



Welding Inspector CWI

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Practice Questions

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1. AWS D1.1 is the primary structural welding code that governs welding of what base material?

- A. Steel
- B. Aluminum
- C. Stainless steel
- D. Titanium

2. What is the key difference between a discontinuity and a defect in welding?

- A. A defect is always visible to the naked eye; a discontinuity is not
- B. A defect is a discontinuity that exceeds the acceptance criteria of the applicable code
- C. A discontinuity only occurs in the base metal; a defect only occurs in the weld metal
- D. A defect requires immediate repair; a discontinuity does not require inspection

3. Which of the following is the MOST fundamental NDT method used by a Certified Welding Inspector during routine weld examination?

- A. Visual inspection (VT)
- B. Radiographic testing (RT)
- C. Ultrasonic testing (UT)
- D. Magnetic particle testing (MT)

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4. What is the crystal structure of iron (ferrite) at room temperature?

- A. Body-centered cubic (BCC)
- B. Face-centered cubic (FCC)
- C. Hexagonal close-packed (HCP)
- D. Body-centered tetragonal (BCT)



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5. What does the acronym SMAW stand for?

- A. Shielded Metal Arc Welding
- B. Submerged Metal Arc Welding
- C. Shielded Mig Arc Welding
- D. Semi-automatic Metal Arc Welding

6. Which minimum filter lens shade is required for shielded metal arc welding (SMAW) at 200–400 amperes?

- A. Shade 8
- B. Shade 10
- C. Shade 12
- D. Shade 14

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7. On a welding symbol, the reference line is always drawn in what orientation?

- A. Horizontal
- B. Vertical
- C. Diagonal at 45°
- D. Curved

8. A joint made between two members lying in the same plane is called a:

- A. Butt joint
- B. Corner joint
- C. T-joint
- D. Lap joint

9. AWS D1.1 applies to structures with a base metal minimum thickness of:

- A. 1/16 in (1.6 mm)
- B. 3/32 in (2.4 mm)
- C. 1/8 in (3.2 mm)
- D. 3/16 in (4.8 mm)

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10. Which type of porosity is characterized by a cluster of pores grouped together in a localized area of the weld?

- A. Uniformly scattered porosity
- B. Linear porosity
- C. Cluster porosity
- D. Piping porosity

11. During visual inspection of a completed weld, an inspector notices the weld face is concave and dips below the base metal surface. This discontinuity is called:

- A. Overlap
- B. Undercut
- C. Underfill
- D. Burn-through

12. What crystal structure does austenite (gamma iron) possess?

- A. Body-centered cubic (BCC)
- B. Face-centered cubic (FCC)
- C. Hexagonal close-packed (HCP)
- D. Simple cubic

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13. In GMAW, what primarily shields the weld pool from atmospheric contamination?

- A. Flux coating on the electrode
- B. Submerged granular flux
- C. An externally supplied shielding gas
- D. A slag blanket formed during welding

14. What type of eye protection must be worn beneath an auto-darkening welding helmet during grinding operations?

- A. Tinted safety glasses
- B. A full face shield alone
- C. Clear safety glasses or goggles
- D. No additional protection is needed



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15. Where is the arrow placed on a welding symbol?

- A. At the left end of the tail
- B. At one end of the reference line
- C. Above the reference line
- D. Inside the weld symbol

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16. Which joint type is formed when one member is placed perpendicular to the surface of another, forming a T shape?

- A. Butt joint
- B. Lap joint
- C. T-joint
- D. Corner joint

17. A prequalified WPS under AWS D1.1 does NOT require:

- A. Qualification testing (procedure qualification)
- B. A written document describing welding variables
- C. Specification of the welding process
- D. Identification of the filler metal classification

18. Piping porosity (also called wormhole porosity) forms when gas escapes through:

- A. Solidified weld metal at the toes
- B. The heat-affected zone
- C. Laminations in the base metal
- D. The solidifying weld pool, creating an elongated void aligned with the solidification direction

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19. What term describes a weld discontinuity where the weld metal flows over the base metal surface but does not fuse with it?

- A. Undercut
- B. Overlap
- C. Porosity
- D. Incomplete fusion



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20. What is the maximum carbon content (by weight) that can dissolve in austenite?

