

NAFA Certified Air Filter Specialist (CAFS) Practice Exam (Sample)

Study Guide



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Questions

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- 1. Which type of filter is known for its ability to capture odors and gaseous pollutants?**
 - A. HEPA filters**
 - B. Ceramic filters**
 - C. Activated carbon filters**
 - D. Foam filters**
- 2. What can result from running filters to their maximum pressure drop?**
 - A. Increased energy costs**
 - B. Improved air quality**
 - C. Decreased filter lifespan**
 - D. Reduced maintenance requirements**
- 3. What are the two general categories of Enclosed Finish Booths?**
 - A. Side draft and top draft**
 - B. Cross draft and down draft**
 - C. Negative pressure and positive pressure**
 - D. Open air and closed circulation**
- 4. What is the name of the current European Air Filter Standard?**
 - A. EN 1282:2001**
 - B. EN 779:2002**
 - C. EN 1452:2003**
 - D. EN 12345:2004**
- 5. A two-stage air cleaner utilizes which two components?**
 - A. An Ionizer section and a collector section**
 - B. A pre-filter and a HEPA filter**
 - C. A fan and a filter**
 - D. A carbon section and a HEPA section**

- 6. How does surface area impact air filter efficiency?**
- A. Lower surface area increases efficiency**
 - B. More surface area allows for higher dust-holding capacity**
 - C. Surface area has no impact on efficiency**
 - D. Higher surface area increases airflow resistance**
- 7. What is one method used to maintain the efficiency of air filters?**
- A. Increasing the filter size**
 - B. Regularly replacing or cleaning filters**
 - C. Heating the filter material**
 - D. Decreasing air flow through the filter**
- 8. What is a HEPA filter's efficiency at capturing 0.3 micron particles?**
- A. 90.00%**
 - B. 99.00%**
 - C. 99.97%**
 - D. 95.50%**
- 9. What is a potential drawback of PCO systems?**
- A. High initial cost of equipment**
 - B. Low efficiency in air purification**
 - C. Noise pollution during operation**
 - D. Limited effectiveness against bacteria**
- 10. Which air filter type is typically made of electrostatically charged fibers?**
- A. HEPA filters**
 - B. Activated carbon filters**
 - C. Electrostatic filters**
 - D. Fiberglass filters**

Answers

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1. C
2. A
3. B
4. B
5. A
6. B
7. B
8. C
9. A
10. C

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Explanations

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1. Which type of filter is known for its ability to capture odors and gaseous pollutants?

- A. HEPA filters**
- B. Ceramic filters**
- C. Activated carbon filters**
- D. Foam filters**

Activated carbon filters are specifically designed to capture odors and gaseous pollutants due to their unique properties. The effectiveness lies in the large surface area of activated carbon, which is achieved through a process that creates a porous structure. This porosity allows the activated carbon to adsorb various gases and volatile organic compounds (VOCs) from the air. When air passes through an activated carbon filter, the molecules of the gases adhere to the surface of the carbon, effectively removing them from the air stream. This makes activated carbon filters widely used in applications where odor control is important, such as in air purifiers, HVAC systems, and commercial environments. In contrast, HEPA filters primarily focus on particulate matter and do not have the capacity to effectively adsorb gases or odors. Ceramic filters are often used for water filtration or as pre-filters in some air systems but do not target gaseous pollutants. Foam filters are typically mechanical filters that trap larger particles but lack the specificity and efficiency for capturing odors or gaseous contaminants. Thus, activated carbon filters are the preferred choice for removing unpleasant odors and gaseous pollutants from the air.

2. What can result from running filters to their maximum pressure drop?

- A. Increased energy costs**
- B. Improved air quality**
- C. Decreased filter lifespan**
- D. Reduced maintenance requirements**

Running filters to their maximum pressure drop primarily results in increased energy costs. As air filters become dirty or loaded with particles, the resistance to airflow increases, leading to a higher pressure drop. HVAC systems require more energy to push air through these clogged filters, which typically results in elevated energy consumption. This can cause additional strain on equipment and lead to higher operational costs over time. While addressing air quality, decreased filter lifespan, and reduced maintenance requirements may have some relevance, they do not directly associate with the immediate consequences of maximum pressure drop. For instance, improved air quality is more likely to occur with clean filters rather than dirty ones. Similarly, a filter running at its maximum pressure drop can indeed decrease its lifespan because it is working harder and is likely to fail sooner due to excess strain. Reducing pressure loss typically allows for longer intervals between replacements and less frequent maintenance; however, in this context, the immediate impact of running filters to their maximum pressure drop primarily aligns with the increased energy costs incurred.

