewater flow (DWF) from primary treatment tanks must be?
   A. ≤ 2250 gal/per day
   B. ≤ 150 gal/day/bedroom
   C. = Design wastewater flow (DWF)
   D. 150% of estimated wastewater flow in accordance with Table 4 of this manual or s. Comm 83.43 (6), Wis. Adm. Code
3. The design wastewater flow (DWF) from public facilities must be?
   A. ≤ 2250 gal/per day
   B. ≤ 150 gal/day/bedroom
   C. = Design wastewater flow (DWF)
   D. ≥150% of estimated wastewater flow in accordance with Table 4 of this manual or s. Comm 83.43 (6), Wis. Adm. Code
4. The Forward flow must be?
   A. ≤ 2250 gal/per day
   B. ≤ 150 gal/day/bedroom
   C. = Design wastewater flow (DWF)
   D. ≥150% of estimated wastewater flow in accordance with Table 4 of this manual or s. Comm 83.43 (6), Wis. Adm. Code
5. Distribution cell area per orifice size for a sand filter media tank must be?
   A. ≤ 2250 gal/per day
   B. ≤ 4 ft²
   C. ≥ 4 ft²
   D. ≤6 ft²

6. Design loading rate (DLR) for a sand filter media tank must be?
   A. ≤ 5 gpd/ft2 based on forward flow
   B. ≤ 4 ft²
   C. ≥ 5 gpd/ft2 based on forward flow
   D. ≤6 ft²

Table 2 SIZE

7. Surge volume in recirculation tank or chamber must be?
   A. ≥ Depth as required by pump manufacturer
   B. ≥ 2.2 x DWF
   C. ≥ 2/3 DWF
   D. ≥ DWF ÷ 2
8. Reserve volume in recirculation tank or chamber must be?
   A. ≥ Depth as required by pump manufacturer
   B. ≥ 2.2 x DWF
   C. ≥ 2/3 DWF
   D. ≥ DWF ÷ 2
9. Recirculation tank capacity must be?
   A. ≥ Depth as required by pump manufacturer
   B. ≥ 2.2 x DWF
   C. ≥ 2/3 DWF
   D. ≥ DWF ÷ 2
10. Pump protection volume capacity in recirculation tank or chamber
   A. ≥ Depth as required by pump manufacturer
   B. ≥ 2.2 x DWF
   C. ≥ 2/3 DWF
   D. ≥ DWF ÷ 2
11. Orifice spacing along lateral for a sand filter media tank must be?
   A. ≥ 37 inches
   B. ≥ DWF ÷ DLR
   C. ≤ 24 inches
   D. ½ of spacing between laterals or 12 inches, whichever is less
12. Total distribution cell area for a sand filter media tank must be?
   A. ≥ 37 inches
   B. ≥ DWF ÷ DLR
   C. ≤ 24 inches
   D. ½ of spacing between laterals or 12 inches, whichever is less
13. Depth of filter tank for a sand filter media tank must be?
   A. ≥ 37 inches
   B. ≥ DWF ÷ DLR
   C. ≤ 24 inches
   D. ½ of spacing between laterals or 12 inches, whichever is less
14. Spacing between laterals for a sand filter media tank must be?
   A. ≥ 37 inches
   B. ≥ DWF ÷ DLR
   C. ≤ 24 inches
   D. ½ of spacing between laterals or 12 inches, whichever is less

Table 3 OTHER SPECIFICATIONS

15. Depth of stone aggregate over effluent distribution network must be?
    A. ≥ 3 inches
    B. ≥ 24 inches
    C. ≥ 2 inches
    D. ≥ 2 to ≤ 6 inches
    E. ≥ 6 inches
16. Depth of filter media must be?
    A. ≥ 3 inches
    B. ≥ 24 inches
    C. ≥ 2 inches
    D. ≥ 2 to ≤ 6 inches
    E. ≥ 6 inches
17. Depth of stone aggregate under a effluent distribution network must be?
    A. ≥ 3 inches
    B. ≥ 24 inches
    C. ≥ 2 inches
    D. ≥ 2 to ≤ 6 inches
    E. ≥ 6 inches
18. Depth of pea gravel over underdrain pipe must be?
    A. ≥ 3 inches
    B. ≥ 24 inches
    C. ≥ 2 inches
    D. ≥ 2 to ≤ 6 inches
    E. ≥ 6 inches
19. Depth of stone aggregate for underdrain effluent collection must be?
    A. ≥ 3 inches
    B. ≥ 24 inches
    C. ≥ 2 inches
    D. ≥ 2 to ≤ 6 inches
    E. ≥ 6 inches
20. Stone aggregate sieve specifications must be?
    A. ≥ Two 4 inch pipes extending from the filter media aggregate interface to finished grade
    B. Located at a distance equal to approximately 1/6 the distribution cell length from each end along the center of the filter's width
    C. ≥ 5 feet
    D. ≤ 10%
    E. ≤ 15%
    F. Aggregate Maximum/minimum Gradation (ASTM Standard C33, Size 4, coarse aggregate)
21. Difference in flow between any two orifices in the effluent distribution network would be?
    A. ≥ Two 4 inch pipes extending from the filter media aggregate interface to finished grade
    B. Located at a distance equal to approximately 1/6 the distribution cell length from each end along the center of the filter's width
    C. ≥ 5 feet