- A. 0.025%
- B. 0.77%
- C. 2.11%
- D. 4.3%

21. Which electrode type is used in the GTAW process?

- A. Consumable coated stick electrode
- B. Non-consumable tungsten electrode
- C. Continuously fed solid wire electrode
- D. Flux-cored tubular wire electrode

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22. Which clothing material is MOST appropriate for a welder to wear to protect against spatter and arc flash?

- A. Flame-resistant (FR) cotton or wool
- B. Polyester blend shirt
- C. Nylon coveralls
- D. Rayon jacket

23. In AWS welding symbol notation, where is weld information placed when the weld is on the ARROW side of the joint?

- A. Above the reference line
- B. In the tail
- C. Below the reference line
- D. To the right of the arrow

24. When two overlapping members are joined along their overlapping region, the joint is classified as a:

- A. Butt joint
- B. T-joint
- C. Edge joint
- D. Lap joint

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25. Which of the following welding processes is listed as prequalified in AWS D1.1?

- A. Gas tungsten arc welding (GTAW)
- B. Plasma arc welding (PAW)
- C. Submerged arc welding (SAW)
- D. Electroslag welding (ESW)

26. Porosity in a GMAW weld is most commonly caused by which of the following?

- A. Excessive preheat temperature
- B. Contamination of the base metal or filler with moisture, oil, or rust
- C. Too-slow travel speed resulting in excessive heat input
- D. Insufficient arc voltage causing incomplete fusion

27. A groove melted into the base metal at the toe of a weld and left unfilled is known as:

- A. Crater crack
- B. Porosity
- C. Overlap
- D. Undercut

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28. What is the eutectoid carbon content in the iron-carbon diagram?

- A. 0.025%
- B. 0.10%
- C. 2.11%
- D. 0.77%

29. In Submerged Arc Welding (SAW), the arc is shielded by:

- A. Carbon dioxide gas injected through the torch
- B. A flux coating on the consumable wire
- C. Argon gas flowing over the weld pool
- D. A blanket of granular flux covering the arc

30. When welding on galvanized steel, which respiratory hazard is of PRIMARY concern?

- A. Carbon monoxide
- B. Ozone
- C. Nitrogen dioxide
- D. Zinc oxide fumes



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Answer Key & Explanations

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1. A — Steel

AWS D1.1 is titled 'Structural Welding Code – Steel' and covers the welding of steel structures. Other AWS codes address aluminum (D1.2) and stainless steel (D1.6).

2. B — A defect is a discontinuity that exceeds the acceptance criteria of the applicable code

A discontinuity is any interruption in the normal physical structure of a material. It becomes a defect only when it exceeds the acceptance criteria specified by the applicable code or standard, making rejection mandatory.

3. A — Visual inspection (VT)

Visual inspection (VT) is the most fundamental and most widely used NDT method. It is always performed before, during, and after welding, and is required by virtually every welding code.

4. A — Body-centered cubic (BCC)

At room temperature, iron exists as alpha-ferrite with a body-centered cubic (BCC) crystal structure. This structure transforms to FCC austenite above 912°C (1674°F).

5. A — Shielded Metal Arc Welding

SMAW stands for Shielded Metal Arc Welding, commonly called 'stick' welding. It uses a flux-coated consumable electrode to create the arc and provide shielding.

6. B — Shade 10

ANSI Z49.1 and OSHA 1910.133 tables specify shade 10 as the minimum for SMAW at 200–400 A. Lower shades provide insufficient UV/IR protection at this amperage range.

7. A — Horizontal

Per AWS A2.4, the reference line of a welding symbol is always drawn horizontally. All other elements of the symbol are placed relative to this horizontal line.

8. A — Butt joint

A butt joint is formed when two members are aligned in the same plane with their edges meeting. Corner, T-, and lap joints involve members at angles or overlapping.

9. D — 3/16 in (4.8 mm)

AWS D1.1 generally applies to structural steel 3/16 in (4.8 mm) and thicker. Thinner material falls under sheet-metal or other codes such as AWS D1.3.