3. What are the two general categories of Enclosed Finish Booths?

- A. Side draft and top draft
- B. Cross draft and down draft**
- C. Negative pressure and positive pressure
- D. Open air and closed circulation

Enclosed finish booths are essential in various industries for creating a controlled environment for finishing applications like spray painting and coating. The correct categorization of these booths is based on how air moves through them during the finishing process. Cross draft and down draft represent two fundamental ways in which airflow is managed within these booths. In a cross draft booth, air enters from one side and exits from the opposite, effectively carrying overspray away from the workpiece. This type of airflow is efficient for certain applications but can sometimes lead to uneven coating if the airflow isn't properly balanced. In a down draft booth, air enters from above and flows downwards, drawing overspray and fumes down and away from the workpiece. This type of design promotes a cleaner application by minimizing the chance of contaminants being reintroduced to the surface being painted. This method is often preferred for high-quality finishes as it helps to maintain a consistent airflow and reduces the risk of turbulence that can affect the paint application. The other options do not accurately represent the general categories of enclosed finish booths. For instance, while negative and positive pressure relate to airflow dynamics, they describe pressure conditions rather than specific airflow paths. Similarly, open air and closed circulation refer more to ventilation systems rather than distinct categories of finish booths.

4. What is the name of the current European Air Filter Standard?

- A. EN 1282:2001
- B. EN 779:2002**
- C. EN 1452:2003
- D. EN 12345:2004

The correct answer is based on the significance of the European Air Filter Standard EN 779:2002. This standard was established to categorize and evaluate air filters for general ventilation by their efficiency in removing airborne particles from the air. EN 779:2002 provides a framework for testing, reporting, and understanding the performance of air filters, ensuring that they meet specific filtration requirements and can reliably improve indoor air quality. This standard plays a crucial role in guiding manufacturers and consumers in the selection of appropriate air filtration solutions. The designation and the year of the standard are important because they reflect the periodic updates that aim to align with advancements in air quality management practices. In contrast, the other options do not pertain to the current standard used specifically for evaluating air filters for ventilation. While they may refer to various aspects of filtration or other unrelated standards, EN 779:2002 is the recognized norm for air filter performance in Europe.

5. A two-stage air cleaner utilizes which two components?

A. An Ionizer section and a collector section

B. A pre-filter and a HEPA filter

C. A fan and a filter

D. A carbon section and a HEPA section

The two-stage air cleaner is designed to improve air quality by effectively removing contaminants from the air. The correct pairing of components in a two-stage air cleaner involves an ionizer section and a collector section. In this configuration, the ionizer section helps to charge airborne particles, such as dust, pollen, and smoke, causing them to clump together and become more substantial. This process enhances their ability to be captured by the subsequent collector section. The collector section typically employs a method, such as an electrostatic charge, to attract and trap these charged particles, thus efficiently cleaning the air. The other options represent combinations of filtration or cleaning methods that do not specifically reflect the dual mechanism of a two-stage air cleaner. For instance, while pre-filters and HEPA filters are used in combination in many air purification systems, they do not formally constitute a two-stage process as defined in the context of this question. Therefore, the configuration of an ionizer followed by a collector is what highlights the unique two-stage functionality of this type of air cleaner.

6. How does surface area impact air filter efficiency?

A. Lower surface area increases efficiency

B. More surface area allows for higher dust-holding capacity

C. Surface area has no impact on efficiency

D. Higher surface area increases airflow resistance

The correct answer focuses on how increased surface area of an air filter can significantly enhance its dust-holding capacity, which directly correlates to filter efficiency. When an air filter has a larger surface area, it provides more space for airborne particles to be captured. This means that the filter is able to trap more dust, pollen, and other contaminants before needing to be replaced or cleaned, resulting in a longer service life and maintaining air quality more effectively. Filters with greater surface area can also maintain lower pressure drops, which helps in sustaining airflow across the filter. This balance helps in ensuring that the air filter operates efficiently while still capturing a greater volume of particles from the air it processes. A filter that can hold more dust will not only last longer but will also perform better in terms of maintaining optimal airflow and filtration efficiency over time. In contrast, lower surface area would limit the amount of dust that the filter can hold before becoming clogged, negatively affecting both efficiency and airflow. A scenario where surface area has no impact on efficiency overlooks the fundamental physics of filtration, which directly links particle capture to the available area of the filter material. Lastly, while increased surface area can lead to higher airflow resistance, this isn't inherently negative if the filter design takes it into account and

