RECIRCULATING SAND FILTER SYSTEM COMPONENT QUIZ (PART 2)

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

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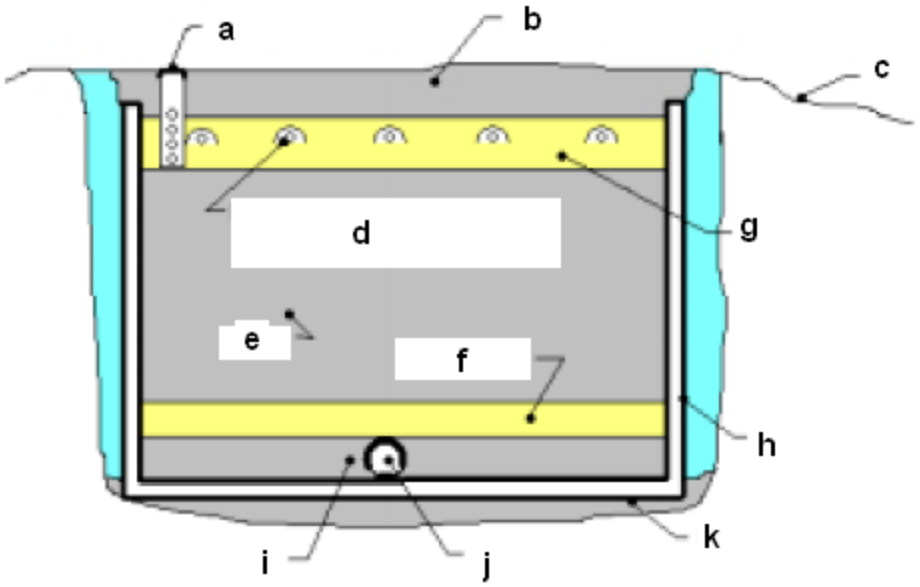
1. Print these pages.
2. Circle the correct answers and transfer to the answer sheet on the last page.
3. Page down to the last page for the verification forms and mailing instructions.
4. Download Manual-Click Here

Fig. 4 – Sand filter in a tank
Use diagram for question 78-84



78. Letter 'e' represents_____

79. Letter 'f' represents _____

80. Letter 'g' represents_____

81. Letter 'h' represents_____

82. Letter 'i' represents_____

83. Letter 'j' represents _____

84. Letter 'k' represents _____

85. The minimum distribution cell area is calculated by dividing the design wastewater flow by a design loading rate of 5gpd/ft2.

A. true
B. false

86. The sand filter container is a watertight closed top vessel.

A. true
B. false

87. A 4" underdrain pipe with slots or holes is placed on the bottom of the container to collect the filtered effluent. Installation orientation of the slots or holes must be on the bottom of the underdrain pipe. The collection pipe extends outside the sand filter container to the recirculation tank.

A. true
B. false

88. A layer of stone aggregate meeting the specifications listed in Table 1 is placed in the bottom of the tank to a depth of at least equal to the bottom of the collection pipe. The stone aggregate provides a means for the filtered effluent to flow to the collection pipe.

A. true
B. false

89. A layer of pea gravel meeting the specifications listed in Table 3 is placed over the effluent collection stone aggregate and filtered effluent collection pipe to a depth of at least three inches. The pea gravel acts a barrier so the filter media does not migrate into the collection stone aggregate and pipe.

A. true
B. false

90. A three-foot layer of sand media meeting the specifications listed in Table 1 is placed on top of the pea gravel to provide filtration and treatment of the effluent. The top of the filter media is leveled.

