

DW Module 18:
Cartridge or Bag Filtration
Answer Key



Exercise

Unit 1 – Exercise

Multiple Choice – Choose the best answer:

1. Which statement is true about bag and cartridge filters?

- a. Bag and cartridge filters tend to be non-rigid.
- b. Bag and cartridge filters are typically rigid.
- c. Bag filters tend to be non-rigid, cartridge filters are typically rigid.
- d. Bag filters tend to be rigid, cartridge filters are typically non-rigid.

(Answer: c.- Bag filters tend to be non-rigid, cartridge filters are typically rigid.)

2. Which type of systems are bag and cartridge filters usually limited to?

- a. Small sized systems
- b. Medium sized systems
- c. Large sized systems

(Answer: a. – Small sized systems)

3. Which of the following is **not** a water treatment application for bag or cartridge filters?

- a. For use with coagulants or a pre-coat.
- b. For use as a prefilter prior to another treatment process.
- c. To provide filtration of high quality surface water or ground water under the influence of surface water (GUDI) sources.

(Answer: a. - For use with coagulants or a pre-coat.)

4. Bag and cartridge filters typically remove which of the following? (Choose all that apply)

- a. Bacteria
- b. Giardia cysts
- c. Viruses
- d. Cryptosporidium oocysts
- e. Fine colloids

(Answer: b.- Giardia cysts and d. - Cryptosporidium oocysts)

5. What are the two main factors that limit the use of bag or cartridge filtration for water treatment (Select two)

- a. pH
- b. source water quality
- c. water temperature
- d. system size

- e. chemical pretreatment
(Answer: b. – source water quality and c. – water temperature)
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Exercise

Unit 2 – Exercise

Multiple Choice – Choose the best answer:

1. Which of the following are true statements about cartridge filter? **(Choose all that apply)**
- The larger the pore size in a cartridge filter, the higher the inlet pressure requirements.
 - Cartridge filter housings may be made of Teflon.
 - Cartridge filters are rated by tensile strength.

(Answer: only c. is true;

- is false because the **smaller** the pore size in a cartridge filter, the higher the inlet pressure requirements.
- Is false – cartridge filters may be made of stainless steel or plastic; Teflon is neither of these materials.)

2. Which of the following statements about pressure gauges are true? **(Choose all that apply)**
- The housings for cartridge filters should be equipped with pressure gauges
 - The purpose of inlet and outlet pressure gauges on a cartridge filter is to monitor flow at various locations.
 - When the pressure differential exceeds the manufacturer's limit, the effectiveness of the filter may be compromised.
 - The pressure differential across the bag or cartridge filter dictates when filter change-out must be conducted.

(Answer: a., c., and d. are true;

b is the only false statement - The purpose of inlet and outlet pressure gauges on a cartridge filter is to monitor **pressure** at various points of the treatment process.)

3. Which of the following, when located at the filters, would provide a continuous record of head loss and flow rate as well as an easily monitored means of determining the best time to change the filter?

(Choose one)

- valves
- pressure gauges
- chart recorders

(Answer: c.)

Matching: Match the letter of the corresponding bag or cartridge filter system component with the number of the correct statement.

A. on-line analytical equipment

- B. flow meters
- C. pressure gauges
- D. chemical feeders
- E. prefilter
- F. filter

1. F Has a smaller pore size and usually removes the target contaminant.
 2. A Examples: Turbidimeters, particle counters, and chlorine analyzers
 3. E Has a larger pore size to remove larger particles
 4. B Measures finished water flow
 5. C Monitors head loss
 6. D Examples: chlorinator, caustic soda, or soda ash feeder
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Exercise

Unit 3 – Exercise

Multiple Choice – Choose the best answer:

1. Which of the following source water qualities will not affect the operation of a bag or cartridge filter:
 - a. turbidity
 - b. color
 - c. colloids
 - d. algae
 - e. Giardia
 - f. pH

(Answer: f.)

2. Select the items that are true for bag and cartridge filters:
 - a. low "up front" cost
 - b. ease of operation
 - c. suitable mainly for high flow systems
 - g. little operator involvement
 - h. suitable for waters with high algae content

(Answer: a., b., and g.)

3. Choose the statements that are true about why site-specific piloting should be considered prior to installing a bag or cartridge filter system.
- To verify that the filter is capable of producing water that meets regulatory requirements.
 - To quantify the system's ability to produce a water quality that will be acceptable to the consumer.
 - The confidence in bag and cartridge filtration is much higher than in the conventional treatment process.
 - To aid in the determination of the cost of operation of the proposed system.

(Answer: a., b., and c)

4. Is this statement True or False?

The purpose of intake screening devices on the front end of a treatment plant is to allow of large objects to pass through into the treatment plant.

- True
- False

*(Answer: False, the purpose is **not** to allow large objects or fish to pass through the screens to the treatment plant.)*

5. The Interim Surface Water Treatment Rule was enacted to primarily control? **(Choose one)**

- chlorine residual
- turbidity
- lead and copper

(Answer: b.)

6. 3-log means the removal of _____% removal of a target organism. **(Choose one)**

- 90
- 75 (three quarters of 100%)
- 99.9
- 33.3 (1/3 of 100%)

(Answer: c.)



Exercise

Unit 4 – Exercise

Multiple Choice – Choose the best answer:

1. Cartridge filters should be changed when the pressure reaches _____ psi.
- 5 psi
 - 10 psi
 - 15 psi
 - 20 psi

(Answer: c. 15 psi)

2. Cartridge filters drains should be flushed _____ .
- a. daily
 - b. bi-weekly
 - c. weekly
 - d. monthly

(Answer: a. daily)

3. Which one of the following statements is true? (Choose all that are correct)

- a. A bag or cartridge filter approved for Giardia removal should always be repaired if it becomes clogged.
- b. A bag or cartridge filter approved for Giardia removal should always be removed and replaced with a new filter if it becomes clogged.
- c. When doing a routine inspection or performing maintenance on a bag or cartridge filter approved for Giardia removal, divert the flow through a backup filter unit.
- d. When doing a routine inspection or performing maintenance on a bag or cartridge filter approved for Giardia removal, divert the flow through a chlorinator or UV light.

(Answer: b. and c.)

Fill in the blank:

4. Four water quality parameters that should be examined to verify the proper operation of a bag or cartridge filter are: filtrate turbidity, Giardia and Cryptosporidium removal, virus removal, and chlorine residual.
5. The three steps that must be completed to start a bag or cartridge filter system are: establish/verify the proper flow rate, then bleed any air from the system, and finally operate in filter to waste mode.
6. The use of chart recorders at the filters to obtain a continuous record of head loss and flow rate is advantageous because it provides an easily monitored means for determining the best time to change the filter.
7. For a surface water system, the required residual disinfectant concentration may not be less than 0.2 mg/L for more the 4 hours before the first customer.