ESCO Air Conditioning Practice Exam (Sample)

Study Guide

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Questions

1. The state of the refrigerant entering the condenser is

A. High pressure / Highly superheated vapor

B. Low pressure / Highly superheated vapor

C. High pressure / Subcooled liquid

D. Low pressure / Subcooled liquid

2. In the refrigeration cycle, what happens to refrigerant in the evaporator?

A. It condenses into a liquid

B. It absorbs heat and changes from liquid to gas

C. It releases heat and changes from gas to liquid

D. It evaporates without absorbing heat

3. In order to remove as much moisture as possible from a system, you should:

A. Double evacuate the system to 500 microns with a medium vacuum pump

B. Single evacuate the system to 700 microns with a deep vacuum pump

C. Single evacuate the system to 300 microns with a deep vacuum pump

D. Triple evacuate the system to 500 microns with a deep vacuum pump

4. After a system has been opened and the compressor changed, the service technician must:

A. Replace the refrigerant, leak check, evacuate, and charge

B. Replace the filter dryer, leak check, evacuate, and charge

C. Replace the oil, leak check, evacuate, and charge

D. Replace the TXV, leak check, evacuate, and charge

5. What role does regular air filter maintenance play in air conditioning systems?

A. It enhances the visual appearance of the system

B. It helps prevent system breakdowns

C. It maintains adequate airflow and improves efficiency

D. It ensures the unit runs quietly

6. Refrigerant gives up heat when

- **A. It condenses**
- **B. It evaporates**
- **C. It is compressed**
- **D. It is superheated**

7. When should a drain trap be installed on a split system?

- **A. When the air handler drain is on the negative air side**
- **B. When the condenser is located above the air handler**
- **C. When the air handler is on the positive air side**
- **D. When installing a heat pump**

8. Which of the following is not true of a capillary tube metering device?

- **A. They are simple and inexpensive**
- **B. They can handle variable loads effectively**
- **C. They maintain a constant refrigerant flow**
- **D. They are generally used in small systems**

9. What limits the amount of refrigerant in an AC system?

- **A. System age and condition**
- **B. Manufacturer's specifications and local regulations**
- **C. Compressor type**
- **D. Duct configuration**

10. When using an electronic leak detector, the sensor probe should be moved at approximately:

- **A. 1 inch per second**
- **B. 1 inch per two seconds**
- **C. 2 inches per second**
- **D. 2 inches per three seconds**

Answers

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

Explanations

1. The state of the refrigerant entering the condenser is

A. High pressure / Highly superheated vapor

B. Low pressure / Highly superheated vapor

C. High pressure / Subcooled liquid

D. Low pressure / Subcooled liquid

The state of the refrigerant entering the condenser is high pressure and highly superheated vapor. This means that the refrigerant is at a high temperature and has been heated beyond its boiling point. This option is correct because as the refrigerant travels through the system, it undergoes a phase change from a high pressure liquid to a low pressure vapor, which is highly superheated. The other options, B, C, and D, are incorrect. Option B is incorrect because low pressure refrigerant would not be superheated, as it is already below its boiling point. Option C is incorrect because if the refrigerant was subcooled, it would still be in liquid form and would not have undergone a phase change. Option D is incorrect because low pressure refrigerant would not be subcooled, as it is already below its boiling point. Therefore, the correct answer is A.

2. In the refrigeration cycle, what happens to refrigerant in the evaporator?

A. It condenses into a liquid

B. It absorbs heat and changes from liquid to gas

C. It releases heat and changes from gas to liquid

D. It evaporates without absorbing heat

In the refrigeration cycle, the refrigerant's primary role in the evaporator is to absorb heat from the surrounding environment and undergo a phase change from liquid to gas. This process is crucial because it enables the refrigeration system to remove heat from the area that needs to be cooled. When the refrigerant enters the evaporator, it is in a low-pressure liquid state. As it passes through the evaporator coils, it absorbs heat from the surrounding air or liquid, which causes the refrigerant to vaporize and change into a gas. This heat absorption is what produces the cooling effect inside the refrigerator, air conditioning unit, or other cooling systems. This understanding of the refrigerant's behavior in the evaporator is central to the operation of refrigeration systems, as it highlights the importance of heat absorption in achieving effective cooling.

3. In order to remove as much moisture as possible from a system, you should:

A. Double evacuate the system to 500 microns with a medium vacuum pump

B. Single evacuate the system to 700 microns with a deep vacuum pump

C. Single evacuate the system to 300 microns with a deep vacuum pump

D. Triple evacuate the system to 500 microns with a deep vacuum pump

To remove as much moisture as possible from a system, it is essential to have a low-pressure environment inside the system. Double evacuating the system to 500 microns with a medium vacuum pump is the most effective method among the options provided. This process helps achieve a lower pressure level inside the system, which aids in removing moisture effectively. Single evacuating the system may not be sufficient to reach the optimal pressure level needed for thorough moisture removal. Additionally, using a deep vacuum pump ensures a better vacuum level, increasing the efficiency of the evacuation process. Triple evacuating the system may not provide significant additional benefits compared to double evacuating and can be unnecessary in this scenario.

