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Practice Questions

Try all 30 first, then check the answer key at the back.

1. On a welding symbol, what does it mean when the symbol is placed below the reference line?

A. The weld should be made on the other side of the joint
B. The weld should be made on both sides of the joint
C. The weld is optional and can be placed at the fabricator's discretion
D. The weld should be made on the arrow side of the joint

2. What does a circular symbol placed at the intersection of the arrow and reference line indicate?

A. An all-around weld
B. A field weld
C. A spot weld
D. A plug weld

3. What information would typically be found in the tail of a welding symbol?

A. The cost estimate for the weld
B. Welding process specifications or reference information
C. The welding engineer's signature
D. The date the weld must be completed

4. What does a flag at the junction of the arrow and the reference line signify?

A. Field weld
B. All-around weld
C. Intermittent weld
D. Weld with reinforcement

5. How is the size of a spot weld indicated on a welding symbol?

A. Inside the spot weld symbol
B. To the right of the spot weld symbol
C. Below the reference line
D. To the left of the spot weld symbol

6. What information is conveyed when numbers are placed to the right of a seam weld symbol?

A. Diameter and depth of the weld
B. Voltage and amperage settings
C. Length and pitch of the weld
D. Width and height of the weld

7. What does a circle around the intersection of the reference line and arrow indicate?

A. Multiple pass weld
B. All-around weld
C. Spot weld
D. Field weld

8. In projection welding symbols, how is the number of projections indicated?

A. Above or below the weld symbol, depending on projection location
B. Always to the right of the symbol
C. Inside the projection weld symbol
D. In the tail of the welding symbol

9. What does it mean when there is no arrow or other side significance shown on a welding symbol with a resistance spot weld symbol?

A. The drawing is incomplete and requires revision
B. The weld must be made exactly at the centerline of the joint
C. Both pieces must be turned over and welded from both sides
D. The weld can be made from either side as resistance spot welds typically penetrate through the material

10. Which of the following is a typical destructive test method for resistance spot welds?

A. Dye penetrant test
B. Eddy current test
C. Peel test
D. Ultrasonic test

11. What is the most common non-destructive testing method used to evaluate resistance spot welds in production environments?

A. Liquid penetrant testing
B. Ultrasonic testing
C. Magnetic particle testing
D. Computed tomography

12. What type of weld failure occurs when the weld nugget completely pulls out from one sheet, leaving a hole?

A. Button pullout failure
B. Interfacial failure
C. Partial thickness failure
D. Heat-affected zone failure

13. What is the minimum acceptable nugget diameter for a spot weld according to most industry standards?

A. $3\sqrt{t}$ (where t is the thickness of the thinnest sheet)
B. 5t (where t is the thickness of the thinnest sheet)
C. 2t (where t is the thickness of the thinnest sheet)
D. $4\sqrt{t}$ (where t is the thickness of the thinnest sheet)

14. Which of the following defects is caused by excessive welding current in resistance spot welding?

A. Stick weld
B. Incomplete fusion
C. Expulsion
D. Cold weld

15. Which non-destructive test method is based on measuring the electrical conductivity changes in welds?

A. Visual inspection
B. Eddy current testing
C. Ultrasonic testing
D. Radiographic testing

16. What is the purpose of the chisel test for resistance spot welds?

A. To determine weld strength and examine failure mode
B. To measure hardness of the weld
C. To identify surface porosity
D. To check electrode alignment

17. In resistance welding, what defect is characterized by a lack of fusion between the sheets with only a weak bond at the faying surface?

