

# HVAC Sheet Metal Technician Practice Test (Sample)

## Study Guide



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## **Questions**

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- 1. What is a potential issue with having ducts that are too small?**
  - A. Increased filtration efficiency**
  - B. Excessive noise levels**
  - C. Reduced airflow and higher energy costs**
  - D. Increased humidity levels**
- 2. What is the function of an HVAC filter?**
  - A. To reduce energy consumption**
  - B. To circulate air**
  - C. To remove dust and contaminants**
  - D. To cool refrigerants**
- 3. How many 6" branch ducts can an air handler moving 800 CFM at 0.1" accommodate?**
  - A. 5**
  - B. 7**
  - C. 10**
  - D. 12**
- 4. Where is an air cleaning device typically installed within an HVAC system?**
  - A. After the evaporator**
  - B. Before the air handler and evaporator**
  - C. Inside the ductwork**
  - D. At the exhaust outlet**
- 5. Which air quality issue can be minimized by using filters in HVAC systems?**
  - A. Stale air**
  - B. Excess humidity**
  - C. Dust and allergens**
  - D. Temperature fluctuations**

- 6. How are vent sizes typically determined for HVAC systems?**
- A. Based on local building codes**
  - B. Appliance manufacturer specifications**
  - C. Industry best practices**
  - D. Size of the room served**
- 7. What is the recommended practice for maintaining air quality during duct installation?**
- A. Avoiding contamination from construction debris**
  - B. Using only metal ducts**
  - C. Choosing smaller duct sizes**
  - D. Installing ducts after wall finishes**
- 8. Which safety equipment is essential when working with sheet metal?**
- A. Hard hat and earplugs**
  - B. Safety goggles and gloves**
  - C. Steel-toe boots and safety vest**
  - D. Face mask and knee pads**
- 9. Name a common method for sealing duct joints.**
- A. Mastic**
  - B. Glue**
  - C. Nails**
  - D. Rivets**
- 10. What does "CFM" stand for in HVAC terminology?**
- A. Cubic Feet per Minute**
  - B. Coolant Flow Meter**
  - C. Constant Flow Mechanism**
  - D. Compressor Fan Measurement**

## **Answers**

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

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## **Explanations**

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**1. What is a potential issue with having ducts that are too small?**

- A. Increased filtration efficiency**
- B. Excessive noise levels**
- C. Reduced airflow and higher energy costs**
- D. Increased humidity levels**

Having ducts that are too small can lead to reduced airflow and higher energy costs. When the duct size is inadequate for the volume of air that needs to be moved through the system, it creates a bottleneck effect. This restriction causes the HVAC system to work harder to push air through the smaller passage, resulting in increased energy consumption. Additionally, the restricted airflow may lead to uneven heating or cooling throughout the space, causing some areas to be too hot or too cold, further exacerbating energy use as the system struggles to maintain the desired temperature. This situation ultimately impacts the efficiency of the entire HVAC system, leading to higher utility bills and potential wear on the equipment due to overwork. Therefore, the sizing of ducts is vital for maintaining optimal performance and energy efficiency in an HVAC system.

**2. What is the function of an HVAC filter?**

- A. To reduce energy consumption**
- B. To circulate air**
- C. To remove dust and contaminants**
- D. To cool refrigerants**

The function of an HVAC filter is primarily to remove dust and contaminants from the air that passes through the HVAC system. By trapping these particles, the filter helps to maintain indoor air quality, ensuring that the air circulating within a building is cleaner and healthier for occupants. This is particularly important for those with allergies or respiratory issues, as airborne pollutants can exacerbate these conditions. Additionally, clean filters play a crucial role in the efficiency of the HVAC system itself. When filters are clogged with debris, the system may have to work harder to circulate air, which can lead to increased energy consumption and decreased system performance. Thus, while removing dust and contaminants is the primary function, effective filtration indirectly contributes to energy efficiency and the overall longevity of the HVAC system as well.

