

Lesson 5: Welding Out of Position

Making a Downhill Fillet Weld

Objective: Students will observe how to make a downhill fillet weld using a shielded metal arc welder.

Directions: Use an arc welder to make a downhill fillet weld in a tee joint.

Materials and Equipment:

SMAW machine and accessories	Safety glasses or goggles
Chipping hammer	Leather gloves and any other protective clothing recommended by instructor
Wire brush	SMAW electrode(s), selected by instructor
Helmet*	Mild steel plates, selected by instructor

* Everyone participating in or observing the demonstration should wear appropriate protective eyewear.

Procedure:

1. Inspect equipment, materials, and work area to ensure safe and correct operation.
2. Wear appropriate face and eye protection and protective clothing.
3. Set up and turn on the machine.
 - a. Explain any differences in setup, such as current setting or electrode diameter, for welding in the vertical position.
 - b. Explain that slag has a tendency to run into the weld pool when welding downhill. To prevent this, the welder must stay ahead of the slag, which requires a speed that generally produces welds with shallow penetration. For this reason, downhill welding is probably most effective on thin material.
4. Cover up and remind those in the area to do so as well.
5. Tack weld the pieces together at a 90-degree angle, leaving approximately a 1/16-in. gap between the pieces.
6. Clean slag from the tack welds.
7. Secure the pieces in the vertical position.
8. Strike an arc and demonstrate the correct procedure for welding the joint.
 - a. Hold the electrode approximately 10 to 15 degrees below a right angle, so that it is pointed up at the work, and about 45 degrees from each side.
 - b. Generally, the arc length used for vertical welds is shorter than that used for flat welds.

- c. A stringer bead is generally recommended for the root pass.
- 9. Remove the slag from the weld.
- 10. Run additional passes if needed to complete the weld, cleaning the weld between each pass. A weaving pattern can be used to distribute heat if needed.
- 11. Clean the final pass and inspect the weld.
- 12. Remove the electrode from the holder and observe safety, shutdown, and cleanup procedures.
- 13. Assign the student version of AS 2 to be performed by the students.