

Recommended products for auto body repair:

- ▶ [Millermatic 211](#) (mild steel)
- ▶ [Millermatic 350P Auto Body Package](#) (aluminum, high strength steels)

General Questions

1. Why are auto manufacturers building vehicles out of different materials?

Aluminum and high strength steel are lighter in weight than the mild steel traditionally used in automotive manufacturing. Using lighter-weight metals in vehicles improves their fuel economy and helps automakers meet the U.S. government's Corporate Average Fuel Economy (CAFE) requirements.

2. What is Pulse MIG welding?

Pulse MIG welding applies a repeated pulse current over a constant background current, which reduces the heat input into the weld, resulting in less warping and distortion. The peak current/voltage transfers a single droplet of filler metal across the welding arc while the background current/voltage reduces heat input without allowing the arc to extinguish. Pulse MIG welding allows higher deposition rate in all positions where dip or spray transfer welding methods aren't possible. It's also a cleaner process than MIG welding, as it produces no spatter because the wire does not touch the weld puddle. The frequency at which the arc switches between the peak and background is what gives pulse welding its unique sound.

3. Can I use my current welder for pulse welding?

Only if it's an inverter type machine that has pulse MIG capabilities. Transformer based machines are not capable of pulse welding.

- ▶ **Recommended:** [Millermatic 350P](#) or [Millermatic 350P Aluminum](#)

Aluminum

1. What does it take to weld aluminum?

A 240V dedicated pulse MIG welder using 100% argon shielding gas is recommended.

Recommended: [Millermatic 350P Auto Body Package](#)

2. What gun is recommended for welding aluminum?

Because aluminum wire is softer than steel wire, it's more difficult to feed through long distances. Best results will be achieved pushing the wire a shorter distance.

- ▶ MIG gun (Teflon liner with 30-degree head tube — this reduces the amount of friction/drag)
 - [Miller MIG Guns](#)
- ▶ Push-pull gun
 - [Miller Push-Pull Guns](#)
- ▶ Spool gun
 - [Miller Spool Guns](#)



3. Which wires are recommended for welding aluminum?

An aluminum-constructed vehicle may utilize several different grades of aluminum through its structure. The welding wire used to make the proper repairs needs to match the grade of aluminum being welded.

- Common aluminum welding wires are 4043, 5356, 5554. Reference OEM specifications and repair procedures for selecting the correct wire for the repair.

► **Recommended:** [Hobart 4043, 5356, 5554](#)

4. How do I prepare an aluminum weld joint?

Since the melting point of the protective aluminum oxide layer (3,700 °F) is higher than the melting point of the base material (1,200 °F), the aluminum oxide layer needs to be removed before welding.

► Use the following steps to remove:

- Degrease the surfaces with a solvent
- Use a clean cloth such as cheese cloth or paper towels
- Use a dedicated stainless steel brush to remove the oxide layer
- Clean all wire brushes and cutting tools frequently

► Don't use any of the following:

- Lubricants on the joint preparation metal working process
- Chlorinated solvents in the welding area because they may form toxic gases
- Oxy-fuel gas cutting or oxy-fuel flames to preheat
- Shop rags or compressed air to clean or blow off the joint

5. How should I store aluminum and aluminum wire when not in use?

It's important to protect aluminum from oxidizing. Following these guidelines for proper storage:

- Store in a dry location that has minimal temperature fluctuations
- Store vertically to minimize moisture condensation
- Bring wire and material inside 24 hours prior to welding to allow them to come to room temperature
- Store wire in a sealed bag to limit air exposure

High Strength and Ultra-High Strength Steel

1. What's the difference between low carbon steels and high strength steels?

Aside from the difference in strengths and mechanical properties, the major difference between low carbon steels and high strength steels are the weldability of these materials, specifically the heat sensitivity. Low carbon steels have a low heat sensitivity; welding minimally affects the base material in the heat affected zone (HAZ). High strength steels are very heat sensitive. If too much heat is used while welding, it can have a drastic impact on the properties of the HAZ compared to the base material, causing cracking, increased hardness and ultimately producing a weld joint that will fail under load much soon than the unaffected base material.

2. What does it take to weld high strength or ultra-high strength steel?

A 240V dedicated pulse MIG welder using 100% argon shielding gas is recommended.

► **Recommended:** [Millermatic 350P Auto Body Package](#)

3. What gun is recommended for welding high strength or ultra-high strength steel?

The MIG gun is most popular. However, spool guns and push/pull guns can also be used.

4. Which wires are recommended for welding high strength or ultra-high strength steel?

- Generally, when welding high strength steels, the tensile strength of the wire should equal to or greater than the lowest tensile strength of the material being welded.
- Silicon bronze and other high strength steel wires are often recommended. Please reference OEM specifications for specific wire requirements.

5. How do I prepare a high strength steel weld joint?

To ensure a good weld and prevent contamination, make sure the base material is free of rust, road contaminants, paint and protective coatings.

The following items can be used (don't cross contaminate with aluminum):

- Wire brush
- Die grinder
- Wire wheel
- Flap disc

ITW Resources:

MIG Welding Aluminum Important Questions:

<https://www.millerwelds.com/resources/article-library/mig-welding-aluminum-important-questions-and-best-practices>

Select Right Spool Gun, Welder, Filler Metal:

<https://www.millerwelds.com/resources/article-library/mig-aluminum-diy-selecting-the-right-welder-spool-gun-and-filler-wire-for-success-at-home>

Setting the Correct MIG Parameters:

<https://www.millerwelds.com/resources/article-library/miggmaw-101-setting-the-correct-parameters>

Challenges of Welding Aluminum in Auto Body Repair:

<https://www.millerwelds.com/resources/article-library/addressing-the-challenges-of-welding-aluminum-in-auto-body-repair>

Hobart Filler Metals Welding Aluminum:

<http://www.hobartbrothers.com/news/207/523/Welding-Aluminum-Troubleshooting-Questions-Answered.html>