

# National Electrical Code (NEC) Article 690 Practice Test (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. What is a critical factor in the sizing of conductors for a PV system?**
  - A. The minimum temperature rating of the conductors.**
  - B. The maximum circuit current must be considered for conductor sizing.**
  - C. The length of the installation area.**
  - D. The number of PV modules used in the system.**
  
- 2. Which components must comply with the requirements for controlled conductors part of a rapid shutdown in a PV system?**
  - A. Only inverter circuits**
  - B. PV system dc circuits and inverter output circuits**
  - C. Only dc circuits**
  - D. Only wye-connected systems**
  
- 3. What should the markings on the disconnecting means include?**
  - A. PV SYSTEM DISCONNECT or equivalent**
  - B. WARNING: High Voltage**
  - C. Solar Energy Source**
  - D. Power Supply OFF**
  
- 4. How is the highest voltage controlled within the area boundary during a rapid shutdown?**
  - A. By switching off power to the entire system**
  - B. Through an automatic voltage regulator**
  - C. By limiting it to a maximum of 80V**
  - D. By ensuring grounding connections are intact**
  
- 5. What function is primarily hindered by improper shutdown procedures in photovoltaic systems?**
  - A. Energy conversion efficiency**
  - B. Safety during emergencies**
  - C. Overall system longevity**
  - D. Power generation capability**

- 6. What must be marked on PV source circuits according to Article 690?**
- A. Voltage rating of the circuit**
  - B. A warning sign indicating the presence of ungrounded conductors**
  - C. Manufacturer details of components**
  - D. Type of inverter used**
- 7. Why is the equipment grounding conductor critical in a non-solidly grounded PV system?**
- A. To ensure proper voltage regulation**
  - B. To minimize potential shock hazards**
  - C. To enhance the overall system efficiency**
  - D. To provide a backup power source**
- 8. For isolating devices in PV systems, what is the maximum circuit current limit for the installation of an isolating device?**
- A. 50 Amps**
  - B. 40 Amps**
  - C. 30 Amps**
  - D. 20 Amps**
- 9. In PV systems, what does the grounding electrode system connect to?**
- A. The solar panels directly**
  - B. Utility lines for grounding**
  - C. The building's electrical services**
  - D. Equipment that generates excess electricity**
- 10. Which type of systems does Article 690 apply to?**
- A. Wind energy systems**
  - B. Solar photovoltaic systems**
  - C. Geothermal heating systems**
  - D. Hydropower systems**

## Answers

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

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## **Explanations**

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**1. What is a critical factor in the sizing of conductors for a PV system?**

- A. The minimum temperature rating of the conductors.**
- B. The maximum circuit current must be considered for conductor sizing.**
- C. The length of the installation area.**
- D. The number of PV modules used in the system.**

In the sizing of conductors for a photovoltaic (PV) system, the primary consideration is the maximum circuit current. This is essential because conductors must be capable of safely carrying the maximum current anticipated during operation without overheating. Overheating can lead to insulation failure, increased resistance, and potential safety hazards such as electrical fires. To select the appropriate conductor size, it is necessary to refer to standards such as the National Electrical Code (NEC), specifically looking at the ampacity tables that correlate with the conductors' materials, ambient temperature conditions, and the maximum current they will need to carry. The maximum circuit current is often determined by the specifications of the PV modules, the number of modules in series and parallel arrangements, and any additional factors such as the inverter's output. While other aspects might seem relevant, such as the minimum temperature rating of the conductors, the installation area length, or the number of PV modules, they play supporting roles in overall system design and safety. However, none directly influence the primary need for conductors to be appropriately sized to handle the maximum expected current. Thus, focusing on current-carrying capacity is critical for ensuring safe and reliable operation of a PV system.

**2. Which components must comply with the requirements for controlled conductors part of a rapid shutdown in a PV system?**

- A. Only inverter circuits**
- B. PV system dc circuits and inverter output circuits**
- C. Only dc circuits**
- D. Only wye-connected systems**

The answer indicating that both the PV system DC circuits and inverter output circuits must comply with the requirements for controlled conductors in a rapid shutdown scenario is based on critical safety measures mandated by the National Electrical Code (NEC), specifically Article 690. Rapid shutdown requirements are designed to minimize risk in the event of an emergency, enabling first responders to safely approach a building with a photovoltaic (PV) system installed. The rationale for including both the PV system DC circuits and inverter output circuits is that these components can pose a significant hazard by remaining energized even after the shutdown has been initiated. By ensuring compliance for both sections of the system, the NEC aims to provide a comprehensive approach to safety, addressing potential risks throughout the PV system. The inclusion of DC circuits ensures that the portion of the system directly connected to the solar panels—where electrical energy generation occurs—becomes non-energized during shutdown. The inverter output circuits are equally important because they transmit electricity from the inverter to the service equipment or the grid; if these circuits remain energized, they can create dangerous conditions during a shutdown need. It is important to ensure all critical sections of the circuit are addressed to mitigate risks associated with voltage and the potential for electrocution, which is why this answer correctly reflects

