

HVAC Metering Devices Practice Test (Sample)

Study Guide



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SAMPLE

Questions

SAMPLE

- 1. If the thermal bulb on a TXV comes loose from the mounting at the outlet of the evaporator, what will occur?**
 - A. The valve will open, feeding more refrigerant to the evaporator.**
 - B. The valve position will remain unchanged.**
 - C. The valve will close, starving the evaporator.**
 - D. The suction pressure will drop.**
- 2. The EEV is electronically driven and controlled; what major function does it share with a TXV?**
 - A. Maintains system pressure**
 - B. Restricts refrigerant flow**
 - C. Regulates temperature**
 - D. Filters contaminants**
- 3. What does an AXV do to refrigerant flow when the evaporator pressure drops?**
 - A. Decreases**
 - B. Stabilizes**
 - C. Increases**
 - D. None of the above**
- 4. What is the primary refrigerant flow path through a metering device?**
 - A. High pressure to low pressure**
 - B. Low pressure to high pressure**
 - C. Liquid to vapor**
 - D. Vapor to liquid**
- 5. Which factors should be considered when selecting a metering device for HVAC applications?**
 - A. Size and weight only**
 - B. Cost and brand recognition**
 - C. Accuracy, flow range, compatibility, and environmental conditions**
 - D. Availability of spare parts**

- 6. What happens to the low side pressure in a low side float (LSF) system as the temperature increases?**
- A. It decreases**
 - B. It remains constant**
 - C. It increases**
 - D. It fluctuates**
- 7. In a PWM solenoid EEV, what does the control signal do?**
- A. Steadily opens the valve at a constant rate**
 - B. Varyingly opens and closes the solenoid valve**
 - C. Only opens the valve**
 - D. Maintains constant pressure**
- 8. How should a flow meter be installed to ensure accuracy?**
- A. Anywhere in the piping system**
 - B. With no regard for pipe length**
 - C. According to the manufacturer's specifications**
 - D. In random locations for flexibility**
- 9. Which type of HVAC metering device is essential for determining energy costs related to heating?**
- A. Power meters**
 - B. Flow meters**
 - C. Temperature sensors**
 - D. Humidity sensors**
- 10. Why might it be problematic to have incorrect installation of HVAC metering devices?**
- A. It can lead to system aesthetics issues**
 - B. It can cause mechanical failures**
 - C. It can result in erroneous readings**
 - D. It enhances performance of the system**

Answers

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

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Explanations

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1. If the thermal bulb on a TXV comes loose from the mounting at the outlet of the evaporator, what will occur?

A. The valve will open, feeding more refrigerant to the evaporator.

B. The valve position will remain unchanged.

C. The valve will close, starving the evaporator.

D. The suction pressure will drop.

When the thermal bulb of a thermostatic expansion valve (TXV) becomes loose from its mounting at the outlet of the evaporator, it will not be able to accurately sense the temperature of the refrigerant gas leaving the evaporator. The thermal bulb is designed to respond to the temperature changes by adjusting the position of the valve to control the flow of refrigerant. In this situation, if the thermal bulb is not properly mounted, it may interpret the temperature readings incorrectly. As a result, the TXV will likely respond by opening the valve wider than necessary, feeding more refrigerant into the evaporator. This increased flow can flood the evaporator, leading to inefficient cooling and possible liquid refrigerant returning to the compressor, which can cause damage over time. The implication here is that the proper function of the thermal bulb is crucial for the accurate operation of the TXV. If it is mispositioned, the ability to regulate refrigerant flow effectively is compromised, prompting the valve to open inappropriately. This highlights the importance of the thermal bulb's placement and the overarching significance of accurate sensing in HVAC system performance.

2. The EEV is electronically driven and controlled; what major function does it share with a TXV?

A. Maintains system pressure

B. Restricts refrigerant flow

C. Regulates temperature

D. Filters contaminants

The electronic expansion valve (EEV) shares the function of restricting refrigerant flow with the thermal expansion valve (TXV). Both devices are integral to refrigerant management in HVAC systems, ensuring that the proper amount of refrigerant enters the evaporator based on the demand for cooling. By controlling the flow of refrigerant, the EEV and TXV help maintain the desired temperature in the evaporator and enhance the system's overall efficiency. While the EEV uses electronic controls to adjust the flow more precisely in response to system conditions, the TXV relies on thermal sensing of the refrigerant's superheat. This shared function is crucial for optimizing performance across varying load conditions in the HVAC system.

