

# ICC Structural Steel and Bolting Certification Practice Test (Sample)

## Study Guide



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## **Questions**

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- 1. For which type of welds is the special inspector not required to be continuously present?**
  - A. Double-pass welds**
  - B. Single-pass fillet welds not exceeding 5/16 inch**
  - C. All types of welds**
  - D. Fillet welds above 5/16 inch**
- 2. What characteristics must approved alternative fastener assemblies conform to?**
  - A. Cost-effectiveness and durability**
  - B. Materials, manufacturing, and chemical composition**
  - C. Size and weight specifications**
  - D. Specific brand requirements**
- 3. For twist-off tension-control bolt assemblies, how far should the end of the bolt be from the outer face of the nut when properly installed?**
  - A. It should be recessed**
  - B. It should be flush with**
  - C. It should extend beyond**
  - D. It should be offset**
- 4. For what purpose shall thermally cut surfaces be ground smooth?**
  - A. For visually appealing finishes**
  - B. For cyclically loaded joints**
  - C. For aesthetic purposes**
  - D. For ease of installation**
- 5. According to the AISC Steel Construction Manual, which of the following is not an acceptable method for setting column base plates?**
  - A. Steel shims**
  - B. treated-hardwood shims**
  - C. Concrete pads**
  - D. Plastic shims**

- 6. Which type of joint's faying surfaces are important in the performance of the joint when stressed?**
- A. Bearing type**
  - B. Slip critical**
  - C. Welded**
  - D. Friction type**
- 7. Who holds the responsibility for the correct setting of anchor rods for base plates?**
- A. General contractor**
  - B. Structural engineer**
  - C. Owners designated representative for construction**
  - D. Site supervisor**
- 8. In slip-critical joints, how should galvanizing faying surfaces be treated?**
- A. Sandblasted**
  - B. Left untouched**
  - C. Hand wire brushed**
  - D. Coated with an epoxy**
- 9. What is the primary purpose of identification markings on structural steel?**
- A. For aesthetic considerations**
  - B. To ensure proper certification and traceability**
  - C. To indicate weight limits**
  - D. To simplify installation**
- 10. Who is responsible for the accurate location and strength of foundation piers for base plates as per the Code of Standard Practice?**
- A. Site engineer**
  - B. Owners designated representative for construction**
  - C. General contractor**
  - D. Structural engineer**

## **Answers**

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

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## **Explanations**

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**1. For which type of welds is the special inspector not required to be continuously present?**

**A. Double-pass welds**

**B. Single-pass fillet welds not exceeding 5/16 inch**

**C. All types of welds**

**D. Fillet welds above 5/16 inch**

The correct choice indicates that special inspector presence is not continuously required for single-pass fillet welds not exceeding 5/16 inch. In structural steel work, continuous inspection by a special inspector is usually mandated for welds to ensure quality and adherence to standards. However, for smaller, simpler welds such as single-pass fillet welds that do not exceed a specific size threshold—a common rule of thumb is 5/16 inch—the inspection requirements can be less stringent. This is based on the assumption that smaller welds have lower structural implications and are more straightforward to execute correctly. So, for single-pass fillet welds under this size, the code often allows for less rigorous oversight because the potential for defects is lower compared to larger or more complex welds, thus permitting certain flexibility in inspection practices. This principle helps streamline the inspection process in contexts where the risk is deemed manageable.

**2. What characteristics must approved alternative fastener assemblies conform to?**

**A. Cost-effectiveness and durability**

**B. Materials, manufacturing, and chemical composition**

**C. Size and weight specifications**

**D. Specific brand requirements**

Approved alternative fastener assemblies must conform to specific characteristics related to materials, manufacturing processes, and chemical composition to ensure they meet the necessary performance and safety standards. These factors are crucial because they directly affect the structural integrity and performance of the fastener assemblies in a variety of applications. For instance, the materials used in the fastener assemblies must possess the necessary mechanical properties to withstand the loads and stresses imposed on the structure. The manufacturing processes must ensure that the components are produced consistently and reliably, maintaining quality and performance standards across all units. Additionally, the chemical composition is important to prevent issues such as corrosion or material fatigue, which can compromise the long-term durability of the fasteners in their intended environment. This emphasis on materials, manufacturing, and chemical composition is especially relevant in structural applications where safety and reliability are paramount. Fasteners play a critical role in maintaining the stability and integrity of structures, so understanding and adhering to these criteria is essential for compliance with industry standards and regulations.