### 3. What should the markings on the disconnecting means include?

- A. PV SYSTEM DISCONNECT or equivalent**
- B. WARNING: High Voltage**
- C. Solar Energy Source**
- D. Power Supply OFF**

The requirement for markings on disconnecting means in photovoltaic (PV) systems is outlined in NEC Article 690. Specifically, the marking indicating "PV SYSTEM DISCONNECT" or an equivalent term is crucial for safety and clarity. This designation is essential in conveying the purpose of the disconnecting means, which is to allow individuals to safely disconnect the solar energy system from the electrical supply during maintenance, emergency situations, or other operational needs. Having clear and specific markings helps ensure that anyone interacting with the system—such as emergency responders, maintenance personnel, or electricians—can quickly identify the disconnecting means, understand its function, and act accordingly. This is vital not only for the safety of individuals but also for the protection of the equipment and the integrity of the solar energy system. Markings like "WARNING: High Voltage," while important for indicating the potential dangers associated with the system's operation, do not specifically identify the purpose of the disconnect. Similarly, "Solar Energy Source" and "Power Supply OFF" provide useful information but lack the specificity that "PV SYSTEM DISCONNECT" conveys regarding operational procedures. Having a standardized phrase contributes to uniformity and reduces the risk of misinterpretation during critical situations.

### 4. How is the highest voltage controlled within the area boundary during a rapid shutdown?

- A. By switching off power to the entire system**
- B. Through an automatic voltage regulator**
- C. By limiting it to a maximum of 80V**
- D. By ensuring grounding connections are intact**

The highest voltage within the area boundary during a rapid shutdown of a photovoltaic (PV) system is limited to a maximum of 80V. This requirement is part of the safety regulations set forth in the NEC, specifically in Article 690, which addresses the installation of solar photovoltaic systems. The rationale behind this limit is to ensure that, in the event of an emergency or when maintenance is required, the voltage remains at a level that minimizes the risk of electric shock to first responders and workers. By controlling the maximum voltage to 80V, it provides a safer environment while still allowing for effective operation of the solar photovoltaic system. This limit applies even if the system is functioning normally; during a rapid shutdown, various devices are employed to deactivate the system and bring the voltage down to this safe level. It reflects a balance between operational efficiency and safety, ensuring that the system does not pose excessive risk under emergency conditions. In contrast, switching off power to the entire system might not effectively bring voltage levels down to the required safety standards quickly, while an automatic voltage regulator primarily manages voltage fluctuations during normal operations rather than during shutdowns. Lastly, maintaining proper grounding is crucial for safety, but it does not directly control the highest voltage output during a shutdown scenario.

**5. What function is primarily hindered by improper shutdown procedures in photovoltaic systems?**

- A. Energy conversion efficiency**
- B. Safety during emergencies**
- C. Overall system longevity**
- D. Power generation capability**

Improper shutdown procedures in photovoltaic systems predominantly affect safety during emergencies. Ensuring that the system can be safely deactivated is crucial for protecting personnel and equipment when issues arise, such as during maintenance or in hazardous situations. If shutdown protocols are not followed correctly, it could lead to risks of electrocution or fires, which are significant concerns in photovoltaic installations due to the presence of high voltage DC current. The safety of workers and first responders depends on the ability to quickly and effectively shut down the system. Clear and proper shutdown procedures help mitigate these risks, allowing emergency personnel to perform their duties without fear of electrical hazards. While factors like energy conversion efficiency, overall system longevity, and power generation capability are important for the performance and maintenance of a photovoltaic system, the immediate priority during any emergency situation is always safety.

**6. What must be marked on PV source circuits according to Article 690?**

- A. Voltage rating of the circuit**
- B. A warning sign indicating the presence of ungrounded conductors**
- C. Manufacturer details of components**
- D. Type of inverter used**

The marking requirements for photovoltaic (PV) source circuits as outlined in Article 690 of the National Electrical Code (NEC) are crucial for ensuring safety and proper operation. A warning sign indicating the presence of ungrounded conductors is essential because PV systems often have conductors that remain energized, even in the absence of sunlight. This can pose a significant shock hazard to anyone working on or near the system. Therefore, the code mandates that these circuits must clearly indicate this risk to protect installers, maintenance personnel, and emergency responders by alerting them to the potential dangers associated with ungrounded PV conductors. Marking the voltage rating, manufacturer details, or type of inverter used, while informative, does not specifically address the immediate safety risks associated with ungrounded conductors. The primary goal of the warning sign is to enhance awareness and ensure that individuals understand they are working with live circuits that could lead to electrical hazards.