A. true
B. false

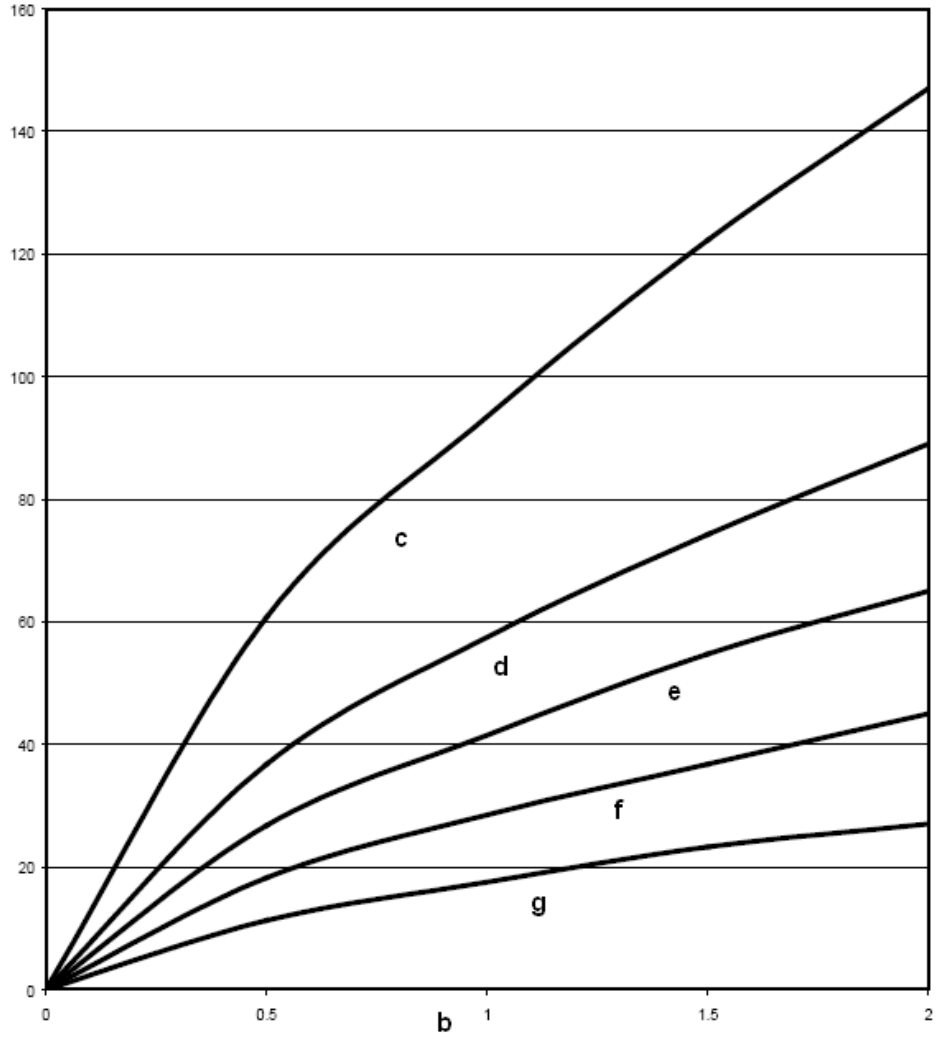
91. The distribution network spreads the septic tank effluent as uniformly as possible over the sand filter surface. The network consists of a manifold and laterals. Typical design consists of:

A. Orifices - orifices shall be located upward with orifice shields or a half pipe protecting the orifices from becoming blocked by aggregate.
B. Laterals – laterals are spaced two feet apart, with an upturned long sweep elbow and valve for clean out. The lateral length can not exceed that indicated in Graph 1 for various diameters. Laterals are sloped back in order to provide drainage of the lateral between doses.
C. Manifold – manifolds slope back to provide drainage of the manifold between doses. The manifold is sized using Table 5.
D. all of the above.

