

Residential Air Conditioning Systems Mechanic (313D) Certification Practice Exam (Sample)

Study Guide



Everything you need from our exam experts!

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Introduction

Preparing for a certification exam can feel overwhelming, but with the right tools, it becomes an opportunity to build confidence, sharpen your skills, and move one step closer to your goals. At Examzify, we believe that effective exam preparation isn't just about memorization, it's about understanding the material, identifying knowledge gaps, and building the test-taking strategies that lead to success.

This guide was designed to help you do exactly that.

Whether you're preparing for a licensing exam, professional certification, or entry-level qualification, this book offers structured practice to reinforce key concepts. You'll find a wide range of multiple-choice questions, each followed by clear explanations to help you understand not just the right answer, but why it's correct.

The content in this guide is based on real-world exam objectives and aligned with the types of questions and topics commonly found on official tests. It's ideal for learners who want to:

- Practice answering questions under realistic conditions,
- Improve accuracy and speed,
- Review explanations to strengthen weak areas, and
- Approach the exam with greater confidence.

We recommend using this book not as a stand-alone study tool, but alongside other resources like flashcards, textbooks, or hands-on training. For best results, we recommend working through each question, reflecting on the explanation provided, and revisiting the topics that challenge you most.

Remember: successful test preparation isn't about getting every question right the first time, it's about learning from your mistakes and improving over time. Stay focused, trust the process, and know that every page you turn brings you closer to success.

Let's begin.

How to Use This Guide

This guide is designed to help you study more effectively and approach your exam with confidence. Whether you're reviewing for the first time or doing a final refresh, here's how to get the most out of your Examzify study guide:

1. Start with a Diagnostic Review

Skim through the questions to get a sense of what you know and what you need to focus on. Your goal is to identify knowledge gaps early.

2. Study in Short, Focused Sessions

Break your study time into manageable blocks (e.g. 30 - 45 minutes). Review a handful of questions, reflect on the explanations.

3. Learn from the Explanations

After answering a question, always read the explanation, even if you got it right. It reinforces key points, corrects misunderstandings, and teaches subtle distinctions between similar answers.

4. Track Your Progress

Use bookmarks or notes (if reading digitally) to mark difficult questions. Revisit these regularly and track improvements over time.

5. Simulate the Real Exam

Once you're comfortable, try taking a full set of questions without pausing. Set a timer and simulate test-day conditions to build confidence and time management skills.

6. Repeat and Review

Don't just study once, repetition builds retention. Re-attempt questions after a few days and revisit explanations to reinforce learning. Pair this guide with other Examzify tools like flashcards, and digital practice tests to strengthen your preparation across formats.

There's no single right way to study, but consistent, thoughtful effort always wins. Use this guide flexibly, adapt the tips above to fit your pace and learning style. You've got this!

Questions

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- 1. If the indoor dry bulb is 73°F and the wet bulb is 68°F, what might be causing discomfort for the customer?**
 - A. Too high humidity level**
 - B. Perhaps airflow through the evaporator is too fast, maybe the system is oversized**
 - C. Improper thermostat calibration**
 - D. Dirty condenser coils**
- 2. What happens when the contactor is energized and there is 220V on the input side but only 110V on the load side?**
 - A. Compressor is overloaded**
 - B. Obstruction in the contacts**
 - C. Circuit breaker has tripped**
 - D. Capacitor is faulty**
- 3. According to the first law of thermodynamics, what is true about heat as a form of energy?**
 - A. It can be created under certain conditions**
 - B. It can be destroyed during energy transfer**
 - C. It cannot be created or destroyed**
 - D. It can only be transformed into other energy forms**
- 4. What is the main difference between a Heat Recovery Ventilator (HRV) and an Energy Recovery Ventilator (ERV)?**
 - A. HRV collects moisture only**
 - B. ERV collects sensible and latent heat**
 - C. HRV is less efficient**
 - D. Both serve the same function**
- 5. If the indoor temperature is 74°F DB and 62°F WB, what does this suggest about moisture in the air?**
 - A. High moisture content**
 - B. Low moisture content**
 - C. Balanced moisture levels**
 - D. Excess condensation**