**3. For twist-off tension-control bolt assemblies, how far should the end of the bolt be from the outer face of the nut when properly installed?**

- A. It should be recessed**
- B. It should be flush with**
- C. It should extend beyond**
- D. It should be offset**

In the case of twist-off tension-control bolt assemblies, the end of the bolt should be flush with the outer face of the nut when properly installed. This requirement ensures that the bolt has been tightened to the correct tension level, as the design of the assembly allows for visual confirmation of proper installation. When the bolt end is flush with the nut, it indicates that the necessary amount of twist has occurred, effectively breaking off the tension control feature of the bolt and confirming that the bolt is adequately tensioned. This flush condition plays a critical role in structural applications, as it ensures the joint's integrity and load-bearing capacity. With proper installation, there's consistency in the performance of the joint and reduced risk of connection failure due to inadequate tensioning. Factors such as manufacturing tolerances and bolt length are also designed to accommodate this flush condition. Properly installed bolted connections contribute to the overall safety and reliability of the structural steel assembly.

**4. For what purpose shall thermally cut surfaces be ground smooth?**

- A. For visually appealing finishes**
- B. For cyclically loaded joints**
- C. For aesthetic purposes**
- D. For ease of installation**

Thermally cut surfaces are required to be ground smooth primarily to ensure the integrity and performance of cyclically loaded joints. When steel components are connected through welding or bolting in applications subject to repeated loading, such as bridges and structures experiencing vibration or dynamic forces, the quality of the joint becomes critical. Rough edges created by thermal cutting can act as stress concentrators, leading to potential fatigue failures over time. By grinding these surfaces smooth, the distribution of stress is improved, which enhances the overall durability and strength of the welded or bolted connection. This practice is essential in maintaining the structural integrity and longevity of components that will experience fluctuating loads, thereby preventing premature failure due to fatigue. While the other options may provide some validity in certain contexts—such as aesthetic or ease of installation considerations—the primary concern in structural applications, especially those involving cyclic loads, rests on the mechanical performance and safety of the joint. This highlights why attention to surface preparation is vital in load-bearing connections.

**5. According to the AISC Steel Construction Manual, which of the following is not an acceptable method for setting column base plates?**

**A. Steel shims**

**B. treated-hardwood shims**

**C. Concrete pads**

**D. Plastic shims**

Setting column base plates properly is crucial for ensuring the stability and integrity of a structure. The American Institute of Steel Construction (AISC) Steel Construction Manual outlines acceptable methods and materials for this important task. Steel shims are widely accepted due to their durability and ability to maintain their form under load. They provide a reliable means of leveling and supporting the base plate. Concrete pads also serve as a solid foundation for column base plates, offering significant compressive strength and stability. Plastic shims can be used as well, particularly in situations where moisture control and corrosion are considerations, such as in environments that are prone to rust. However, treated-hardwood shims are not considered an acceptable method for setting column base plates. While hardwood can provide some level of support, it is subject to degradation over time due to environmental factors, such as moisture and pests. Additionally, hardwood does not provide the same level of load-bearing capacity and consistency as the other options. Therefore, selecting materials that maintain structural integrity over time is crucial for safety and performance, making treated-hardwood shims unsuitable for this application as per the AISC guidelines.

**6. Which type of joint's faying surfaces are important in the performance of the joint when stressed?**

**A. Bearing type**

**B. Slip critical**

**C. Welded**

**D. Friction type**

When evaluating the performance of structural joints under stress, the significant role of faying surfaces becomes particularly critical in slip-critical joints. In these joints, the faying surfaces—the areas where the connected pieces of steel are in contact—must be meticulously prepared and remain free of contaminants to ensure adequate friction, preventing any relative movement between the connected parts when subjected to loads. In slip-critical applications, the design relies on the friction generated between these faying surfaces to resist applied forces. The quality of this surface, influenced by factors like surface roughness, cleanliness, and bolt tension, is essential for achieving the required friction to hold the joint together without slipping. Consequently, proper inspection and preparation of the faying surfaces are crucial for the effectiveness of the joint. Alternatives such as bearing type and welded joints do not place the same emphasis on the faying surfaces in the context of resisting slipping. Bearing-type joints transfer loads through contact points with bolts acting primarily in shear, while welded joints rely on the continuity of the weld metal to carry loads. Friction-type joints, while they highlight the importance of surface contact, are much less common in structural applications compared to slip-critical joints, which are specifically designed to exploit frictional resistance.

