

4130 Chrome Moly

Yes, you can TIG weld 4130 tubing easily with the proper techniques identified in this procedure. We will answer the top ten most frequently asked questions of TIG welding 4130 Chrome-Moly. These procedures are intended for sporting applications such as experimental airplanes, racing car frames, roll cages, go-carts, bicycles, and motorcycle frames.

Can I weld 4130 using the TIG process?

Yes, 4130 Chrome-Moly has been TIG welded in the aerospace and aircraft industries for years.

Do I need to pre-heat?

Tubing applications do not require the normal 300°F to 400°F pre-heat to obtain acceptable strength. However, it is recommended that pre-heat of 100°F to 125°F be used to remove parent material moisture.

What filler material do I use?

Although there are several good filler materials, my recommendation would be ER80S-D2. This filler material will meet the strength and elongation requirements for experimental planes, racing car frames, roll cages, motorcycles and bicycle frames. Typically, you would obtain 20% elongation from this filler material after welding.

Why do I not use 4130 filler?

4130 filler typically is used for high strength and rigid applications. Due to its hardness or lack of elongation (flexibility), it is not recommended for sporting applications such as experimental airplanes, race car frames, roll cages, etc.

When I use ER80S-D2 filler material, do I give up strength for elongation?

Yes, the parent material will provide a tensile strength of approximately 95 Ksi. The filler material, when diluted with the parent material, will provide approximately 70 Ksi. However, with the proper joint design (such as cluster or gusset), the cross-sectional area and linear inches of weld will more than compensate for the strength.

Do I heat treat 4130 after welding?

NO! The term “heat treat” has been generically misused in the welding field, as has normalizing. Heat treat and normalizing operations are extremely sensitive to heat control (preferably oven-controlled) and do metallurgically change the strength value of the parent material. Stress-relieving is the recommended practice and 1,100°F is the optimum temperature for tubing applications. Use temperature crayon 900°F and mark approximately 1” away from weld areas. Use Oxy/Acetylene torch with neutral flame and oscillate to avoid hot spots.

NOTE: Excessive stresses are induced by too much heat input, poor fit-up, or both, therefore stress relieving can be avoided if all fit-ups are precision (using tools like the “Ol Joint Jigger”) and applying minimum heat input, i.e. smaller welds. TIG welding should not require a weaving pattern in the welding technique.

Do I have to pre-clean 4130 material?

Yes, remove surface scale and oils with mild abrasives and acetone. Wipe to remove all oils and lubricants. All burrs need to be removed with a hand scraper or burring tool.

Do I need to back-purge 4130 material?

Whenever possible, it is recommended to back-purge all 4130 welds using Argon gas. However, many welds are closure welds and back purging is impractical.

Do I need 4130 plate for support gussets?

No, mild steel will provide adequate stress and strain distribution. Most gussets are designed with more than adequate linear inches of weld.

Should I cool the metal after I finish welding?

ABSOLUTELY NOT! Rapid quenching of the metal will create problems such as cracking and lamellar tearing. Always allow the weld to slow cool.