

Stick Welding: Beginner to Confident Basics

A practical SMAW guide covering history, electrode classifications, settings, technique, troubleshooting, practice, and safety.

What Stick Welding Is

Stick welding is shielded metal arc welding (SMAW). The flux-coated electrode conducts current and melts as filler metal while the coating creates shielding gases and slag. It is rugged, portable, and well suited to repair, structural work, and outdoor conditions.

A Short History

Early arc-welding experiments date to the late 1800s. Coated electrodes and improved power sources transformed manual metal arc welding in the early 20th century, making dependable field welding possible across construction, shipbuilding, pipelines, farms, and repair shops.

Electrode Number Basics

For many AWS mild-steel electrodes, the first digits indicate minimum tensile strength in ksi, the next digit indicates approved position, and the final digits relate to coating/current characteristics. Always use the manufacturer's classification and data sheet for exact requirements.

Common Electrodes

Rod	Typical shop use	Notes
E6010	Pipe/root work; field work	Deep, forceful arc; commonly DCEP; requires appropriate power source
E6011	Repair/outdoor/less-clean steel	AC/DC capable variants; forceful digging arc
E6013	Light fabrication; sheet	Smooth arc; relatively easy restrike; moderate penetration
E7018	Structural/fabrication	Low-hydrogen classification; storage/handling matters
E7024	High-deposition flat/horizontal	Iron-powder electrode; limited positions

Amperage and Arc Length

Electrode diameter, electrode classification, position, base-metal thickness, joint design, and machine characteristics all influence current. Start inside the manufacturer's recommended range. Too long an arc tends to increase spatter and instability; too short can cause sticking or slag problems.

Technique

- Strike the arc deliberately; establish a controlled puddle before traveling
- Maintain arc length close to the electrode core diameter unless procedure calls for otherwise
- Use drag or manipulation appropriate to the electrode
- Watch both puddle edges to ensure tie-in
- Remove slag between passes
- Store low-hydrogen electrodes according to manufacturer/code requirements

Troubleshooting

Problem	Likely causes	Check
Sticking	Current low, arc too short	Increase within range; improve strike
Undercut	High current, fast travel, poor angle	Reduce heat or travel speed; correct angle
Slag inclusion	Poor cleaning, narrow groove, bad manipulation	Clean each pass; improve joint access/tie-in
Porosity	Moisture/contamination/long arc	Dry/handle rods correctly; clean metal; shorten arc
Excess spatter	Long arc, high current, polarity mismatch	Shorten arc; verify current/polarity

Practice Progression

- Beads on flat plate
- Pad of beads
- Flat fillet welds
- Butt joints
- Horizontal fillets
- Vertical-up practice
- Overhead only after consistent control in easier positions

Safety

Welding can expose you to intense ultraviolet/infrared radiation, hot metal, electric shock, fire, compressed gas, fumes, and moving equipment. Use appropriate PPE, ventilation/fume control, fire prevention, and manufacturer instructions. Never rely on a quick-reference chart where a code, engineered procedure, or qualified welding procedure specification is required.