

steel quiz

Modern Steel Construction's monthly Steel Quiz tests your knowledge of steel design and construction. This month's Quiz (tack)les welding.

- 1 **True or False:** The critical stress in a fillet weld is considered to be a shear stress.
- 2 A single-sided CJP groove weld without a backing bar:
 - a. is impossible
 - b. should be avoided
 - c. is possible due to recent advances in robotic welding technology
- 3 **True or False:** Welding in structural steel is performed in compliance with written welding procedure specifications (WPS).
- 4 Regarding welding inspection, _____ inspection is the most commonly required inspection process.
- 5 Shielding protects the molten weld metal from primarily which two gases? (Choose two.)
 - a. Nitrogen
 - b. Argon
 - c. Oxygen
 - d. Helium
- 6 Five configurations are typically presented in welded joints; butt, T-, corner, edge and _____.
- 7 Which of the following terms does not belong with the others?
 - a. Weld backing
 - b. Backing strips
 - c. Weld tabs
 - d. Backing bars
- 8 I permit access, either for welding or for insertion of backing. I limit the presence of triaxial stresses, which leads to better ductility. There are requirements that govern my size, and I like to have smooth surfaces that are free of notches and gouges. What am I?
- 9 Section 7 of AWS D1.1 addresses
 - a. Qualification
 - b. Strengthening and Repairing of Existing Structures
 - c. Fabrication
 - d. Stud Welding

TURN PAGE FOR THE ANSWERS

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Figure 1

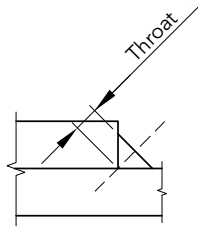
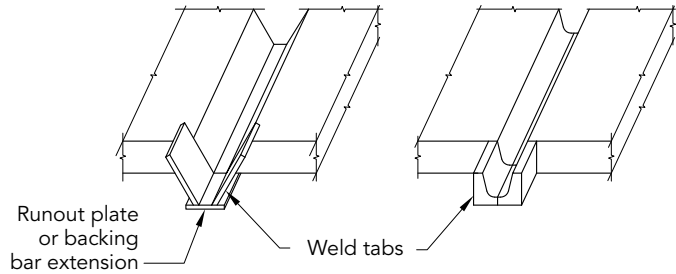


Figure 2



- 1 True.** Tension, compression and moments acting upon a fillet-welded joint are always resolved as shear in the weld throat—i.e., the least diagonal dimension (see Figure 1).
- 2 b.** This situation should be avoided. These joints are seldom justifiable economically or structurally. They are expensive for several reasons: welder qualifications are appreciably more demanding, the resulting joints are not prequalified and preparation and fit-up are more exacting. Inspection of such welds can be difficult and potentially controversial when attempts are made to confirm acceptable complete penetration. Weld repairs are intricate and may damage other portions of the joint unless care is used.
- 3 True.** WPS are used to control base metal, consumables, joint geometry, electrical and other essential variables for welded joints.
- 4 Visual.** The designer must realize that more stringent requirements for inspection can needlessly add significant cost to the project and should specify them only in those instances where they are essential to the integrity of the structure. The most common weld in steel fabrication is a fillet weld, which, per Chapter N of the *Specification for Structural Steel Buildings* (ANSI/AISC 360, available at www.aisc.org/specifications) requires visual inspection.
- 5 a. and c.** Nitrogen and oxygen. Given that the atmosphere is composed of roughly 80% nitrogen and 19% oxygen, the weld pool must be protected from these gases.
- 6 Lap.** Examples of lap joints (as generalized in Figure 1) include flange plates on beams, angles to gusset plates and clip angles to beam webs.
- 7 c.** Weld tabs. A weld tab is not a backing bar but rather a piece of material that extends beyond the ends of a joint, on which the weld can be initiated or terminated. They are sometimes referred to a "runoff tabs." See Figure 2.
- 8 A weld access hole.** Requirements for weld access holes are listed in *Specification* section J1.6, with configurations provided in the Commentary.
- 9 d.** Stud Welding. This section details the requirements for the welding of shear studs, either by the stud welding process or by use of other arc welding processes (e.g., SMAW, FCAW).