6. What charge do electrons possess?

- A. Positive charge**
- B. Negative charge**
- C. No charge**
- D. Neutral charge**

7. How should a load be lifted with a wrap-around sling if crushing of the load is a major concern?

- A. Use a single strap only**
- B. Form a loop around the load**
- C. Place a spreader above and below the load**
- D. Have two people lift from opposite ends**

8. Fuses in electrical circuits are designed to function as what?

- A. Load management tools**
- B. Safety devices that shut down circuits during excessive current**
- C. Voltage regulators**
- D. Switching mechanisms**

9. Which T-stat terminals are used when employing a 4-wire setup?

- A. R, W, G, Y**
- B. R/Rc, W, G, Y**
- C. R, Rc, Y1, W1**
- D. R, G, Y1, Y2**

10. Which statement is accurate about conventional fan/limit controls?

- A. They only have normally closed contacts**
- B. They are only activated by manual settings**
- C. They have normally open contacts on the limit side**
- D. They are thermally driven**

Answers

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

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Explanations

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- 1. If the indoor dry bulb is 73°F and the wet bulb is 68°F, what might be causing discomfort for the customer?**
 - A. Too high humidity level**
 - B. Perhaps airflow through the evaporator is too fast, maybe the system is oversized**
 - C. Improper thermostat calibration**
 - D. Dirty condenser coils**

The situation described indicates that there is a discrepancy between the indoor dry bulb and wet bulb temperatures, which suggests that humidity levels could be affecting comfort. The dry bulb temperature of 73°F is relatively cool, but the wet bulb temperature of 68°F indicates a certain level of moisture in the air. The difference of 5°F between these two temperatures points towards a moderately high humidity level, which can be discomforting in various conditions. A potential reason for discomfort in this scenario could be related to the airflow through the evaporator unit. If the system is oversized or the airflow is too rapid, it may not be adequately dehumidifying the air. This lack of proper dehumidification can lead to a perception of increased humidity, making the indoor environment feel less comfortable. When air moves quickly over the evaporator coils, it can be cooled without adequately removing moisture, leading to feelings of muggy or sticky air. Addressing the airflow and the system sizing may potentially alleviate the discomfort the customer is experiencing, as proper airflow is essential for achieving both cooling and dehumidification effectively.

- 2. What happens when the contactor is energized and there is 220V on the input side but only 110V on the load side?**
 - A. Compressor is overloaded**
 - B. Obstruction in the contacts**
 - C. Circuit breaker has tripped**
 - D. Capacitor is faulty**

When the contactor is energized and shows a discrepancy in voltage between the input side and the load side, specifically having 220V on the input side but only 110V on the load side, this typically indicates that there is an obstruction or problem with the contacts within the contactor. When the contacts of a contactor are not fully engaging due to dirt, corrosion, or physical damage, they can result in a high resistance connection. This high resistance can cause a significant drop in voltage across the load side, preventing the necessary voltage from reaching the compressor or other connected components. As a result, the load may not operate properly, leading to performance issues such as under-voltage conditions that can damage equipment or lead to inefficiency. In this scenario, it's vital to inspect the contactor to determine if there is an obstruction such as debris or wear that is preventing it from making a proper connection. Regular maintenance and checks of the contactor's contacts play a crucial role in ensuring optimal performance of the air conditioning system.

3. According to the first law of thermodynamics, what is true about heat as a form of energy?

- A. It can be created under certain conditions**
- B. It can be destroyed during energy transfer**
- C. It cannot be created or destroyed**
- D. It can only be transformed into other energy forms**

The first law of thermodynamics, also known as the law of energy conservation, states that energy cannot be created or destroyed, only transformed from one form to another. This principle applies to all forms of energy, including heat. In a closed system, the total amount of energy, including heat energy, remains constant over time. Therefore, any heat added to a system must come from another form of energy, and any heat lost by the system must go somewhere else, typically into the environment or to another system. This concept is foundational in understanding how energy works in residential air conditioning systems, as it governs the relationships between heat, work, and energy transfers within the system. Because heat is a form of energy, and all energy must adhere to the first law of thermodynamics, it cannot be created or destroyed in the context of thermal processes. This understanding is crucial for properly managing and troubleshooting heating and cooling systems.