**7. Why is the equipment grounding conductor critical in a non-solidly grounded PV system?**

- A. To ensure proper voltage regulation**
- B. To minimize potential shock hazards**
- C. To enhance the overall system efficiency**
- D. To provide a backup power source**

The equipment grounding conductor plays a crucial role in a non-solidly grounded photovoltaic (PV) system primarily to minimize potential shock hazards. In such systems, the grounding conductor provides a path for fault currents to flow safely to the ground, reducing the risk of electric shock to personnel who may come into contact with the system. In the event of a fault, like an insulation failure or equipment malfunction, without proper grounding, there can be a dangerous buildup of voltage on exposed conductive parts, which could lead to hazardous situations. The grounding conductor ensures that any fault current has a clear and low-resistance path to the ground, significantly lowering the risk of electric shock to those nearby and increasing safety for maintenance and operation of the system. In addition, proper grounding also helps in ensuring that equipment operates correctly by reducing voltage imbalances and allowing protective devices to function effectively. While voltage regulation and overall system efficiency are important considerations, they are secondary to the immediate safety concerns addressed by the grounding conductor. The option regarding providing a backup power source is not relevant in this context, as grounding conductors are not involved in generating or supplying electricity.

**8. For isolating devices in PV systems, what is the maximum circuit current limit for the installation of an isolating device?**

- A. 50 Amps**
- B. 40 Amps**
- C. 30 Amps**
- D. 20 Amps**

In photovoltaic (PV) systems, isolating devices are critical components that provide a means to disconnect parts of the circuit for maintenance or emergency purposes while ensuring safety for technicians and the system. According to the National Electrical Code (NEC), there are specific limits on the maximum circuit current that these isolating devices can handle to ensure they operate safely and effectively. The current limit set for isolating devices is based on typical operating conditions and expected fault scenarios. A maximum circuit current limit of 30 Amps is designated to ensure that the isolating device can safely interrupt the current without the risk of arcing, overheating, or other safety hazards. This limit helps maintain the integrity of the electrical connections and minimizes potential damage to both the isolating device and the surrounding equipment. Thus, selecting an isolating device rated for a maximum of 30 Amps aligns with NEC guidelines and ensures proper functionality within the parameters of PV system design and safety protocols.

**9. In PV systems, what does the grounding electrode system connect to?**

- A. The solar panels directly**
- B. Utility lines for grounding**
- C. The building's electrical services**
- D. Equipment that generates excess electricity**

In photovoltaic (PV) systems, the grounding electrode system is essential for ensuring safety and compliance with the National Electrical Code (NEC). The grounding electrode system connects to the building's electrical services to establish a common ground reference. It helps protect the system from lightning strikes, over-voltages, and electrical faults by safely directing any faults to the ground, thereby minimizing the risk of electrical shock or fire. By connecting the grounding electrode system to the building's electrical services, it ensures that all electrical components within the system, including the inverter and other equipment, are at the same electrical potential as the building's grounding system. This integration prevents differences in voltage between the solar equipment and the existing electrical system, reducing the risk of damage and ensuring reliable operation of the PV system. The other options do not align with the purpose of the grounding electrode system. Connecting directly to solar panels or utility lines does not provide the necessary safety measures outlined in the NEC. Connecting to equipment generating excess electricity would not create a secure grounding path, risking potential hazards. Thus, grounding the PV system through the building's electrical services is critical for effective safety and operation.

**10. Which type of systems does Article 690 apply to?**

- A. Wind energy systems**
- B. Solar photovoltaic systems**
- C. Geothermal heating systems**
- D. Hydropower systems**

Article 690 of the National Electrical Code specifically addresses solar photovoltaic systems. This section establishes the requirements for the installation, interconnection, and safety considerations associated with photovoltaic technology, including aspects like wiring methods, overcurrent protection, and grounding, which are crucial for safeguarding both the installation and the personnel involved. Solar photovoltaic systems capture sunlight and convert it into electricity, making them distinct from other renewable energy sources like wind, geothermal, and hydropower, each of which has its own regulations and guidelines under different articles in the NEC. Therefore, while Article 690 focuses solely on the requirements pertinent to solar technologies, other systems like wind energy, geothermal heating, and hydropower are covered under other relevant sections of the NEC, not Article 690.

## 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](mailto:hello@examzify.com).**

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

**<https://necarticle690.examzify.com>**

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

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