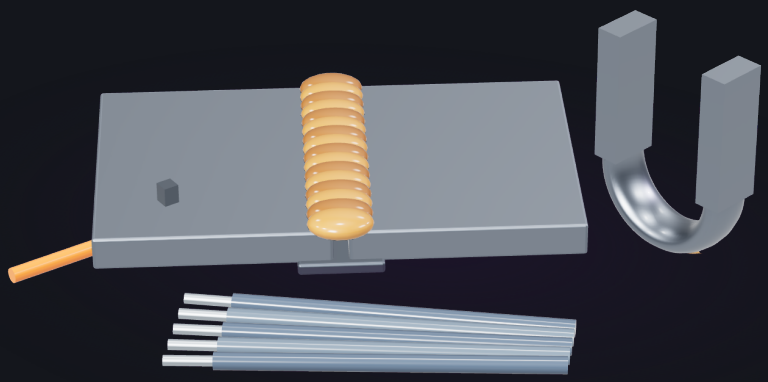
FREE STUDY GUIDE

Welder Certification Study Guide 2026

How the AWS welder test works, positions 1G to 6G, electrodes, welding symbols, defects and a 25-question practice quiz with answers.

- How the test and the certificate work
- Plate and pipe positions, drawn
- Reading welding symbols (AWS A2.4)
- 25-question practice quiz + answer key



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How welder certification works

What you test, where, and how you keep it

In the U.S., most welding jobs ask you to pass a hands-on weld test. You weld a test plate or pipe in a set position, and an inspector checks it. If it passes, you are qualified for that process, position and thickness range. There is no written exam for the basic welder qualification: the weld is the test.

Two common paths

- AWS Certified Welder: a national program from the American Welding Society. You test at an AWS Accredited Test Facility (ATF), and your record goes into the AWS database, so any employer can check it.
- Employer test: many shops test you on day one with their own Welding Procedure Specification (WPS). The result is valid for that company.

The codes you will hear about

Code	Where it is used
AWS D1.1	Structural steel: buildings, bridges, frames. The most common plate test.
ASME Section IX	Pressure vessels, boilers and process piping.
API 1104	Pipelines (oil and gas).

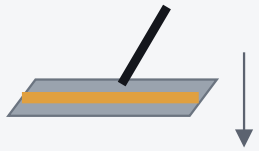
Keeping it current

A welder qualification usually stays valid while you keep welding with that process. In the AWS Certified Welder program, you send a maintenance form every 6 months to show you are still welding. If you stop using the process for longer than that, you may have to test again.

> **Tip**
> Before you book a test, ask the shop or the union hall which code, process and position they hire for. Testing in the right one saves money and time.

Positions: plate and pipe

The number is the position, the letter is the joint: G = groove, F = fillet



1G · Flat

Plate flat, weld from above



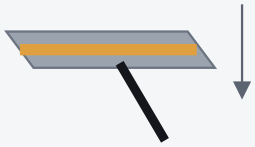
2G · Horizontal

Plate vertical, weld runs sideways



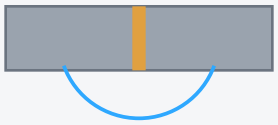
3G · Vertical

Plate vertical, weld runs up or down



4G · Overhead

Weld from below, over your head



1G pipe

Pipe horizontal and rolled



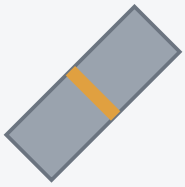
2G pipe

Pipe vertical, weld runs around it



5G pipe

Pipe horizontal and fixed: flat, vertical and overhead in one joint



6G pipe

Pipe fixed at 45 degrees: the hardest test

Fillet positions follow the same numbers: 1F flat, 2F horizontal, 3F vertical, 4F overhead.

Why 3G and 4G matter

Under AWS D1.1, passing plate groove tests in 3G and 4G usually qualifies you for groove and fillet welds on plate in all positions. Always confirm in the WPS and the code edition your employer uses.

Processes and electrodes

Know what you are running before you strike an arc

Process	Also called	Where you see it
SMAW	Stick	Structural, repair, field work. Works outdoors in wind.
GMAW	MIG	Shops and production. Fast, needs shielding gas.
FCAW	Flux-core	Heavy structural. Self-shielded wire works outdoors.
GTAW	TIG	Pipe root passes, stainless, aluminum. Slow and precise.