92. The distribution network spreads the septic tank effluent as uniformly as possible over the sand filter surface. The network consists of a manifold and laterals. Typical design consists of:

A. Force main – Force mains slope back to provide drainage of the force main between doses. The force main is sized using Table 6.
B. Recirculation tank pump - the pump is sized to meet flow rate and lateral pressure of at least five feet at distal end.
C. both A & B
D. A only
E. B only

Graph 1
Minimum Lateral Diameter Based on Orifice Spacing for 1/8" Diameter Orifices
Use below diagram for question 93-98



93. Letter ‘a’ represents _____

94. Letter ‘b’ represents _____

95. Letter ‘c’ represents _____

96. Letter ‘d’ represents _____

96. Letter ‘e’ represents _____

97. Letter ‘f’ represents _____

98. Letter ‘g’ represents _____

Table 5
Maximum Manifold Length Based on Individual Lateral Flow Rates
Use below diagram for questions 99-106

Table 5 Maximum Manifold Length Based on Individual Lateral Flow Rates and h					
a		d	e	f	g
b	c	Diameter Manifold	Diameter Manifold	Diameter Manifold	Diameter Manifold
10	5	6 ft	8 ft	12 ft	18 ft
20	10	4 ft	6 ft	8 ft	14 ft
30	15	2 ft	4 ft	6 ft	12 ft
40	20	2 ft	2 ft	6 ft	10 ft
50	25	NP[a]	2 ft	4 ft	8 ft
60	30	NP	2 ft	4 ft	8 ft
70	35	NP	NP	2 ft	6 ft
80	40	NP	NP	2 ft	6 ft
90	45	NP	NP	2 ft	6 ft
100	50	NP	NP	2 ft	4 ft

99. Letter ‘a’ represents _____

100. Letter ‘b’ represents _____

101. Letter ‘c’ represents _____

102. Letter‘d’ represents _____

103. Letter ‘e’ represents _____

104. Letter ‘f’ represents _____

105. Letter ‘g’ represents _____

106. Letter ‘h’ represents_____

Table 6
Friction Loss (foot/100 feet) in Plastic Pipe
Use below diagram for questions 107-113

Table 6
Friction Loss (foot/ a feet) in Plastic Pipe[a]

g	f				
c	e	1-1/2"	2"	3"	4"
10	2.50				
11	2.99				
12	3.51				
13	4.07				
14	4.66	1.92			
15	5.30	2.18			
16	5.97	2.46			
17	6.68	2.75			
18	7.42	3.06			
19	8.21	3.38			
20	9.02	3.72			
25	13.63	5.62	1.39		
30	19.10	7.87	1.94		
35	25.41	10.46	2.58		
40	32.53	13.40	3.30		
45	40.45	16.66	4.11		
50	49.15	20.24	4.99		
60		28.36	7.00	0.97	
70		37.72	9.31	1.29	
80	Velocities in this area exceed d ft		11.91	1.66	
90	per second, which are not acceptable		14.81	2.06	
100	velocity for this pipe diameter		18.00	2.50	0.62

Velocities in this area are below b feet per second

Note a: Table is based on Hazen – Williams formula: $h = 0.002082L \times (100/C)^{1.85} \times (gpm^{1.85} \div d^{4.8655})$
Where: h = Feet of head L = Length in feet
C = Friction factor from Hazen – Williams (145 for plastic pipe)
gpm = gallons per minute d = Nominal pipe size

107. Letter 'a' represents _____

108. Letter 'b' represents _____

109. Letter 'c' represents _____

110. Letter'd' represents _____

111. Letter 'e' represents _____

112. Letter 'f' represents _____

113. Letter 'g' represents _____

114. At least ____ observation pipes are placed extending from the top of the filter media/stone aggregate interface to finish grade to monitor for ponding and/or formation of a clogging mat.

