Thermite Welding Practice Exam (Sample)

Study Guide

Everything you need from our exam experts!

Questions

1. **How much of the melted rail end must be cut off when a rail end begins to melt?**
   - **A. 1 inch**
   - **B. 2 inches**
   - **C. 3 inches**
   - **D. 4 inches**

2. **What type of welding is specifically noted for cooldowns and handling moisture conditions?**
   - **A. Mig welding**
   - **B. Tig welding**
   - **C. Thermite welding**
   - **D. Arc welding**

3. **Which tool or method is advised against using for sharpening shear dies?**
   - **A. mechanical devices**
   - **B. hand filing**
   - **C. light grinding**
   - **D. none of the above**

4. **How many tie spikes or clips must be removed from each side of the weld crib?**
   - **A. 1**
   - **B. 2**
   - **C. 3**
   - **D. 4**

5. **Is thermite welding permitted on rail ends that have already been repair welded?**
   - **A. Surely permitted**
   - **B. Sometimes permitted**
   - **C. Prohibited**
   - **D. Conditionally permitted**

6. How high are the Orgo and Boutet Wide Gap Welds left at the heat lines?

A. .005

B. .010

C. .015

D. .020

7. The Orgo Head Repair process specifies that 2" of the railhead must be completely removed down to which section of the web?

A. 1/2"

B. 1"

C. 1-1/2"

D. 2"

8. What shade lens is required during the ignition and pouring of molten steel?

A. 4

B. 5

C. 6

D. 7

9. What maximum distance is acceptable for the flow on the rail head before welding?

A. 2 inches

B. 4 inches

C. 1 inch

D. 3 inches

10. Which of the following processes might result in excess heat during thermite welding?

A. Charging

B. Preheating

C. Notching

D. Alignment

Answers

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

Explanations

1. How much of the melted rail end must be cut off when a rail end begins to melt?

A. 1 inch

B. 2 inches

C. 3 inches

D. 4 inches

When a rail end begins to melt during the thermite welding process, it is crucial to cut off a specific amount of the melted portion to ensure a proper weld and to remove any imperfections that may have formed. The standard practice dictates removing a 2-inch section of the melted rail end. This 2-inch cut serves several purposes. Firstly, it eliminates any irregularity or contamination at the melted end, which could interfere with the integrity of the weld. Secondly, it ensures that the surfaces being joined are clean and free from any oxides or other materials that might weaken the joint. Proper preparation is vital for achieving a high-quality weld that can withstand the operational stresses encountered by rail joints. While the other options represent various cut lengths, the 2-inch specification has been established as optimal for achieving the best possible weld quality in this specific context, balancing efficiency with the need for a clean weld area.

2. What type of welding is specifically noted for cooldowns and handling moisture conditions?

A. Mig welding

B. Tig welding

C. Thermite welding

D. Arc welding

Thermite welding is particularly distinguished by its effective handling of cooldowns and moisture conditions due to the nature of the process. This method relies on an exothermic reaction between aluminum powder and metal oxides, resulting in molten metal that is poured into a mold. This process generates extremely high temperatures, allowing for rapid solidification and making it less sensitive to atmospheric moisture compared to other welding methods. The ability to perform well in adverse conditions is critical for applications that demand strong, durable welds, especially in railway construction and heavy metal applications. Given the chemical composition and the method of heating, thermite welding prevents issues like contamination and moisture-related defects, which can often compromise weld integrity in other welding techniques. The other methods mentioned, while effective in various scenarios, are generally more susceptible to issues arising from environmental conditions, particularly with moisture, which can negatively impact weld quality and performance.

3. Which tool or method is advised against using for sharpening shear dies?

A. mechanical devices

B. hand filing

C. light grinding

D. none of the above

Using mechanical devices to sharpen shear dies is advised against because these tools can remove material too aggressively and may lead to an uneven edge or even damage the die. Shear dies require precise geometry and a sharp edge to ensure they function correctly during operation. Mechanical devices may not provide the level of control needed to maintain the necessary tolerances and surface finish that are critical for effective cutting. On the other hand, hand filing and light grinding are generally acceptable methods for sharpening shear dies, as they allow for more precise adjustments and refinements in the edge profile. This precision is crucial in maintaining the integrity and performance of the shear dies, as a well-sharpened die contributes significantly to the quality of the cut and the lifespan of the tool.

4. How many tie spikes or clips must be removed from each side of the weld crib?

A. 1

B. 2

C. 3

D. 4

In thermite welding, the removal of tie spikes or clips is essential to properly prepare the welding area and ensure a successful weld. The correct approach is to remove one tie spike or clip from each side of the weld crib. This allows for the thermal expansion and contraction that occurs during the welding process while maintaining the stability of the rails or components being joined. Removing one tie spike from each side (a total of two) provides the necessary clearance for the molten thermite to flow into the joint without obstruction. This step is crucial because leaving too many spikes or clips in place could hinder the weld quality, potentially leading to defects or structural weaknesses in the final weld. Proper preparation is key in thermite welding practices, and understanding how many attachments to remove helps ensure both safety and the integrity of the welding joint.