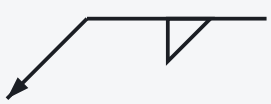
Reading a stick electrode: E7018

Part	Meaning
E	Electrode
70	Minimum tensile strength of the weld metal: 70,000 psi
1	Position: 1 = all positions (2 = flat and horizontal only)
8	Coating and current: low-hydrogen, AC or DCEP

- E6010: deep penetration, DCEP, common for pipe root passes.
- E7018: low-hydrogen, the classic structural rod. After the can is opened, keep it in a rod oven so it does not absorb moisture.
- GMAW on carbon steel often uses 75% argon and 25% CO2 (C25).
- DCEP means electrode positive, also called reverse polarity.

Reading welding symbols

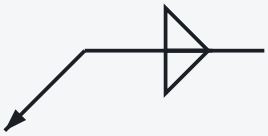
AWS A2.4: the reference line tells you what to weld and where



Symbol BELOW the line: weld on the arrow side.



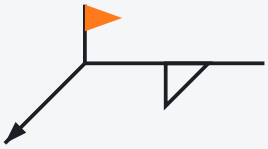
Symbol ABOVE the line: weld on the other side.



Symbol on both sides: weld both sides of the joint.



V shape: V-groove weld on the arrow side.



Flag: field weld, done on site, not in the shop.



Circle: weld all around the joint.

- The triangle is a fillet weld. The number to its left is the weld size (leg length).
- The number to its right is the length of the weld; a second number after a dash is the pitch (center to center) for intermittent welds.
- The tail carries extra notes: process, specification or procedure. No note, no tail.
- The arrow points to the joint. Arrow side is the side it touches.

Practice

Grab any shop drawing and say each symbol out loud: weld type, side, size, length, field or shop. It is the fastest way to stop guessing on the job.

Inspection and common defects

What the inspector looks for, and how to avoid it

Your test coupon is checked visually first. Then it is usually cut into strips and bent (guided bend test), or checked by X-ray. In a bend test, the strip is bent around a mandrel, and hidden defects open up on the surface. Under AWS D1.1, an open discontinuity larger than 1/8 in (3 mm) fails the strip.

Defect	What it looks like	Common fix
Porosity	Small gas holes in the weld	Clean the metal, check gas flow and drafts, dry rods
Undercut	A groove melted into the base metal at the toe	Lower the amperage, adjust angle, pause at the edges
Incomplete fusion	Weld metal sitting on top, not melted in	More heat, correct angle, clean between passes
Slag inclusion	Slag trapped between passes	Chip and brush every pass, fix the bead shape
Cracks	Lines in the weld or next to it	Preheat when required, low-hydrogen rods, proper fit-up
Overlap	Weld metal rolled over the toe without fusing	Travel faster, less filler, correct angle

Before you hand in the coupon

Check the start and the stop of each pass. Most test failures come from a cold start or a crater at the end, not from the middle of the weld.

Safety on the job

OSHA rules for welding: 29 CFR 1910 Subpart Q (general industry) and 1926 Subpart J (construction)

- Eyes and face: a welding helmet with the right filter shade for your process and amperage. Use the ANSI Z49.1 shade chart.
- Skin: flame-resistant clothing, leather gloves, no synthetic shirts. UV burns like a sunburn.
- Fumes: weld with ventilation or local exhaust, keep your head out of the plume. Galvanized and stainless fumes need extra care.
- Fire: clear flammables, keep an extinguisher close, and use a fire watch when the job requires it.
- Hot work: never weld or cut a drum or tank that held fuel or chemicals until it is cleaned and declared safe.
- Confined spaces: follow the permit rules. Never bring a gas cylinder inside.
- Cylinders: upright, chained and capped when not in use.

> **Remember**
> Safety rules on site come from your employer and the law. This page is a reminder, not a replacement for training.

Test day and a 4-week plan

Test-day checklist

- Ask in advance: code, process, position, plate thickness and backing.
- Bring your own helmet, gloves, jacket, chipping hammer, wire brush and grinder if allowed.
- Read the WPS twice: amperage range, electrode, passes, interpass cleaning.
- Tack and fit-up exactly as shown. A bad fit-up is a bad weld.
- Take your time on each restart. Clean every pass.

4-week practice plan

Week	What to practice
1	Flat and horizontal fillets (1F, 2F). Consistent arc length and travel speed.
2	Vertical up (3F, then 3G). Weave, pause at the toes.
3	Overhead (4F, then 4G). Short arc, smaller beads.
4	Full test coupons in your target position. Cut and bend your own strips, if your shop allows.

Practice quiz: 25 questions

Circle one answer. Key on the last page.