7. What is one method used to maintain the efficiency of air filters?

- A. Increasing the filter size**
- B. Regularly replacing or cleaning filters**
- C. Heating the filter material**
- D. Decreasing air flow through the filter**

Regularly replacing or cleaning filters is a crucial method for maintaining their efficiency. Over time, air filters collect dust, dirt, and other particulates, which can obstruct airflow and reduce their effectiveness in trapping contaminants. When filters are not maintained, they can become clogged, leading to increased resistance to airflow, which can cause the HVAC system to work harder and less efficiently. By routinely replacing or cleaning these filters, it ensures that they continue to operate at optimal levels, supporting better air quality and system performance. This proactive approach can help prevent breakdowns and extend the life of the HVAC system, ultimately saving costs associated with energy inefficiency and repairs. The other options, although they seem plausible, do not effectively contribute to maintaining filter efficiency in the same way. For instance, increasing the filter size may not always be practical and could lead to installation challenges, while heating filter material could damage it and lead to reduced performance. Decreasing airflow can result in inadequate air circulation, which is counterproductive to filter function. Hence, maintaining filters through regular replacements or cleaning is the most effective method.

8. What is a HEPA filter's efficiency at capturing 0.3 micron particles?

- A. 90.00%**
- B. 99.00%**
- C. 99.97%**
- D. 95.50%**

A HEPA (High-Efficiency Particulate Air) filter is specifically designed to trap particles that are 0.3 microns in size with an efficiency of 99.97%. This means that when air is passed through a HEPA filter, it can capture at least 99.97% of airborne particles that are 0.3 microns in diameter. This level of efficiency is crucial for ensuring that the air is clean and free from harmful particles, making HEPA filters a standard in healthcare, clean rooms, and other environments where air quality is critical. The significance of the 0.3 micron particle size is related to the most penetrating particle size (MPPS) for HEPA filters. It is at this size that particles are most likely to pass through the filter rather than being trapped. However, due to their design and the mechanisms through which they operate (including inertial impaction, interception, and diffusion), HEPA filters still maintain an exceptionally high efficiency at capturing these particles. This distinguishes HEPA filters from other types of filters that do not achieve such a high level of particulate removal.

9. What is a potential drawback of PCO systems?

- A. High initial cost of equipment**
- B. Low efficiency in air purification**
- C. Noise pollution during operation**
- D. Limited effectiveness against bacteria**

The potential drawback of PCO (PhotoCatalytic Oxidation) systems being attributed to high initial cost of equipment is a significant consideration for users and organizations looking into air purification technologies. PCO systems often involve advanced technology that utilizes UV light in combination with photocatalysts to effectively remove contaminants from the air, which can lead to a higher purchase and installation price compared to traditional air filtration systems. This higher initial investment can deter some users, especially in situations where budget constraints are a major factor. While the operational costs may be lower in the long term due to their effectiveness and potential energy savings, the initial barrier of a higher cost can limit access to these technologies, especially for smaller businesses or residential applications. In contrast, low efficiency in air purification, noise pollution during operation, and limited effectiveness against bacteria may not be inherent weaknesses of PCO systems. In fact, PCO technology is designed to be quite efficient against a range of airborne pollutants, operates relatively quietly, and can be effective against bacteria when utilized properly. Thus, the initial investment required for PCO systems stands out as a noteworthy consideration in the decision-making process for air purification solutions.

10. Which air filter type is typically made of electrostatically charged fibers?

- A. HEPA filters**
- B. Activated carbon filters**
- C. Electrostatic filters**
- D. Fiberglass filters**

Electrostatic filters are specifically designed using electrostatically charged fibers, which serve to attract and capture particles from the air. This unique characteristic allows these filters to be more efficient at filtering out a variety of airborne contaminants, including dust, pollen, and smoke, due to the static charge enhancing particle adhesion. The charge effectively increases the surface area for trapping particles, leading to improved filtration performance. In contrast, HEPA filters are known for their mechanical filtration capabilities, capturing particles of a specific size through a dense mat of fibers, but they do not rely on electrostatic charge for their operation. Activated carbon filters utilize carbon to absorb gases and odors, and while they play a critical role in improving indoor air quality, they are not made of charged fibers. Fiberglass filters are predominantly used for larger particles and lack the electrostatic properties that enhance filtration efficiency. Thus, the distinctive feature of electrostatic filters being made of charged fibers clearly differentiates them from the other types of filters presented.