**7. Who holds the responsibility for the correct setting of anchor rods for base plates?**

- A. General contractor**
- B. Structural engineer**
- C. Owners designated representative for construction**
- D. Site supervisor**

The responsibility for the correct setting of anchor rods for base plates typically lies with the owner's designated representative for construction. This individual oversees the construction process on behalf of the owner and ensures that all aspects of the project, including the installation of anchor rods, are performed according to specified requirements and standards. The role of the owner's representative is critical in maintaining communication between the owner and the construction team, ensuring that the installation aligns with design specifications and structural integrity. They are involved in the coordination of various construction activities and play a pivotal role in quality control. Proper alignment and setting of anchor rods are crucial, as they provide the foundational support for structural elements, and any error in their placement can have significant implications for the overall stability and safety of the structure. This responsibility underscores the importance of oversight in construction projects and the need for careful adherence to engineering details and construction practices throughout the construction lifecycle.

**8. In slip-critical joints, how should galvanizing faying surfaces be treated?**

- A. Sandblasted**
- B. Left untouched**
- C. Hand wire brushed**
- D. Coated with an epoxy**

In slip-critical joints, the treatment of galvanizing on faying surfaces is crucial for ensuring proper performance and strength of the joint. The correct approach is to hand wire brush the galvanizing from the faying surfaces to create a clean and roughened surface. This is important because slip-critical joints rely on friction for load transfer; therefore, any contaminants or smooth coatings can significantly reduce the effectiveness of the joint. Hand wire brushing removes the zinc coating in a controlled manner, ensuring a sufficient surface profile for the development of adequate friction and maintaining the integrity of the joint under load. This treatment helps expose the underlying metal, which can enhance the frictional characteristics necessary for the joint to function as intended. Other methods of treating the galvanizing, such as sandblasting, may be too aggressive and could damage the substrate or create an uneven surface condition that could impair the joint's performance. Leaving the surfaces untouched would mean retaining the smooth zinc coating, which is counterproductive in achieving the necessary friction. Coating the surfaces with an epoxy would introduce a foreign material that would also diminish the friction needed for a slip-critical connection. Therefore, hand wire brushing is the most suitable method to ensure optimal performance of slip-critical joints in construction.

**9. What is the primary purpose of identification markings on structural steel?**

- A. For aesthetic considerations**
- B. To ensure proper certification and traceability**
- C. To indicate weight limits**
- D. To simplify installation**

The primary purpose of identification markings on structural steel is to ensure proper certification and traceability. These markings provide essential information regarding the material's compliance with industry standards, specifications, and quality control procedures. They typically include details such as the manufacturing mill, heat number, product specification, and sometimes the material grade. This information is crucial for verifying that the steel used in construction meets the required safety and structural integrity standards. Traceability is vital in the construction industry, particularly for structural components, as it allows for tracking back to the source of the material in case any issues arise, such as failures or defects. By having well-documented identification markings, engineers and inspectors can ensure that the steel used in a project is reliable and can withstand the loads and stresses it will encounter. While aesthetic considerations, weight limits, and simplifying installation are factors that may be relevant in the broader context of construction and engineering, they do not address the fundamental purpose of identification markings on structural steel. Such markings serve a specific role in quality assurance and safety, which is paramount in structural applications.

**10. Who is responsible for the accurate location and strength of foundation piers for base plates as per the Code of Standard Practice?**

- A. Site engineer**
- B. Owners designated representative for construction**
- C. General contractor**
- D. Structural engineer**

The correct answer highlights the critical role of the owner's designated representative for construction in ensuring the accurate location and strength of foundation piers for base plates according to the Code of Standard Practice. This representative acts on behalf of the owner to oversee and ensure that construction practices meet specified requirements and standards. This responsibility involves coordinating with various parties, including the design team and the construction crew, to confirm that the foundation's specifications are met and that the piers are correctly placed to support the structural loads. The representative must ensure that all aspects of the construction align with the contractual obligations and industry standards, facilitating communication between the owner and the contractors. In contrast, while the structural engineer is crucial in designing the piers and guaranteeing their strength, the execution and oversight responsibility falls predominantly on the owner's representative. Meanwhile, the site engineer and general contractor play significant roles too, but primarily in implementation and construction management rather than being directly responsible for verifying location and strength per the Code of Standard Practice.