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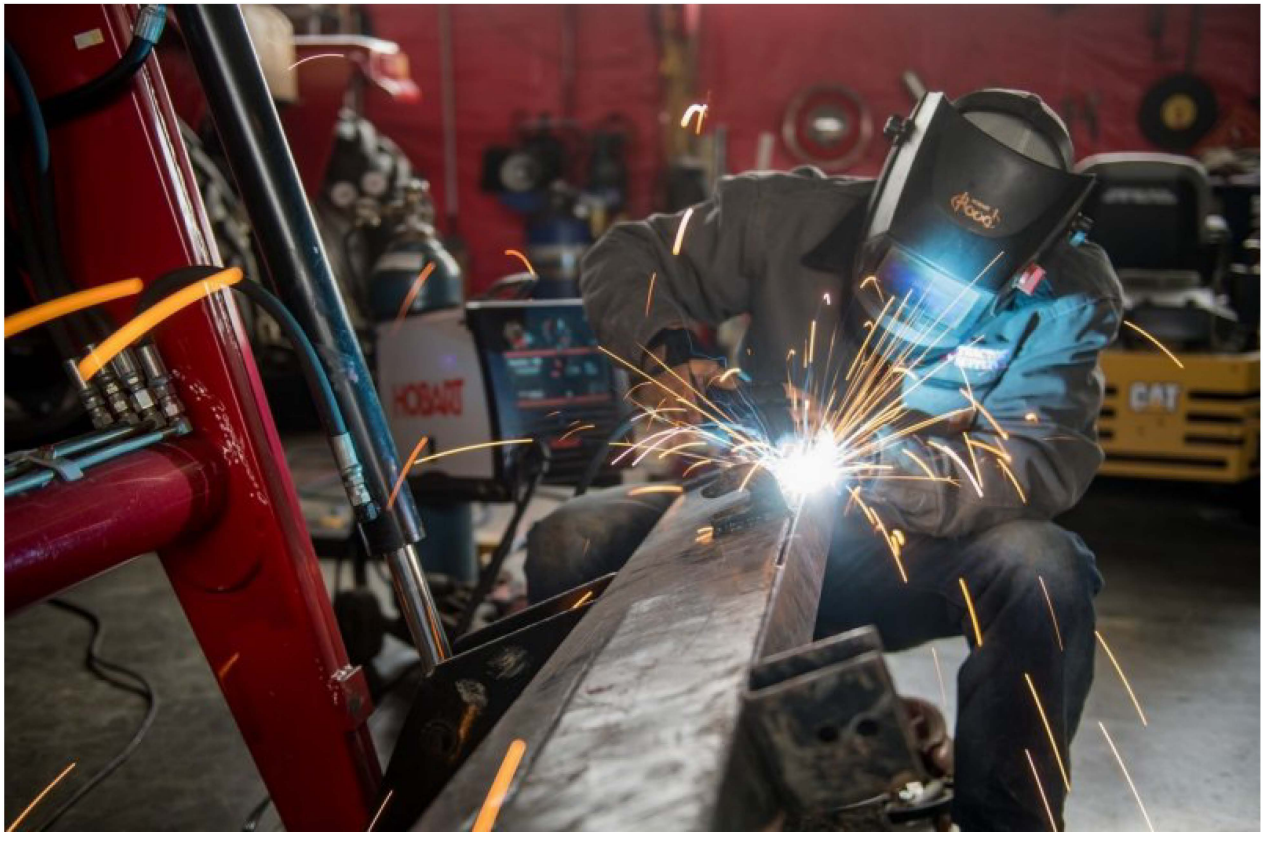
Electric Welding Basics for Beginners



Are you a do-it-yourselfer with a question about welding? With all the stuff you need to get your welding job done and all the people with the know-how to help you do it, Tractor Supply Company is your welding destination. Here are some tips to help you along. If you don't find what you need on this page, visit your local store and an expert team member will be happy to help.

What is electric welding

Electric welding is the joining of metal using an electrical arc and a filler metal stick electrode or wire. Welding is done by creating an arc between the base metal (the metal being welded) and the filler metal. The arc melts the base metal and filler metal, combining them into one material to join the base metals. The filler metal is consumed in the process.