A. Blow hole
B. Crack
C. Expulsion
D. Stick weld

18. What is the primary purpose of cross-sectioning a spot weld for metallographic examination?

A. To check for electrode indentation
B. To measure electrical resistance
C. To measure nugget size and examine internal defects
D. To determine surface hardness

19. Which of the following is a sign of electrode wear in resistance welding quality inspection?

A. Symmetrical indentation
B. Inconsistent weld nugget size
C. Uniform discoloration of the weld zone
D. Consistent expulsion

20. What does the term 'nugget diameter' refer to in resistance spot weld quality assessment?

A. The diameter of the fused zone between the sheets
B. The diameter of the electrode tip
C. The total heat-affected zone
D. The diameter of the visible surface indentation

21. Which weld quality test involves applying a tensile force parallel to the weld interface?

A. Cross-tension test
B. Torsion test
C. Peel test
D. Shear test

22. What does an interfacial failure in a spot weld destructive test indicate?

A. Proper weld strength and fusion
B. Electrode misalignment only
C. Inadequate nugget size or improper weld parameters
D. Excessive nugget penetration

23. According to AWS standards, what is typically considered the minimum acceptable tensile-shear strength for a spot weld?

A. 2,500 × t pounds (where t is thickness in inches)
B. 4,000 × t pounds (where t is thickness in inches)
C. 1,000 × t pounds (where t is thickness in inches)
D. 10,000 × t pounds (where t is thickness in inches)

24. Which non-destructive testing method for spot welds uses sound waves to detect discontinuities?

A. Ultrasonic testing
B. Magnetic particle testing
C. Visual inspection
D. Infrared thermography

25. What is the primary cause of internal porosity in resistance spot welds?

A. Excessive electrode force
B. Too low welding current
C. Insufficient hold time
D. Trapped gases from surface contaminants

26. Which method is best for determining the hardness profile across a resistance weld?

A. Impact testing
B. Peel testing
C. Microhardness testing
D. Tensile testing

27. What is the primary limitation of visual inspection for resistance spot welds?

A. Cannot be performed on aluminum
B. Cannot detect internal defects
C. Takes too much time
D. Requires expensive equipment

28. Which defect is characterized by cracks at the edge of the weld nugget?

A. Circumferential cracking
B. Centerline cracking
C. Crater cracking
D. Longitudinal cracking

29. What is the recommended frequency for performing destructive tests on production spot welds according to most quality standards?

A. For every weld produced
B. Only during initial setup
C. Only when visual inspection indicates a problem
D. Periodically (typically daily or per shift)

30. What is the primary purpose of water cooling in resistance welding electrodes?

A. To reduce electrical resistance in the electrodes
B. To increase current flow through the weld zone
C. To prevent electrode overheating and extend electrode life
D. To cool the workpiece being welded

Answer Key & Explanations

1. D — The weld should be made on the arrow side of the joint
When a welding symbol is placed below the reference line, it indicates that the weld should be made on the arrow side (the side to which the arrow points) of the joint. This is a fundamental principle of reading welding symbols that helps communicate where the weld should be located.

2. C — A spot weld
A circular symbol at the intersection of the arrow and reference line indicates a spot weld. This is commonly used in resistance welding to specify where spot welds should be placed.

3. B — Welding process specifications or reference information
The tail of a welding symbol is used to provide supplementary information such as welding process specifications, welding procedures, references to notes, or specific requirements that cannot be conveyed by the standard symbols alone.

4. A — Field weld
A flag (a small triangular symbol) at the junction of the arrow and reference line indicates a field weld, meaning the weld is to be performed at the job site rather than in a fabrication shop.

5. D — To the left of the spot weld symbol
The size (diameter) of a spot weld is indicated to the left of the spot weld symbol. This dimension specifies the diameter of the weld nugget that should be formed during the resistance welding process.

6. C — Length and pitch of the weld
Numbers placed to the right of a seam weld symbol indicate the length of the weld and the pitch (center-to-center distance) of increments in an intermittent seam weld, typically expressed as 'length-pitch' (e.g., '2-6' means 2 inches of weld spaced 6 inches apart).

7. B — All-around weld
A circle around the intersection of the reference line and arrow indicates an all-around weld, meaning the weld continues completely around the joint or feature.

8. A — Above or below the weld symbol, depending on projection location
In projection welding symbols, the number of projections is indicated above or below the weld symbol, depending on which side of the joint the projections are on. This information is critical for proper setup of projection welding operations.