4. What is the main difference between a Heat Recovery Ventilator (HRV) and an Energy Recovery Ventilator (ERV)?

- A. HRV collects moisture only**
- B. ERV collects sensible and latent heat**
- C. HRV is less efficient**
- D. Both serve the same function**

The key distinction between a Heat Recovery Ventilator (HRV) and an Energy Recovery Ventilator (ERV) lies in their ability to handle different types of heat transfer. An ERV is designed to collect both sensible heat (which relates to temperature) and latent heat (which relates to moisture). This means that in addition to transferring heat, an ERV can also manage humidity levels within the space, allowing for both thermal comfort and improved indoor air quality. In contrast, an HRV primarily focuses on recovering sensible heat. It does not actively manage or recover moisture content in the air, which makes it less ideal for applications where humid air conditions need to be balanced, particularly in climates with high humidity. Thus, the superior capability of the ERV to address both temperature and humidity sets it apart, making it especially useful in varying climates where moisture control is important. Considering the implications of these two systems helps clarify their applications. An HRV will function effectively in cooler, drier climates where humidity is less of a concern, while an ERV is better suited for areas with higher humidity levels where managing moisture levels becomes essential for indoor comfort and health.

5. If the indoor temperature is 74°F DB and 62°F WB, what does this suggest about moisture in the air?

- A. High moisture content**
- B. Low moisture content**
- C. Balanced moisture levels**
- D. Excess condensation**

The combination of indoor temperature being 74°F dry bulb (DB) and 62°F wet bulb (WB) indicates low moisture content in the air. The wet bulb temperature represents the lowest temperature that can be reached by evaporative cooling, which is directly tied to the humidity level in the air. A smaller difference between the dry bulb and wet bulb temperatures generally signifies higher moisture content, as more moisture in the air allows for greater evaporative cooling effect. In this scenario, the difference is calculated by subtracting the wet bulb temperature from the dry bulb temperature ($74^{\circ}\text{F} - 62^{\circ}\text{F} = 12^{\circ}\text{F}$). A difference of 12°F suggests relatively low humidity, as a higher difference would suggest drier air and low moisture levels. Thus, this temperature reading is indicative of a comfortable indoor environment with optimal low moisture content, leading to the conclusion that the air is relatively dry.

6. What charge do electrons possess?

- A. Positive charge**
- B. Negative charge**
- C. No charge**
- D. Neutral charge**

Electrons possess a negative charge, which is a fundamental property of these subatomic particles. This negative charge is critical in various physical and chemical interactions, influencing how atoms bond and react with one another. In an atom, electrons are attracted to the positively charged protons in the nucleus, stabilizing the structure of the atom. Understanding the charge of electrons is important in the field of electrical and electronic systems, including residential air conditioning systems. The behavior of electrons in circuits, their flow, and interaction with other charged entities influence how air conditioning systems operate. This knowledge forms the basis for understanding electrical currents, capacitance, and other relevant principles needed for troubleshooting and maintaining air conditioning units effectively.

7. How should a load be lifted with a wrap-around sling if crushing of the load is a major concern?

- A. Use a single strap only**
- B. Form a loop around the load**
- C. Place a spreader above and below the load**
- D. Have two people lift from opposite ends**

Using a spreader above and below the load is the best option when it comes to preventing crushing of the load during lifting. A spreader not only helps distribute the lifting force more evenly across the load, but it also provides stability and support from two angles, minimizing the risk of the load deforming or collapsing under pressure. This method is particularly useful for fragile or sensitive items that could be damaged if too much force is applied to any one point. Other methods such as using a single strap or simply forming a loop around the load may not provide adequate support and can lead to localized pressure that could crush or damage the load. Lifting with two people at opposite ends, while it may seem effective for balancing the weight, does not address the fundamental concern of crushing from the sling or pressure points, especially if the load is unevenly balanced or heavy. Hence, using a spreader is a more effective strategy for ensuring the load is lifted safely without causing damage.