3. What does an AXV do to refrigerant flow when the evaporator pressure drops?

- A. Decreases**
- B. Stabilizes**
- C. Increases**
- D. None of the above**

An AXV, or Automatic Expansion Valve, plays a crucial role in regulating refrigerant flow to the evaporator in response to changes in evaporator pressure. When the pressure in the evaporator drops, the AXV responds by increasing the flow of refrigerant into the evaporator. This increase in refrigerant flow is essential for maintaining the desired temperature and performance of the evaporator, especially during periods of varying load conditions. The valve is designed to automatically adjust the amount of refrigerant flowing into the evaporator to ensure that it operates efficiently, preventing issues such as loss of cooling capacity or potential damage to the system due to low pressure situations. The other options do not accurately describe the function of the AXV in this context. Decreasing or stabilizing refrigerant flow would not address the needs of the system during a drop in pressure, potentially leading to inefficient operation or inadequate cooling. Therefore, the correct understanding of the AXV's role in increasing refrigerant flow in response to a drop in evaporator pressure reflects the device's critical function in HVAC systems.

4. What is the primary refrigerant flow path through a metering device?

- A. High pressure to low pressure**
- B. Low pressure to high pressure**
- C. Liquid to vapor**
- D. Vapor to liquid**

The primary refrigerant flow path through a metering device is from high pressure to low pressure. Metering devices, such as expansion valves or capillary tubes, are designed to regulate the amount of refrigerant entering the evaporator coil. When refrigerant flows from a high-pressure area, typically after being compressed by the compressor, to a low-pressure area in the evaporator, it undergoes a pressure drop. This drop in pressure allows the refrigerant to expand and change from a liquid into a vapor, facilitating heat absorption as it passes through the evaporator coil. This process is crucial for the refrigeration cycle, as it ensures that the refrigerant can effectively absorb heat from the surrounding environment, thus cooling it down. Understanding this flow path is essential for comprehending how HVAC systems maintain temperature control and operate efficiently.

5. Which factors should be considered when selecting a metering device for HVAC applications?

- A. Size and weight only**
- B. Cost and brand recognition**
- C. Accuracy, flow range, compatibility, and environmental conditions**
- D. Availability of spare parts**

When selecting a metering device for HVAC applications, it is crucial to consider factors such as accuracy, flow range, compatibility, and environmental conditions because these elements directly impact the efficiency and effectiveness of the HVAC system. Accuracy is essential to ensure that the system performs optimally; inaccurate measurements can lead to improper system adjustments, resulting in inefficient operation and increased energy costs. The flow range is also important, as it dictates the operational limits of the device. If the metering device cannot handle the necessary flow rates of the HVAC system, it will lead to performance issues. Compatibility ensures that the metering device can integrate seamlessly with existing system components. This involves considering the type of refrigerants or fluids used, the pressures and temperatures involved, and the physical size of the device. Environmental conditions such as temperature extremes, humidity, and exposure to chemicals can also affect the longevity and reliability of the device. Therefore, selecting a device that can withstand the specific conditions of the application is critical for maintaining system integrity over time. Considering these factors collectively ensures that the chosen metering device meets operational needs and contributes to the overall efficiency and reliability of the HVAC system.

6. What happens to the low side pressure in a low side float (LSF) system as the temperature increases?

- A. It decreases**
- B. It remains constant**
- C. It increases**
- D. It fluctuates**

In a low side float (LSF) system, the low side pressure is directly related to the temperature of the refrigerant. As the temperature of the refrigerant increases, its pressure likewise increases, following the principles outlined by the ideal gas law. In HVAC systems, especially in refrigeration, as the refrigerant absorbs heat and the temperature rises, the molecules move more vigorously, resulting in a higher pressure. The relationship is essential for the proper functioning of the system. The low side float mechanism assists in controlling the flow of refrigerant based on the pressure and corresponding temperature, ensuring that the evaporator can absorb sufficient heat and maintain the desired cooling effect. Therefore, as temperature rises within a low side float system, the expected change in low side pressure is an increase. Understanding this relationship is crucial for HVAC technicians to optimize system performance and troubleshoot effectively.

