

Tungsten Inert Gas (TIG) Arc Welding of Duramold-5; Page 2

Tungsten Electrode Type and Size: Tungsten electrodes should be zirconiated tungsten only. Pure tungsten electrodes may be used, but they do not have the same current carrying capacity as zirconiated electrodes. Do not use thoriated tungsten electrodes because they will produce a wandering, erratic arc. 3/16" diameter electrodes should be used in a 500 amp torch. If a 350 amp torch is used, a 5/32" diameter electrode should be used.

Filler Wire Type, Size and Preparation: For the best match in mechanical properties and color, alloy 5356 filler wire should be used. The filler wire diameter should be 1/8" (preferred) or 5/32" diameter. As a precaution, each piece of filler wire should be degreased by wiping with a clean, lint free rag saturated with solvent prior to welding. Brushing the 5356 filler wire before welding is also recommended for oxide removal.

An additional recommendation is that the filler wire is heated before using at 100–110°F for 24 hours to reduce welding defects caused by water steam deposition on the filler wire.

Gas Cup Size and Angle: The gas cup should be 7/16" to 5/8" inside diameter. The weld is made with a leading angle on the torch of 5° to 15°. Never drag the torch along with a trailing angle because a large amount of weld porosity will result.

Welding Current: When welding using a 5/32" electrode, the maximum welding current should be 220 amps. For 3/16" electrodes, the maximum current should be 300 amps. Typical welding currents are 190 amps for 5/32" electrodes and 250 amps for 3/16" electrodes.

Welding Technique: Aluminum should be welded "hot and fast". That is, the welding current should be high and the travel speed should be as rapid as possible. By putting the heat in quickly, we keep it confined to the welding area. If the heat is put in slowly, the high thermal conductivity of the aluminum conducts it away from the weld and the entire mold block gets hotter. For this reason, high currents will actually have less effect on the surrounding material than a lower current at a slower travel speed. Typical welding currents are 190 amps for 5/32" electrodes and 250 amps for 3/16" electrodes.

To avoid filler wire oxidation during welding, the wire must be maintained under the gas shielding near the melting pool.

Interpass Cleaning: Before depositing subsequent passes, the previous pass should be wire brushed with a stainless steel wire brush. {Thorough cleaning after the first pass is most critical due to the oxides that can be present at the surface interface before welding.} Manual brushing is preferred over power brushing. As always, brushes which have been previously used on steel or copper alloys should not be used on aluminum.

Post-Weld Heat Treatment: No post-weld heat treatment is necessary or desirable. Allow the weld to cool in still or moving air. (That is, after the weld is complete, it's OK to turn on a fan to help cool the part.) Never quench the part in water or spray water on the part.

(The data and suggestions in this guide are based on information believed to be reliable and are offered in good faith but without guarantee. Vista Metals Corp assumes no responsibility or liability for the use of this data and suggestions. Users are cautioned to obtain, understand and follow MSDS guidelines for any captioned cleaning agents or solvents or other consumables and to understand and follow all appropriate manufacturers safety and operating instructions for welding supplies and equipment.)

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