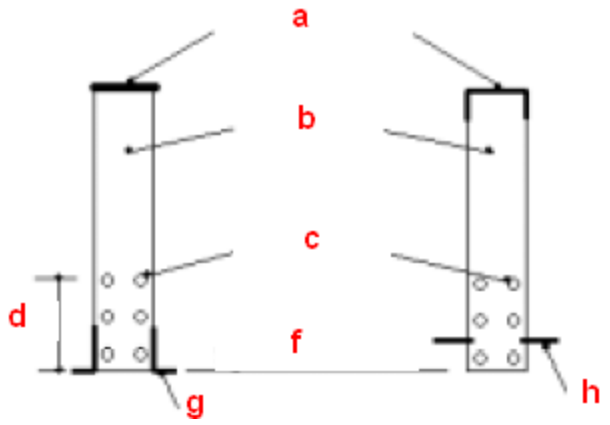
A. 1
B. 2
C. 3
D. 4

115. The pipes must be secured and have perforations in the bottom ____ inches.

A. 1
B. 2
C. 3

D. 4

Fig. 5 – Observation pipes
Use diagram below for question 116-123



116. Letter ‘a’ represents _____

117. Letter ‘b’ represents _____

118. Letter ‘c’ represents _____

119. Letter‘d’ represents _____

120. Letter ‘f’ represents _____

121. Letter ‘g’ represents _____

122. Letter ‘h’ represents _____

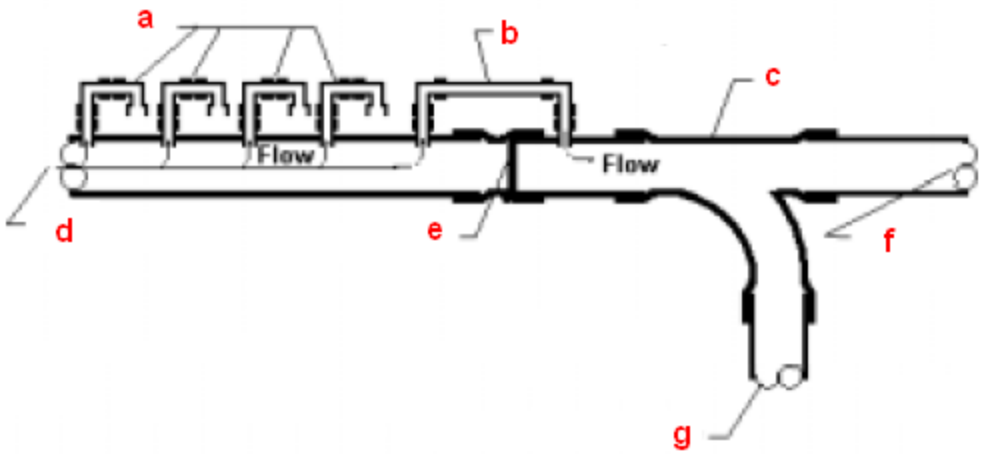
123. The sand filter effluent drains by gravity through the recirculation tank. The filtered effluent drain pipe is installed with a means of diverting 55 to 65% of the effluent to the recirculation tank and with a low liquid level by-pass valve to divert all of the effluent into the recirculation tank during low or no flow conditions.

A. true
B. false

124. The filtered effluent drain pipe diverts 55 to 65% of the effluent into the recirculation tank by the use of a special flow splitter fitting.

A. true
B. false

Fig. 6 – Flow splitter fitting using pipe fittings
Use below diagram for questions 125-



125. Letter 'a' represents _____

126. Letter 'b' represents _____

127. Letter 'c' represents _____

128. Letter 'd' represents _____

129. Letter 'e' represents _____

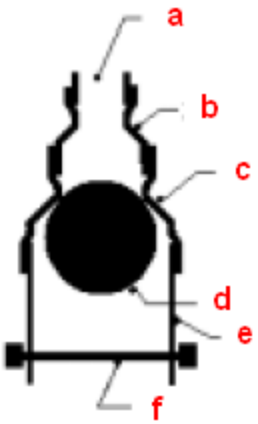
130. Letter 'f' represents _____

131. Letter 'g' represents _____

132. The pipe connecting the by-pass valve to the discharge pipe is installed on the discharge side of the flow control fitting by the use of a short turn tee fitting.