8. Fuses in electrical circuits are designed to function as what?

- A. Load management tools**
- B. Safety devices that shut down circuits during excessive current**
- C. Voltage regulators**
- D. Switching mechanisms**

Fuses in electrical circuits are primarily safety devices that protect the wiring and other components from damage caused by excessive current flow. When the current exceeds a certain threshold, the fuse element melts or breaks the circuit, effectively shutting down the power flow. This action prevents overheating, potential fire hazards, and extensive damage to the electrical system. The role of a fuse is critical in maintaining safety within electrical circuits. By interrupting the flow of electricity when it becomes too high, fuses help to protect appliances and wiring from the risks associated with overcurrent conditions. The other options do not accurately describe the function of fuses. For instance, load management tools involve regulating or distributing electrical loads rather than protecting against overcurrent. Voltage regulators maintain a constant voltage level but do not serve the protective role of a fuse. Similarly, switching mechanisms are devices that open or close circuits but do not inherently provide the safety function of disrupting current flow due to overloads.

9. Which T-stat terminals are used when employing a 4-wire setup?

- A. R, W, G, Y**
- B. R/Rc, W, G, Y**
- C. R, Rc, Y1, W1**
- D. R, G, Y1, Y2**

In a 4-wire setup for thermostats, the proper combination of terminals includes R/Rc, W, G, and Y. Each terminal serves a distinct purpose in the operation of the HVAC system. The R terminal, which can often be denoted as either R or Rc, connects to the power source and provides voltage to the thermostat. The distinction between R and Rc comes into play in some systems where there is a separate transformer for heating and cooling systems. The W terminal is used for the heating signal, which activates the heating system when the thermostat calls for heat. The G terminal controls the fan operation, allowing for independent fan control. Finally, the Y terminal is responsible for the cooling signal, activating the air conditioning system when cooling is required. Together, these terminals enable efficient and separate control of heating, cooling, and fan functions in a 4-wire setup. This setup is quite common in modern systems, allowing for better energy management and comfort control in residential HVAC systems. The other options do not accurately reflect the wiring requirements for a standard 4-wire thermostat.

10. Which statement is accurate about conventional fan/limit controls?

- A. They only have normally closed contacts**
- B. They are only activated by manual settings**
- C. They have normally open contacts on the limit side**
- D. They are thermally driven**

Conventional fan/limit controls are designed to automatically regulate the operation of a heating or cooling system based on temperature. The correct response highlights that these controls are thermally driven, meaning they respond to temperature changes. When the temperature reaches a certain threshold, these controls activate the fan or limit action, promoting efficient temperature management within the system. This thermally driven mechanism allows for precise operation; for instance, when the temperature in a furnace rises to a predetermined point, the limit control turns off the burner to prevent overheating. Conversely, when the temperature drops below a certain point, the fan control activates the blower to circulate air, contributing to both comfort and safety. This understanding is fundamental for maintenance and troubleshooting in residential air conditioning systems, as it emphasizes the importance of temperature sensing in system operations. The other options do not capture this key characteristic of thermal response, making them less applicable in this context.

Next Steps

Congratulations on reaching the final section of this guide. You've taken a meaningful step toward passing your certification exam and advancing your career.

As you continue preparing, remember that consistent practice, review, and self-reflection are key to success. Make time to revisit difficult topics, simulate exam conditions, and track your progress along the way.

If you need help, have suggestions, or want to share feedback, we'd love to hear from you. Reach out to our team at hello@examzify.com.

Or visit your dedicated course page for more study tools and resources:

<https://313dcert.examzify.com>

We wish you the very best on your exam journey. You've got this!

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