D. ≤ 10%
E. ≤ 15%
F. Aggregate Maximum/minimum Gradation (ASTM Standard C33, Size 4, coarse aggregate)

22. Difference in flow between any two orifices in a single lateral
A. ≥ Two 4 inch pipes extending from the filter media aggregate interface to finished grade
B. Located at a distance equal to approximately 1/6 the distribution cell length from each end along the center of the filter's width
C. ≥ 5 feet
D. ≤ 10%
E. ≤ 15%
F. Aggregate Maximum/minimum Gradation (ASTM Standard C33, Size 4, coarse aggregate)

23. Head pressure on orifice must be?
A. ≥ Two 4 inch pipes extending from the filter media aggregate interface to finished grade
B. Located at a distance equal to approximately 1/6 the distribution cell length from each end along the center of the filter's width
C. ≥ 5 feet
D. ≤ 10%
E. ≤ 15%
F. Aggregate Maximum/minimum Gradation (ASTM Standard C33, Size 4, coarse aggregate)

24. Location of observation pipes must be?
A. ≥ Two 4 inch pipes extending from the filter media aggregate interface to finished grade
B. Located at a distance equal to approximately 1/6 the distribution cell length from each end along the center of the filter's width
C. ≥ 5 feet
D. ≤ 10%
E. ≤ 15%
F. Aggregate Maximum/minimum Gradation (ASTM Standard C33, Size 4, coarse aggregate)

25. Number of observation pipes must be?
A. ≥ Two 4 inch pipes extending from the filter media aggregate interface to finished grade
B. Located at a distance equal to approximately 1/6 the distribution cell length from each end along the center of the filter's width
C. ≥ 5 feet
D. ≤ 10%
E. ≤ 15%
F. Aggregate Maximum/minimum Gradation (ASTM Standard C33, Size 4, coarse aggregate)

DEFINITIONS

26. Defines a valve that opens to allow effluent from the filter media to be discharged totally to the recirculation tank during low or no wastewater flow conditions.
A. By-pass valve
B. By-pass zone
C. Infiltrative surface
D. Recirculation rate
E. Recirculating sand filter system
F. Recirculation tank

27. Defines a volume of liquid in a recirculation tank that is designed to provide the filter with sufficient liquid to keep the filter active when the recirculation tank is receiving little or no flow from a facility.
    A. By-pass valve
    B. By-pass zone
    C. Infiltrative surface
    D. Recirculation rate
    E. Recirculating sand filter system
    F. Recirculation tank
28. Defines a top layer of media that receives effluent from a distribution network.
    A. By-pass valve
    B. By-pass zone
    C. Infiltrative surface
    D. Recirculation rate
    E. Recirculating sand filter system
    F. Recirculation tank
29. Defines the portion of the wastewater effluent that is delivered back into the system compared to the wastewater effluent that is not delivered back into the system.
    A. By-pass valve
    B. By-pass zone
    C. Infiltrative surface
    D. Recirculation rate
    E. Recirculating sand filter system
    F. Recirculation tank
30. Defines an onsite wastewater treatment component, which contains a recirculation tank and an effluent filtering component which treats wastewater bypassing it through the system more than once.
    A. By-pass valve
    B. By-pass zone
    C. Infiltrative surface
    D. Recirculation rate
    E. Recirculating sand filter system
    F. Recirculation tank
31. Defines the tank which receives effluent from a septic treatment tank and sand filter and doses the sand filter.
    A. By-pass valve
    B. By-pass zone
    C. Infiltrative surface
    D. Recirculation rate
    E. Recirculating sand filter system
    F. Recirculation tank