1 **In "E7018", what does "70" mean?**

a) 70 amps
b) Minimum tensile strength of 70,000 psi
c) 70-degree angle
d) 7.0 mm diameter

2 **In "E7018", the "1" means the rod can be used:**

a) Flat only
b) Flat and horizontal only
c) In all positions
d) Overhead only

3 **A 3G plate test is welded in which position?**

a) Flat
b) Horizontal
c) Vertical
d) Overhead

4 **A 4G test is welded:**

a) Flat
b) Overhead
c) On pipe at 45 degrees
d) Vertical down only

5 **In a 6G pipe test, the pipe is:**

a) Rolled on a stand
b) Vertical
c) Fixed at 45 degrees
d) Horizontal and rolled

6 **In a 5G pipe test, the pipe is:**

a) Horizontal and fixed
b) Vertical and fixed
c) Horizontal and rolled
d) At 45 degrees

7 **"Stick" welding is the common name for:**

a) GMAW
b) GTAW
c) SMAW
d) FCAW

8 **TIG welding is:**

a) GTAW
b) GMAW
c) SAW
d) SMAW

9 **A fillet triangle BELOW the reference line means:**

a) Weld on the other side
b) Weld on the arrow side
c) Field weld
d) Weld all around

10 **A symbol ABOVE the reference line means:**

a) Arrow side
b) Other side
c) Both sides
d) Grind flush

11 **A flag at the joint of the arrow and reference line means:**

a) Field weld
b) Weld all around
c) Back weld
d) Inspection required

12 **A circle at the same spot means:**

a) Spot weld
b) Weld all around
c) Plug weld
d) Field weld

13 **The tail of a welding symbol is used for:**

a) Weld size
b) Process, spec or notes
c) Weld length
d) Arrow side

Practice quiz: 25 questions (cont.)

14 **A guided bend test shows:**

a) Hardness only
b) Defects that open up when the strip is bent
c) The color of the weld
d) Electrode brand

15 **Under AWS D1.1, a bend strip fails with an open discontinuity larger than:**

a) 1/32 in
b) 1/16 in
c) 1/8 in (3 mm)
d) 1/2 in

16 **Passing 3G and 4G plate groove tests under D1.1 usually qualifies you for:**

a) Flat only
b) Plate groove and fillet in all positions
c) All pipe positions
d) TIG on aluminum

17 **Undercut is:**

a) Gas holes
b) A groove melted into the base metal at the toe
c) Too much weld metal
d) A crack in the crater

18 **Porosity is:**

a) Gas pockets in the weld
b) Slag between passes
c) Lack of fusion
d) Weld spatter

19 **After opening a can of E7018, you should:**

a) Wet the rods
b) Store them in a rod oven
c) Keep them in the sun
d) Use them only for TIG

20 **DCEP means:**

a) Electrode negative
b) Electrode positive (reverse polarity)
c) Alternating current
d) Double current

21 **Why preheat thick carbon steel?**

a) To change its color
b) To lower the risk of cracking
c) To use less gas
d) It is never needed

22 **In the AWS Certified Welder program, you keep your certification active by:**

a) Retesting every month
b) A maintenance form every 6 months
c) Paying once for life
d) Nothing at all

23 **A common GMAW gas for carbon steel is:**

a) 100% oxygen
b) 75% argon / 25% CO2
c) Natural gas
d) 100% nitrogen

24 **A fillet weld size is measured by its:**

a) Leg length
b) Color
c) Number of passes
d) Electrode brand

25 **Before welding on a drum that held fuel, you must:**

a) Weld quickly
b) Have it cleaned and declared safe first
c) Fill it with water halfway only
d) Use TIG instead

Answer key

Check your score: 20 or more is a good sign

1. b
Tensile strength in thousands of psi.

2. c
1 = all positions; 2 = flat and horizontal.

3. c
3 = vertical.

4. b
4 = overhead.

5. c
Fixed at 45: all positions in one joint.

6. a
It does not rotate.

7. c
Shielded metal arc welding.

8. a
Gas tungsten arc welding.

9. b
Below = arrow side.

10. b
Above = other side.

11. a
Weld done on site.

12. b
All around the joint.

13. b
Extra information.

14. b
Soundness and ductility.

15. c
1/8 in in any direction.

16. b
Confirm in the WPS.

17. b
Often too much amperage.

18. a
Dirty metal, bad gas coverage.

19. b
Low-hydrogen rods absorb moisture.

20. b
Direct current electrode positive.

21. b
Slower cooling, less hydrogen cracking.

22. b
Shows you are still welding.

23. b
Called C25.

24. a
The number left of the triangle.

25. b
Hot work rule.

Free educational guide by Vifalio, based on public information from the American Welding Society (AWS), AWS D1.1 and A2.4, ANSI Z49.1 and OSHA, checked in November 2026. Not affiliated with AWS, OSHA or any test facility. Rules change with code editions: always follow your WPS, your employer and your local requirements.