10. C — Cluster porosity

Cluster porosity consists of a group of pores concentrated in a small, localized region. It differs from uniformly scattered porosity (distributed throughout the weld) and piping porosity (elongated, wormhole-like voids).

11. C — Underfill

A weld face that is below the surrounding base metal surface is termed underfill. It reduces the effective throat and cross-section of the joint, potentially making it weaker than required.



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12. B — Face-centered cubic (FCC)

Austenite has a face-centered cubic (FCC) structure, which allows it to dissolve significantly more carbon than ferrite. It exists between 912°C and 1394°C in pure iron.

13. C — An externally supplied shielding gas

GMAW (Gas Metal Arc Welding / MIG) uses an externally supplied shielding gas—such as argon, CO₂, or a mixed gas—to protect the molten weld pool from oxygen and nitrogen in the atmosphere.

14. C — Clear safety glasses or goggles

An auto-darkening helmet is designed for arc welding, not impact protection during grinding. Safety glasses or goggles underneath protect against flying debris when grinding is performed.

15. B — At one end of the reference line

The arrow connects at one end of the reference line and points to the joint or member being welded. The tail (when used) is at the opposite end.

16. C — T-joint

A T-joint is created when one member is welded to the face of another at approximately 90°, creating the characteristic T shape. A corner joint meets at edges, not face-to-surface.

17. A — Qualification testing (procedure qualification)

Prequalified WPSs comply with all AWS D1.1 prequalification requirements and therefore do not require procedure qualification testing. They still must be documented in writing with all essential variables.

18. D — The solidifying weld pool, creating an elongated void aligned with the solidification direction

Piping porosity forms when gas attempts to escape through the weld pool as it solidifies. If the pool solidifies faster than the gas escapes, a long, tunnel-like void (pipe) is trapped in the weld.

19. B — Overlap

Overlap (also called cold lap) occurs when molten weld metal flows onto the base metal surface and solidifies without fusing to it. It creates a mechanical notch and is generally rejectable.

20. C — 2.11%

Austenite can dissolve up to 2.11% carbon at the eutectic temperature (1148°C). Above this carbon content, the alloy is classified as cast iron rather than steel.

21. B — Non-consumable tungsten electrode

GTAW (Gas Tungsten Arc Welding / TIG) uses a non-consumable tungsten electrode. Filler metal, when required, is fed separately into the weld pool by the welder.

22. A — Flame-resistant (FR) cotton or wool

FR cotton and wool are preferred because they self-extinguish after the ignition source is removed. Synthetic fabrics like nylon, polyester, and rayon melt and cling to skin, worsening burn injuries.

23. C — Below the reference line

Arrow-side weld information is always placed below the reference line. Other-side information is placed above. This convention is defined in AWS A2.4.

24. D — Lap joint

A lap joint is formed when two members overlap and the weld is made along the edge of one member to the



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face of the other. This distinguishes it from a butt joint where members are end-to-end.

25. C — Submerged arc welding (SAW)

SAW is listed as a prequalified process in AWS D1.1. GTAW and PAW are not prequalified under D1.1. ESW requires qualification testing.

26. B — Contamination of the base metal or filler with moisture, oil, or rust

Porosity results from gas (hydrogen, nitrogen, oxygen) trapped in solidifying weld metal. Moisture, oil, and rust on the base metal or filler wire are the most common sources of these gases in GMAW.

27. D — Undercut

Undercut is a groove formed at the weld toe due to improper welding parameters. It reduces the base metal cross-section and acts as a stress concentrator, potentially leading to fatigue cracking.

28. D — 0.77%

The eutectoid point in the iron-carbon diagram occurs at 0.77% carbon and 727°C (1341°F), where austenite transforms simultaneously into ferrite and cementite (pearlite).

29. D — A blanket of granular flux covering the arc

In SAW the arc and weld pool are completely submerged beneath a layer of granular flux, which melts to form a protective slag and shields the arc. This is why the process produces no visible arc flash during operation.

30. D — Zinc oxide fumes

Galvanized coatings are zinc-based. Heating zinc produces zinc oxide fumes, which cause metal fume fever. While other fumes may also form, zinc oxide is the principal hazard unique to galvanized work.



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