**3. How many 6" branch ducts can an air handler moving 800 CFM at 0.1" accommodate?**

- A. 5
- B. 7**
- C. 10
- D. 12

To determine how many 6" branch ducts an air handler moving 800 CFM at a pressure drop of 0.1" can accommodate, it's essential to understand the characteristics of 6" ductwork and how airflow interacts with it. A 6" duct typically has a free area that can facilitate a certain amount of airflow. According to airflow tables for duct sizes, a 6" round duct can carry approximately 100 CFM at 0.1" pressure drop under ideal conditions. This estimation can vary slightly based on factors such as the length of the duct and the number of bends, but 100 CFM is a commonly accepted approximation used for size calculations in HVAC design. To find out how many such ducts can handle the total airflow from the air handler: 1. Divide the total airflow (800 CFM) by the individual capacity of a 6" duct (approximately 100 CFM). 2. Performing the calculation:  $800 \text{ CFM} / 100 \text{ CFM per duct} = 8 \text{ ducts}$ . However, considering practical limitations and adjustments in real-world installations, the flow might not be exactly 100 CFM per duct due to additional factors, leading to adjustments that suggest the number should be rounded down.

**4. Where is an air cleaning device typically installed within an HVAC system?**

- A. After the evaporator
- B. Before the air handler and evaporator**
- C. Inside the ductwork
- D. At the exhaust outlet

The correct placement of an air cleaning device within an HVAC system is generally before the air handler and evaporator. This positioning is crucial because it allows the air cleaning device to filter out dust, allergens, and other particles from the air before it passes through the system. When the air is cleaned before it reaches the air handler, it not only improves indoor air quality but also protects the evaporator's coils by preventing dirt and debris from accumulating. This can enhance the efficiency of the system and prolong the life of its components. Maintaining clean coils is vital for optimal heat exchange and overall performance, as dirty coils can lead to inefficient operation and increased energy consumption. The other contexts for installation are less effective for various reasons. For example, placing an air cleaning device inside the ductwork or at the exhaust outlet would not be as effective in filtering the incoming air that the system processes. Additionally, if an air cleaner was installed after the evaporator, contaminants could already settle on the coils and associated components, thereby negating the benefits of the air cleaner.

**5. Which air quality issue can be minimized by using filters in HVAC systems?**

- A. Stale air**
- B. Excess humidity**
- C. Dust and allergens**
- D. Temperature fluctuations**

Using filters in HVAC systems is particularly effective in minimizing the presence of dust and allergens in the air. HVAC filters are designed to capture particulates, including dust, pollen, pet dander, and other allergens, before they circulate throughout indoor spaces. By trapping these airborne particles, filters improve the overall air quality and contribute to a healthier living environment. This function of air filters helps individuals who are sensitive or allergic to certain allergens, reducing potential health issues related to respiratory problems. Maintaining clean filters is also crucial as clogged filters can decrease the system's efficiency and lead to further circulation of contaminants. While the other options relate to air quality, they are not primarily addressed through the use of filters. For example, stale air is often improved through ventilation rather than filtration, excess humidity requires dehumidification solutions, and temperature fluctuations relate more to the heating and cooling processes rather than filtration. Therefore, the use of filters specifically targets the reduction of dust and allergens, enhancing indoor air quality effectively.

**6. How are vent sizes typically determined for HVAC systems?**

- A. Based on local building codes**
- B. Appliance manufacturer specifications**
- C. Industry best practices**
- D. Size of the room served**

The determination of vent sizes for HVAC systems primarily hinges on appliance manufacturer specifications. These specifications provide essential guidelines for ensuring the safe and efficient operation of heating and cooling systems. Each HVAC appliance has specific requirements that dictate the appropriate vent size to optimize performance and venting efficiency. This is crucial not only for maximizing energy efficiency but also for ensuring proper airflow, preventing backdrafts, and maintaining safety standards in the system's operation. While local building codes, industry best practices, and the size of the room served can all contribute factors in the venting process, it is the manufacturer's specifications that ultimately take precedence. They are designed to meet the specific needs and characteristics of each appliance, ensuring compatibility with existing systems and local regulations. Following these manufacturer guidelines is vital to maintain warranty coverage and ensure compliance with safety regulations.