III. DESCRIPTION AND PRINCIPLE OF OPERATION

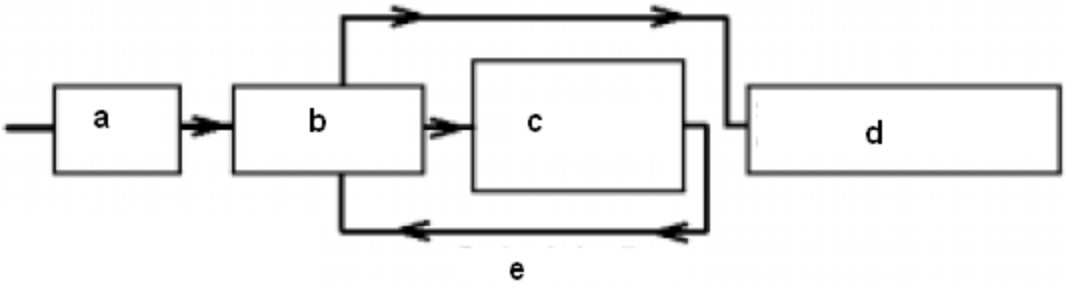
32. POWTS recirculating sand filter system component operation consists of a recirculation tank or chamber and a fixed film aeration process unit in which wastewater passes through a porous media.
    A. true
    B. false
33. Oxygen diffuses into the thin film of vapor as air passes through the media by convection due to temperature differences.

A. true
B. false

34. The filter is of such coarse material, that orifices may only cover forty square feet of surface area.
A. true
B. false

35. Physical entrapment, increased retention time, and conversion of pollutants in the wastewater are important treatment objectives accomplished under unsaturated conditions.
A. true
B. false

Figure 1 indicates the flow path of a recirculating sand filter system.
Use diagram for questions 36-40



36. Letter 'a' represents _____

37. Letter 'b' represents _____

38. Letter 'c' represents _____

39. Letter 'd' represents _____

40. Letter 'e' represents soil _____

IV DESIGN

41. Recirculating Sand Filter System Component Design – Detailed plans and specifications must be developed, reviewed and approved by the governing unit having authority over the plan for the installation. A Sanitary Permit must also be obtained from the department or governmental unit having jurisdiction.
A. true
B. false

42. Design of the recirculating sand filter system component is based on the estimated wastewater flow. It must be sized such that it can accept the daily wastewater flow at a rate that will provide treatment.
A. true
B. false

43. One and two-family dwellings. The infiltrative surface size for one and two-family dwelling application is determined by calculating the designed wastewater flow (DWF).

A. true
B. false

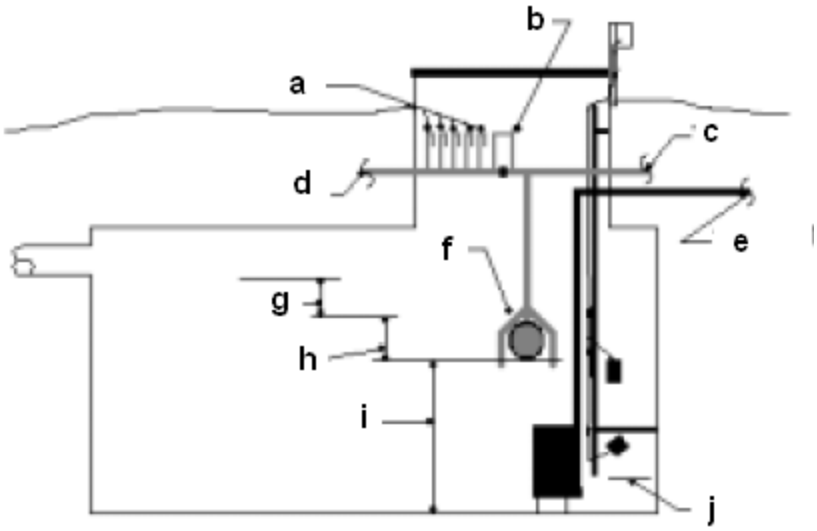
Step B. Design of the Recirculation Tank or Chamber

44. This section determines the required liquid capacity and depth of the recirculation tank or chamber as well as the operation elevation of the by-pass valve, high water alarm and low level emergency pump cut off.