7. In a PWM solenoid EEV, what does the control signal do?

A. Steadily opens the valve at a constant rate

B. Varyingly opens and closes the solenoid valve

C. Only opens the valve

D. Maintains constant pressure

In a PWM (Pulse Width Modulation) solenoid Electronic Expansion Valve (EEV), the control signal is crucial for modulating the flow of refrigerant. The control signal operates by rapidly switching the solenoid on and off, which effectively varies the amount of time the valve is open compared to when it is closed within a given cycle. This on-off switching creates a modulated flow, enabling the valve to adjust to varying thermal loads and conditions in the system. This allows for precise control over refrigerant flow; as the duty cycle of the PWM signal changes, the valve opens and closes at different rates, optimizing the refrigeration cycle's efficiency. It is this ability to rapidly vary the valve position that makes choice B the correct answer, as it emphasizes the dynamic and responsive nature of PWM control in an EEV system. The other options do not capture this variability and modulation aspect of the control signal, making them less accurate descriptions of the operation of a PWM solenoid EEV.

8. How should a flow meter be installed to ensure accuracy?

A. Anywhere in the piping system

B. With no regard for pipe length

C. According to the manufacturer's specifications

D. In random locations for flexibility

Installing a flow meter according to the manufacturer's specifications is essential for ensuring accuracy in measurements. Each flow meter is designed with specific requirements that include factors such as the minimum straight pipe length before and after the meter, orientation, and installation location in relation to bends and fittings in the piping system. These specifications are based on the meter's design characteristics and flow dynamics, which are crucial for minimizing turbulence and ensuring that the flow readings reflect true flow rates without disturbances. Following the manufacturer's guidelines allows for optimal performance of the flow meter by reducing potential errors caused by incorrect installation, such as reading inaccuracies due to interference from nearby fittings or obstructions. Adhering to these specifications ensures that both the calibration and the operating conditions of the flow meter are suitable for the intended application, leading to reliable and precise flow measurements.

9. Which type of HVAC metering device is essential for determining energy costs related to heating?

- A. Power meters**
- B. Flow meters**
- C. Temperature sensors**
- D. Humidity sensors**

Power meters are essential for determining energy costs related to heating because they measure the electrical energy consumption of HVAC systems in real time. By quantifying the amount of electricity used by the heating elements (such as electric heaters or heat pumps), power meters allow HVAC technicians and energy managers to calculate usage patterns and overall energy costs. While flow meters, temperature sensors, and humidity sensors provide valuable information about the operational efficiency and comfort levels within a space, they do not directly quantify energy consumption in monetary terms. Flow meters measure the volume of fluid (like water or refrigerant) passing through the system, temperature sensors track the heat levels within the environment, and humidity sensors monitor moisture content, none of which directly correlate to the cost incurred for the energy consumed by the HVAC system. Therefore, power meters are the key devices for calculating the energy costs associated with heating.

10. Why might it be problematic to have incorrect installation of HVAC metering devices?

- A. It can lead to system aesthetics issues**
- B. It can cause mechanical failures**
- C. It can result in erroneous readings**
- D. It enhances performance of the system**

Having incorrect installation of HVAC metering devices can lead to erroneous readings, which is crucial for the efficient operation and management of HVAC systems. Metering devices are designed to measure various parameters, such as temperature, pressure, and flow rates. If these devices are not installed correctly, the data they provide may not reflect the true conditions of the system. Erroneous readings can result in a cascade of issues, including improper system control, which may lead to increased energy consumption, inadequate heating or cooling, and even premature wear on system components. Accurate measurements are essential for maintenance and troubleshooting; if the readings are inaccurate, HVAC professionals may misdiagnose issues or overlook necessary repairs. Thus, ensuring that metering devices are installed correctly is critical for the overall performance and longevity of the HVAC system.