HASTELLOY® C-22® WELDING RECOMMENDATIONS

GENERAL WELDING RECOMMENDATIONS

Welding Hastelloy C-22 in many ways is similar to traditional 316L material. There are no special welding requirements or concerns, given that proper techniques and procedures are followed. The GTAW process is the most common method and can be done manually or automatically with orbital welding equipment.

Orbital welding parameters for Hastelloy C-22 are also similar to those for welding 316L. Weld schedules for a given size are comparable in weld current inputs, pulsing, travel speeds (IPM), and gas shielding of weld pool for both cover and backing.

WELDING HASTELLOY C-22

Any modern welding power supply with adequate output and controls can be used for common fusion welding. Generally, weld heat input is controlled in the low to moderate range.

Nickel-based alloys generally exhibit sluggish welding and shallow penetration characteristics; therefore, the possibility of incomplete fusion increases. Care must be used to ensure a sound weld. If orbital or automatic welding equipment is used, programs should utilize a pulsed current. Pulsed current inputs can help control weld penetration without exclusive heat input. Pulsing also helps control the weld pool, improving the uniformity of weld bead appearance.

Cleanliness is critical when welding nickel-based alloys. Contamination by grease, oil, lead, sulfur, or other low-melting-point elements can lead to severe cracking problems. The welding surface and adjacent areas should be cleaned thoroughly with an appropriate solvent, such as 99.9% isopropanol (IPA). Prior to welding, all foreign matter such as lubricates, cutting chips, burrs, and crayon markings should be removed.

POST-WELD ANNEALING

In the majority of corrosive environments, C-22 products are used in as-welded condition. Post-weld heat treatment such as full solution annealing or stress relief annealing is usually not required.

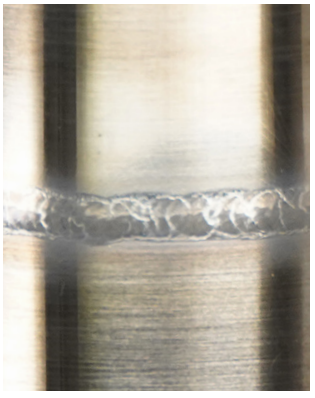
WELDING TO DISSIMILAR METALS

Orbital welding C-22 to other alloys such as AL-6XN or 316L can be done autogenously; however, performance expectations in corrosive environments should be kept low. Welding procedure development and mechanical testing should follow the requirements set by the applicable code or standard. Additional test methods should also be considered when evaluating corrosion. It is advisable to consult a metallurgist with corrosion experience to assess the service requirements for the specified application.

WELD APPEARANCE

Weld appearance of Super Alloys can be somewhat misleading when visually compared with any hygienic weld made in 316L stainless steel. A typical Hastelloy C-22 weld will have oxide islands in the weld bead. These films that form in the weld pool and solidify on the weld have been identified as high-melting-point nonmetallic oxides. Oxide islands are common, and the appearance is permitted in standards such as ASME BPE. Discoloration in the heat-affected zone (HAZ) is also expected and is not necessarily the result of improper gas shielding. Discoloration in the HAZ can be caused by tube mill surface conditioning processes such as pickling, passivation, mechanical polishing, cleaning, and/or annealing furnace atmosphere. Discoloration in the HAZ from these processes is generally darker than it is in traditional stainless steel materials, but it does not indicate an improper weld.

HASTELLOY C-22 WELD EXAMPLES



ID WELD

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CSI CONTACT CSI FOR MORE INFORMATION | CSIDESIGNS.COM | SALES@CSIDESIGNS.COM | 417.831.1411