A. true
B. false

Figure 2 – Cross section of recirculation tank

Use for questions 45-54



45. Letter ‘a’ represents _____

46. Letter ‘b’ represents _____

47. Letter ‘c’ represents _____

48. Letter ‘d’ represents _____

49. Letter ‘e’ represents _____

50. Letter ‘f’ represents _____

51. Letter ‘g’ represents _____

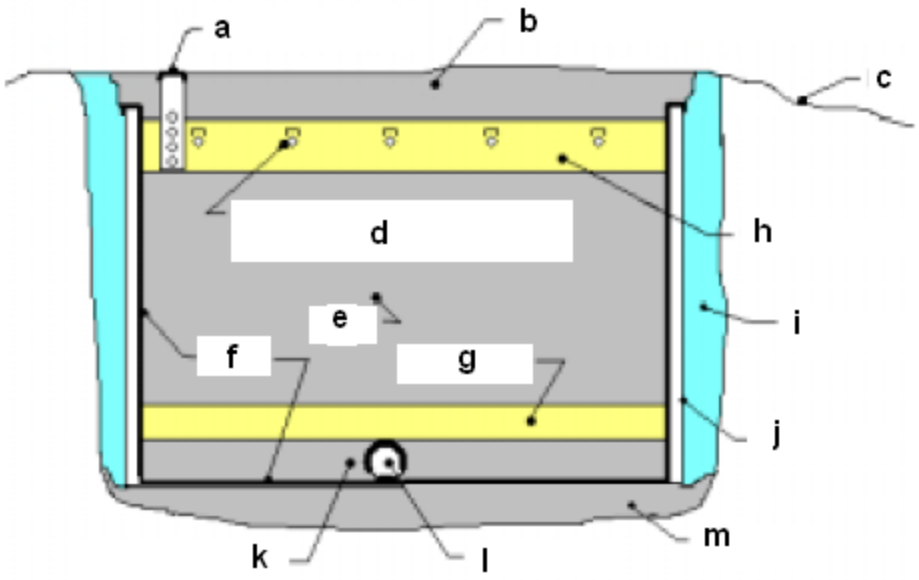
52. Letter ‘h’ represents _____

53. Letter ‘i’ represents _____

54. Letter 'j' represents _____

55. Minimum liquid capacity of recirculation tank or chamber = 2.2 x DWF
    A. true
    B. false
56. Gallons per inch of tank or chamber = capacity in gallons × liquid depth in inches.
    A. true
    B. false
57. The volume of a single dose is determined by multiplying the 2/3 of the DWF by the recirculation rate then dividing by the number of doses per day. Number of doses per week must between 24 and 48.
    A. true
    B. false
58. Reserve zone capacity = DWF × 2
    A. true
    B. false
59. Elevation at which the by-pass valve opens = Elevation required in the tank to hold a volume of liquid equal to the DWF
    A. true
    B. false
60. The minimum elevation of the inlet invert is determined by dividing the sum of the required volumes of the by-pass valve zone, surge zone, and reserve zones by the gallons per inch value of the tank.
    A. true
    B. false

Step C. Design of the Recirculating Sand Filter Component
Fig. 3 – Formed sand filter
Use diagram for question 61-73



61. Letter ‘a’ represents _____

62. Letter ‘b’ represents _____

63. Letter ‘c’ represents _____

64. Letter ‘d’ represents _____

65. Letter ‘e’ represents _____

66. Letter ‘f’ represents _____

67. Letter ‘g’ represents _____

68. Letter ‘h’ represents _____

69. Letter ‘i’ represents _____

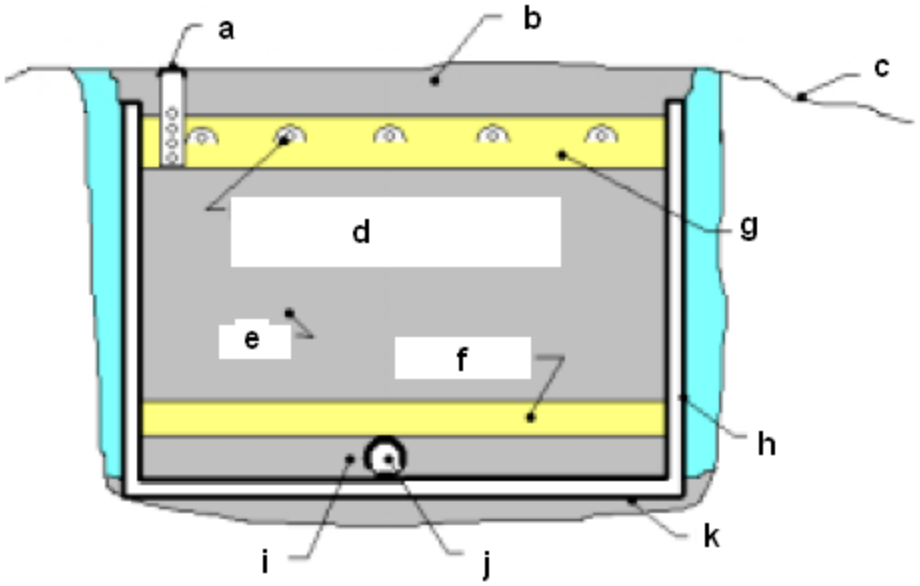
70. Letter ‘j’ represents _____

71. Letter ‘k’ represents _____

72. Letter ‘l’ represents _____

73. Letter ‘m’ represents _____

Fig. 4 – Sand filter in a tank
Use diagram for question 74-77



74. Letter ‘a’ represents _____

75. Letter ‘b’ represents _____

76. Letter ‘c’ represents _____

77. Letter ‘d’ represents _____

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