9. D — The weld can be made from either side as resistance spot welds typically penetrate through the material
When there is no arrow or other side significance shown on a resistance spot weld symbol, it means that the location of the weld is not important or is obvious from the context. The weld can be made from either side as it will penetrate through the material.

10. C — Peel test
The peel test is a common destructive test method for resistance spot welds where the two welded sheets are pulled apart to examine the nugget size and failure mode.

11. B — Ultrasonic testing
Ultrasonic testing is the most common non-destructive method for evaluating spot welds in production environments because it can quickly determine weld size and detect internal discontinuities.

12. A — Button pullout failure
Button pullout failure occurs when the weld nugget completely pulls out of one sheet during destructive testing, which is generally considered a good indication of proper fusion and weld strength.

13. D — 4√t (where t is the thickness of the thinnest sheet)
Most industry standards specify that the minimum acceptable nugget diameter should be 4√t (4 times the square root of the thickness of the thinnest sheet being joined).

14. C — Expulsion
Expulsion (metal splash) occurs when excessive welding current causes the molten metal to be expelled from the weld zone, resulting in material loss and potentially weaker welds.

15. B — Eddy current testing
Eddy current testing works by inducing electrical currents in conductive materials and measuring the changes in electromagnetic field, which can indicate variations in weld quality.

16. A — To determine weld strength and examine failure mode
The chisel test is used to separate spot-welded joints by driving a chisel between the sheets to determine the weld strength and examine the failure mode and nugget size.

17. D — Stick weld
A stick weld occurs when insufficient heat or pressure results in a weak bond without proper fusion between the sheets, often causing interfacial failure during testing.

18. C — To measure nugget size and examine internal defects
Cross-sectioning allows for direct measurement of nugget size and shape, and examination of internal defects like cracks, porosity, and fusion quality that cannot be seen from the surface.

19. B — Inconsistent weld nugget size
Inconsistent weld nugget size is a primary indicator of electrode wear, as worn electrodes cannot maintain consistent current density and pressure during welding.

20. A — The diameter of the fused zone between the sheets
Nugget diameter refers to the size of the fused zone between the welded sheets, which is a critical measurement for determining weld quality and strength.

21. D — Shear test
A shear test applies tensile force parallel to the weld interface to determine the shear strength of the weld, which is critical for many load-bearing applications.

22. C — Inadequate nugget size or improper weld parameters
An interfacial failure, where the weld fractures through the middle of the nugget, often indicates inadequate

nugget size, improper welding parameters, or material incompatibility issues.

23. B — 4,000 × t pounds (where t is thickness in inches)
According to AWS standards, the minimum acceptable tensile-shear strength is typically specified as 4,000 × t pounds (where t is the thickness in inches of the thinner sheet).

24. A — Ultrasonic testing
Ultrasonic testing uses high-frequency sound waves that reflect differently from weld defects, allowing detection of discontinuities without damaging the weld.

25. D — Trapped gases from surface contaminants
Internal porosity is primarily caused by trapped gases (often from surface contaminants like oils, greases, or coatings) that cannot escape the molten nugget during solidification.

26. C — Microhardness testing
Microhardness testing allows for precise measurement of hardness at multiple points across the weld, including the base metal, heat-affected zone, and weld nugget.

27. B — Cannot detect internal defects
Visual inspection is limited because it can only detect surface defects, while most critical defects in resistance spot welds are internal and not visible from the surface.

28. A — Circumferential cracking
Circumferential cracking occurs at the edge of the weld nugget, often due to rapid cooling rates, improper heat balance, or excessive electrode force.

29. D — Periodically (typically daily or per shift)
Most quality standards recommend periodic destructive testing (typically daily or at shift changes) to verify weld quality, with frequency increasing for critical applications or when process changes occur.

30. C — To prevent electrode overheating and extend electrode life
Water cooling in resistance welding electrodes prevents overheating and extends electrode life by removing heat generated during the welding process, which helps maintain consistent electrode face geometry and prevents excessive mushrooming.

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