Flux cored welding (FCAW) works like MIG welding, except flux cored welding does not require an external cylinder full of shielding gas.

What are different types of electric welding

There are a few types of electric welding for DIY welders. The three most popular types are: Arc, MIG and TIG welding. We take a deep dive on these, plus two other types, with this guide.

- Stick Welding
- Wire Feed Welders
- Flux Cored Arc Welding
- TIG Welding
- Resistance Spot Welding

Use the buttons below to learn more about a specific electric welding type.

Stick Welding **MIG Welding** **Flux Cored Arc**

TIG Welding **Resistance Spot**

Stick welding (SMAW or Shielded Metal Arc Welding)

Stick welding (also called SMAW or Shielded Metal Arc Welding) is the process of melting and joining metals by heating them with an arc between a covered metal electrode (rod/stick) and the workpiece. Shielding gas is obtained from the electrode outer coating (called flux).

Advantages of stick welding include:

- Welds steel, stainless steel, cast iron, hard surfacing, and aluminum
- The only electric process that can weld cast iron
- Suited for windy, outdoor conditions
- Can be used for welding on dirty or rusty metals with select filler metals
- Economical
- DC good for out-of-position welding.

Disadvantages of stick welding include:

- Not good for metals thinner than 16 gauge
- Tends to have more spatter than other processes

MIG welding or Wire Feed welding

MIG welding joins metals by heating them with an arc between a continuously fed wire (filler metal electrode) and the workpiece. Externally supplied gas or gas mixtures provide shielding. You can find sheilding gas at your local welding supply store.

The type of shielding gas depends on the type of wire. For mild steel wire, the gas is C25 (that is, 75% Argon and 25% CO2) or CO2. For aluminum wire, the gas is Argon. For stainless steel wire, the gas is called "tri-mix" (a mixture of Argon, CO2 and helium).

What does MIG stand for

MIG stands for metal inert gas. You may also hear this called GMAW, or gas metal arc welding.

Advantages of MIG welding include:

- Welds steel, stainless steel, and aluminum
- Continuous wirefeed makes it the easiest process to learn
- Produces cleaner welds than other processes
- Can be used for high-speed welding
- Provides good control on thinner metals
- Good for out-of-position welding

Disadvantages of MIG welding include:

- Must not be used in windy conditions
- All paint and rust needs to be cleaned off the material before welding

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Flux Cored Arc Welding (FCAW)

Wire-feed welders such as flux-cored and MIG welders, work like a caulking gun. When you pull the trigger on the gun, the wire feeds out continuously until you release the trigger or run out of wire.

How does flux cored arc welding work

Flux Cored Arc Welding (FCAW) melts and joins metals by heating them with an arc between a continuous consumable electrode wire and the work.

Advantages of flux-cored welding include:

- Continuous wirefeed makes it the easiest process to learn
- Welds steel and stainless steel
- Works well on dirty, paint, and rusty material
- Good for out-of-position welding
- Can be used in windy conditions
- Has increased metal deposition rate
- Provides deep penetration for welding thick sections

Disadvantages of flux-cored welding include:

- Requires slag removal after welding
- Produces a lot of spatter that needs clean up after welding

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TIG Welding (Tungsten Inert Gas, also known as GTAW or Gas Tungsten Arc welding)

TIG Welding (also called GTAW or Gas Tungsten Arc Welding) joins metals by heating them with an arc formed between the tungsten electrode and the base metal. (The tungsten electrode, unlike a stick electrode, does not become part of the completed weld). Filler metal is sometimes used and Argon inert gas or inert gas mixtures are used for shielding.

What does TIG stand for

TIG stands for Tungsten Inert Gas. You may also hear this called GTAW, of Gas Tungsten Arc welding.

Advantages of TIG welding include:

- AC TIG welds aluminum and magnesium alloys
- DC TIG welds brass, copper, steel, stainless steel, and titanium
- Provides the highest quality and most precise welds
- Ability to weld thin materials

Disadvantages of spot welding include:

- Primarily used for sheet metal work

Resistance spot welding

Resistance spot welding (also called simply spot welding) joins two pieces of metal by passing current between electrodes positioned on opposite sides of the pieces to be welded. There is no arc with this process and it is the resistance of the metal to the current flow that causes the fusion.