**7. What is the recommended practice for maintaining air quality during duct installation?**

**A. Avoiding contamination from construction debris**

**B. Using only metal ducts**

**C. Choosing smaller duct sizes**

**D. Installing ducts after wall finishes**

Maintaining air quality during duct installation is crucial to ensure that the HVAC system operates efficiently and safely. The recommended practice of avoiding contamination from construction debris plays a significant role in this. When ducts are being installed, they can easily collect dust, dirt, and other particles from the construction environment. If these contaminants are not managed properly, they can be introduced into the air supply once the system is operational, potentially reducing indoor air quality and leading to health issues for occupants. By focusing on preventing construction debris from entering the ductwork, technicians can help ensure that the ducts remain clean and the air that circulates through them is free from harmful particles and pollutants. This proactive approach not only protects the integrity of the HVAC system but also improves overall indoor air quality. Other practices, such as using only metal ducts, choosing smaller duct sizes, or installing ducts after wall finishes, do not directly address the critical aspect of air quality during installation. While they may have their benefits in specific contexts, avoiding contamination during the installation process is paramount for maintaining clean air throughout the lifetime of the HVAC system.

**8. Which safety equipment is essential when working with sheet metal?**

**A. Hard hat and earplugs**

**B. Safety goggles and gloves**

**C. Steel-toe boots and safety vest**

**D. Face mask and knee pads**

When working with sheet metal, safety goggles and gloves are essential pieces of protective equipment. Safety goggles protect the eyes from flying particles, sharp edges, and dust that can occur during cutting, shaping, or handling sheet metal. Since sheet metal work often involves cutting and grinding operations, there is a high risk of small metal shards or debris that could cause eye injuries. Gloves are crucial for protecting hands from cuts, abrasions, and potential lacerations when handling sharp edges of the sheet metal. The surfaces of sheet metal can be very sharp, and a robust pair of gloves offers a layer of protection against these hazards. The combination of these two items—safety goggles and gloves—creates a comprehensive approach to safeguarding against common injuries associated with sheet metal work. This emphasis on eye and hand protection is a standard practice in the industry to ensure worker safety.

**9. Name a common method for sealing duct joints.**

**A. Mastic**

**B. Glue**

**C. Nails**

**D. Rivets**

Mastic is a common method used for sealing duct joints because it is an effective adhesive that creates an airtight seal. Its application is designed specifically for HVAC systems, allowing it to withstand temperature fluctuations and resist the flow of air and moisture. When mastic is properly applied, it adheres well to the surfaces of the ductwork, filling in any gaps or seams and ensuring that there are no leaks in the system. This is crucial for maintaining energy efficiency and optimal performance of the HVAC system, as any air loss due to poorly sealed joints can lead to increased energy costs and reduced heating or cooling efficiency. The other options, while they may have their specific uses in construction or repair, do not provide the same level of effectiveness for sealing duct joints. Glue, for instance, might not withstand the environmental conditions of an HVAC system and could break down over time, leading to leaks. Nails and rivets primarily serve mechanical fastening purposes and do not provide the necessary sealing properties that mastic does. This makes mastic the preferred choice for ensuring a reliable, long-lasting seal in ductwork applications.

**10. What does "CFM" stand for in HVAC terminology?**

**A. Cubic Feet per Minute**

**B. Coolant Flow Meter**

**C. Constant Flow Mechanism**

**D. Compressor Fan Measurement**

CFM stands for "Cubic Feet per Minute," which is a crucial measurement in HVAC systems. It represents the volume of air that is moved or delivered by an air handling system or ventilation system in one minute. This measurement is vital for understanding the efficiency and performance of heating, ventilation, and air conditioning systems. CFM values are used to calculate airflow rates necessary for achieving desired temperature and comfort levels in a space, which is essential for effective HVAC design and operation. An accurate understanding of CFM helps technicians ensure systems are appropriately sized and set up to provide sufficient airflow for heating, cooling, and ventilation, ultimately contributing to energy efficiency and occupant comfort.