A. true
B. false

Fig. 8 – By-pass valve using float ball
Use below diagram for questions 133-138



133. Letter ‘a’ represents _____

134. Letter ‘b’ represents _____

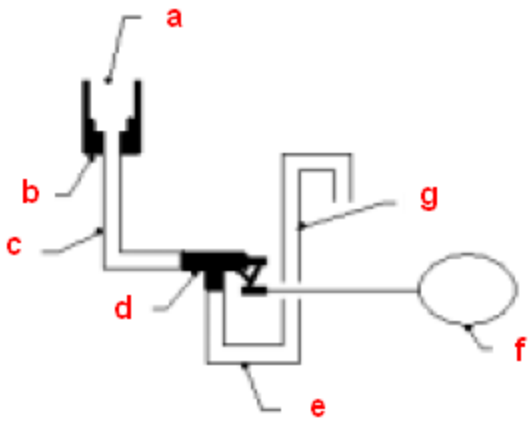
135. Letter ‘c’ represents _____

136. Letter ‘d’ represents _____

137. Letter ‘e’ represents _____

138. Letter ‘f’ represents _____

Fig. 9 – By-pass valve using float valve
Use below diagram for questions 139-145



139. Letter ‘a’ represents _____

140. Letter ‘b’ represents _____

141. Letter ‘c’ represents _____

142. Letter ‘d’ represents _____

143. Letter ‘e’ represents _____

144. Letter ‘f’ represents _____

145. The cover over the distribution net work must extend to final grade and be of either wash aggregate or decorative rock. All surface waters must be diverted away from the sand filter.

A. true
B. false

146. The sand filter is dosed by timed doses. The recirculation tank or chamber must provide for surge loading and surge (forward) volumes.

A. true
B. false

147. The excavation for a recirculating sand filter is made 6” to 12” larger than the filter. Untreated plywood, wafer board or other suitable material is formed into a box to support the liner and allow the liner to be draped over the top. Only sand is placed between the frame and soil to protect the liner after the plywood has decomposed. Approximately 1” of sand is placed in the bottom of the excavation prior to placement of the liner.

The top of the liner must be above the seasonal high water table so groundwater does not flow into the sand filter.

A. true
B. false

148. Recirculating sand filter system. Install a four inch diameter underdrain filtered effluent collection pipe with slots or holes by placing it on the bottom of the sand filter tank and connecting it to solid wall pipe prior to exiting the tank. The installation orientation of the slots or holes must be on the side of the underdrain pipe. The opening in the tank wall shall be sealed by use of a gasket.

A. true
B. false

149. The component owner is responsible for the operation and maintenance of the system. The county, department or POWTS service contractor shall make periodic inspections of the components, and effluent levels, etc.

A. true
B. false

150. Design approval and site inspections before, during, and after the construction are accomplished by the county or other appropriate jurisdictions in accordance to Comm 83 of the Wis. Adm. Code.

A. true
B. false

151. The septic and recirculation tanks are to be inspected and maintained at least every three years. If the scum and sludge occupies 1/3 of the tanks' volume, the tank shall be pumped and its contents properly disposed of. If the tank is not pumped at this time, it shall be pumped when the scum and sludge occupies 1/3 of the tanks' volume.

A. true
B. false

152. Inspections of recirculating sand filter component performance is required at least every six months for the first two years. Then once a year for the next two years. Then once every three years, thereafter. These inspections include checking the liquid levels in the observation pipes and examination for any seepage around the filter.

A. true
B. false

153. User's Manual: A user's manual is to accompany the recirculating sand filter component. The manual is to contain the following as a minimum:

A. Diagrams of all system components and their location.
B. Specifications for electrical and mechanical components.
C. Names and phone numbers of local health authority, component manufacturer or management entity to be contacted in the event of a failure.
D. Information on the periodic maintenance of the recirculating sand filter system, including electrical and mechanical components.
E. none of the above
F. all of the above

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Instructor Signature_____