Advantages of spot welding include:

- Welds steel and stainless steel
- Relatively easy to use
- No shielding gas required

Disadvantages of spot welding include:

- Primarily used for sheet metal work

Types of Electric Welding Processes

There a number of different electric welding processes. While most of the processes work with steel, no one process works with every type of metal. The following table indicates which process is recommended for which type of metal. The different types of welding processes will be discussed in detail in the next section of this module.

Metal ypes and welding process with skill level

Stick welding	MIG	Flux Wire
Metal types: Steel, stainless steel, aluminum, cast iron	**Metal types**: Steel, stainless steel, aluminum	**Metal types**: Steel, stainless steel
Skill level: Moderate	**Skill level**: Low	**Skill level**: Low
AC-TIG	**DC-TIG**	**Resistance Spot**
Metal types: Aluminum, magnesium alloys	**Metal types**: Steel, stainless steel, copper/brass, titanium	**Metal types**: Steel, stainless steel
Skill level: High	**Skill level**: High	**Skill level**: Low

What is plasma cutting

Plasma cutting works on all electrically conductive metals: steel, stainless steel, galvanized, copper, brass, and aluminum. Plasma is known for producing clean accurate cuts with a minimal heat affected area. Plasma cutting reduces warping, which makes it a popular method for working with thin materials, such as in auto bodywork.

Do you need shielding gas for plasma cutting

Plasma cutting uses an electric arc and compressed air to generate its cutting power, so there is no need for gas cylinders.

You can find plasma cutters online at TractorSupply.com or at your local store.

Electric Welding Glossary

The following are common electric welding terms:

- **AC (Alternating Current)** - AC is common household current. AC stick and AC wire feed welding is least desirable because the arc is very erratic and unstable due to the current switching from positive to negative. However, it is the least expensive welding arc to purchase.
- **CC (Constant-Current Welding Machine)** - These welding machines have limited short circuit current. They have a negative volt-amp curve and are often referred to as “droppers”. The voltage will change with different arc lengths while only slightly varying the amperage, thus the name constant current or variable voltage; used in Stick and TIG welders.
- **CV (Constant-Voltage, Constant-Potential (CP) Welding Machine)** - “Potential” and “Voltage” are basically the same. This type of welding machine output maintains a relatively stable, consistent voltage regardless of the amperage output. It results in a relatively flat volt-amp curve (used in MIG and flux cored welders) as opposed to the drooping volt amp curve of a typical Stick (SMAW) welder.
- **DC (Direct Current)** - DC is created by converting AC current into DC current. DC is the much preferred type of current to use for welding because the arc is very smooth and stable with minimal spatter of the filler metal.
- **Duty cycle** - The duty cycle of a welder is the amount of time the welder is designed to operate in a ten minute period, i.e., 20% = two minutes. Duty cycle can be increased on some models up to 100% with decreased output. However, duty cycle is rarely an issue for customers.
- **Filler metal** - Filler metal is metal from a stick or wire that is melted in the arc of the welder and combines with the metal being welded to form an alloy that binds the work pieces together.
- **Flux** - Flux is a material included in a welding stick or fluxcored wire that gives off a gas when it burns. This gas serves to shield the welding arc. See shielding.
- **Shielding** - The electric arc of a welder needs to be protected from the gases of the atmosphere in order to make a good weld. The gas either comes from burning flux (see flux) or from shielding gas (see shielding gas).
- **Shielding gas** - Shielding gas is supplied directly from a gas cylinder and is required for wire welding with solid wire. The shielding gas is a mix of 75% Argon and 25% CO2 (C-25), 100% straight Argon for aluminum, and a mixture of Argon, CO2, and helium for stainless steel (also called "tri-mix"). These gases come in various cylinder sizes. See the Thoroughbred Industrial Cylinder Exchange section for specifics.
- **Stick** - A stick is a metal electrode that also serves as the filler metal in the stick welding process. The shielding gas is obtained from flux in the electrode outer coating. See flux.