5. Is thermite welding permitted on rail ends that have already been repair welded?

A. Surely permitted

B. Sometimes permitted

C. Prohibited

D. Conditionally permitted

Thermite welding on rail ends that have already been repair welded is prohibited primarily due to the integrity and structural reliability concerns related to the welding process. When rail ends undergo repair welding, the material properties can be altered, which may lead to weaknesses or defects in the weld zone. Thermite welding involves a high-temperature exothermic reaction, which can further affect the heat-affected zone and potentially compromise the original repairs or the structural integrity of the rail itself. In jurisdictions and industry standards, it is critical to ensure that all welding processes maintain the necessary strength and safety measures for railway operations. Allowing thermite welding on previously repaired rails could introduce risks of failure, which goes against safety protocols established in the rail transport industry. Therefore, such practices are prohibited to uphold the standards for reliability and performance in railway infrastructure.

6. How high are the Orgo and Boutet Wide Gap Welds left at the heat lines?

A. .005

B. .010

C. .015

D. .020

The correct answer indicates that the Orgo and Boutet Wide Gap Welds are left at a height of .010 inches at the heat lines. This specific measurement is important in thermite welding as it ensures proper bonding and structural integrity in the joint being welded. Maintaining a precise height at the heat lines helps control the flow of molten metal, ensuring it fills the gap adequately without excessive spillage or insufficient coverage. This balance is crucial for producing a high-quality weld that can withstand mechanical stresses and environmental factors. In the context of weld quality, leaving the weld too high can result in excessive material in the joint, which can adversely affect the weld profile and lead to potential defects, while having it too low might compromise the joint strength due to insufficient fusion between the components being joined. Therefore, having the height set correctly at .010 inches is a standard practice that aligns with the technical requirements for optimal thermite welding results.

7. The Orgo Head Repair process specifies that 2" of the railhead must be completely removed down to which section of the web?

A. 1/2"

B. 1"

C. 1-1/2"

D. 2"

The correct answer specifies that 2 inches of the railhead must be completely removed down to a depth of 1 inch into the web. This requirement is based on ensuring that adequate material is removed to allow for proper fusion of the thermite weld. When the railhead is heated and welded, the joint must have a clean and sufficient depth to promote optimal bonding between the rail sections. Removing 2 inches of the railhead down to 1 inch ensures that any brittle or damaged material, as well as dirt and oxides, that may hinder weld quality are effectively eliminated. This depth is critical because it balances the need for a robust weld while avoiding excessive removal of material that could weaken the rail structure. The thermal dynamics involved in the thermite welding process require this specific depth to ensure that the molten thermite fully penetrates and interacts with the exposed surfaces, thus creating a strong and stable joint. In contrast, other depths such as 1/2 inch, 1-1/2 inches, or 2 inches either do not provide enough exposure for effective welding or may risk compromising the integrity of the adjacent rail material.

8. What shade lens is required during the ignition and pouring of molten steel?

A. 4

B. 5

C. 6

D. 7

During the ignition and pouring of molten steel in thermite welding, a lens that is shade 5 is required to protect the welder's eyes. The intense light and infrared radiation emitted during the thermite reaction can be damaging to the eyes. A shade 5 lens strikes a balance, providing adequate protection against the bright light generated while not being too dark, which could impair visibility when monitoring the process. Choosing the appropriate lens shade is critical to ensure both safety and visibility. A shade that is too light would not block enough of the harmful radiation, while a shade that is too dark could hinder the ability to see the critical aspects of the welding operation. Thus, a shade 5 lens provides an optimal level of protection for these specific conditions.

9. What maximum distance is acceptable for the flow on the rail head before welding?

A. 2 inches

B. 4 inches

C. 1 inch

D. 3 inches

In thermite welding, ensuring proper joint alignment and avoiding defects in the weld is critical for the integrity of the welded rail. The maximum acceptable distance for the flow on the rail head before welding is designated to be 2 inches. This distance serves to define the limits within which the molten metal can flow and still achieve a strong bond without compromising the quality of the weld or affecting the fit-up of the rail. Exceeding this distance could lead to issues such as misalignment of the rail sections or an uneven weld bead, which can introduce weak points and potentially lead to failures under load. Thus, maintaining this flow distance ensures optimal heat distribution and proper fusion of the rail materials during the welding process, which is essential for achieving the necessary structural integrity.

10. Which of the following processes might result in excess heat during thermite welding?

A. Charging

B. Preheating

C. Notching

D. Alignment

Excess heat during thermite welding can occur during the preheating process. Preheating is an important step in thermite welding as it involves warming the base metal to a certain temperature before the actual welding process begins. This helps to reduce the temperature difference between the molten weld metal and the base metal, promoting better fusion and reducing the risk of thermal shock. However, if the preheating is excessive, it can lead to overheating of the base metal, which can create challenges such as warping, distortion, or even degradation of material properties. In contrast, charging refers to the process of preparing and applying the thermite mixture, which is focused on ensuring the reactants are correctly positioned for the reaction. Notching involves creating grooves or indentations to aid in the alignment of the metals being welded, which does not inherently produce heat. Alignment is the process of positioning the pieces to ensure proper fit-up prior to welding, and while important for the welding process, it does not contribute to generating excess heat. Thus, preheating stands out as the process most likely associated with creating excess heat in thermite welding.