4. After a system has been opened and the compressor changed, the service technician must:

A. Replace the refrigerant, leak check, evacuate, and charge

B. Replace the filter dryer, leak check, evacuate, and charge

C. Replace the oil, leak check, evacuate, and charge

D. Replace the TXV, leak check, evacuate, and charge

After a system has been opened and the compressor changed, the service technician must replace the refrigerant, leak check, evacuate, and charge. This is the correct answer because when the system is opened, it loses refrigerant, which needs to be replaced to the correct level. Additionally, a leak check is essential to ensure no new leaks have been introduced during the compressor replacement process. Evacuating the system removes any air and moisture, which can be harmful to the system's operation. Finally, charging the system ensures it has the correct amount of refrigerant to operate efficiently. The other options are incorrect because while they may be regular maintenance tasks in some situations, they are not specifically required after changing the compressor in an air conditioning system.

5. What role does regular air filter maintenance play in air conditioning systems?

A. It enhances the visual appearance of the system

B. It helps prevent system breakdowns

C. It maintains adequate airflow and improves efficiency

D. It ensures the unit runs quietly

Regular air filter maintenance is crucial in air conditioning systems as it plays a significant role in both maintaining adequate airflow and improving efficiency. When air filters are clean and unclogged, they allow air to pass through freely, ensuring that the system can effectively circulate cool air throughout the space. This proper airflow is essential for the unit to operate efficiently, as restricted airflow can cause the system to work harder than necessary, leading to increased energy consumption and potential overheating issues. Furthermore, when the filters are regularly maintained and replaced as needed, it helps to ensure that the system runs at optimal performance. This can lead to lower energy bills and prolonged lifespan of the air conditioning unit. Clean filters also contribute to better indoor air quality by trapping dust, allergens, and other particles, resulting in a healthier environment. In contrast, while enhancing the visual appearance of the system may have some minor benefits, it does not impact the performance or functionality of the air conditioning unit. Preventing system breakdowns and ensuring a quiet operation are important, but these can be secondary benefits of maintaining airflow and efficiency, rather than the primary role of regular air filter maintenance.

6. Refrigerant gives up heat when

A. It condenses

B. It evaporates

C. It is compressed

D. It is superheated

When refrigerant is in the process of condensing, it changes from a gas to a liquid state. This change in state releases heat, making it the correct answer. Option B, evaporating, is incorrect because refrigerant absorbs heat when it changes from a liquid to a gas. Option C, compressing, is incorrect because while refrigerant does give up heat in the process of being compressed, it is not during the change in state. Option D, superheating, is incorrect because this process involves adding heat to refrigerant, not giving it up.

7. When should a drain trap be installed on a split system?

A. When the air handler drain is on the negative air side

B. When the condenser is located above the air handler

C. When the air handler is on the positive air side

D. When installing a heat pump

A drain trap should be installed on a split system when the air handler drain is on the negative air side. This is because installing a drain trap in this specific configuration helps prevent air from being pulled into the system through the drain line. It ensures proper drainage of condensate without any air leakage into the system, making it the correct choice. In contrast, the other options do not address the specific condition where a drain trap is required for effective operation in a split system setup.

8. Which of the following is not true of a capillary tube metering device?

A. They are simple and inexpensive

B. They can handle variable loads effectively

C. They maintain a constant refrigerant flow

D. They are generally used in small systems

The statement regarding capillary tube metering devices being simple and inexpensive is indeed true. Capillary tubes are known for their simplicity in design and low cost compared to other metering devices such as expansion valves. They consist of a long, narrow tube that allows the refrigerant to expand as it moves from the high-pressure side to the low-pressure side of the system. In contrast, the other options highlight characteristics that do not align with the operation of capillary tube metering devices. They typically do not handle variable loads effectively, as capillary tubes do not adjust the flow of refrigerant based on changing temperatures or pressures. Instead, they provide a constant flow which can lead to issues under varying load conditions. This also contributes to their inability to maintain a constant refrigerant flow under different operating conditions, as the flow is determined solely by the pressure differential and the physical dimensions of the tube. Furthermore, capillary tubes are commonly utilized in smaller refrigeration and air conditioning systems rather than larger systems which often require more precise control of refrigerant flow. Understanding these operational characteristics is essential for effectively applying knowledge of capillary tubes in HVAC/R systems.

9. What limits the amount of refrigerant in an AC system?

A. System age and condition

B. Manufacturer's specifications and local regulations

C. Compressor type

D. Duct configuration

The amount of refrigerant in an air conditioning system is primarily limited by the manufacturer's specifications and local regulations. Manufacturers design their systems to operate efficiently and safely within specific refrigerant volume parameters. These specifications take into account factors such as the size of the system, the intended application, and the type of refrigerant used. Adhering to these specifications is crucial for optimal performance, energy efficiency, and to avoid issues like refrigerant leaks or system damage. Local regulations also play a significant role because they can impose limits to ensure environmental safety, particularly regarding refrigerants that may contribute to ozone depletion or global warming. Compliance with these regulations not only ensures legal operation but also aligns with best practices in sustainability. While other factors such as the system's age, compressor type, and duct configuration can impact performance and efficiency, they do not directly dictate the amount of refrigerant an AC system is permitted to contain. Therefore, the right choice emphasizes the importance of adhering to established design and regulatory standards regarding refrigerant levels.

10. When using an electronic leak detector, the sensor probe should be moved at approximately:

A. 1 inch per second

B. 1 inch per two seconds

C. 2 inches per second

D. 2 inches per three seconds

When using an electronic leak detector, it is crucial to move the sensor probe at a slow and steady pace to ensure accurate readings. Moving the sensor probe too quickly could result in missing leaks or not detecting them correctly. Therefore, moving the sensor probe at approximately 1 inch per second allows for thorough and precise leak detection. This speed provides enough time for the detector to effectively sense any refrigerant leaks in the system.