Welding Procedures
Stainless Steels and Nickel Alloys

Bead Profiles and Techniques

Desired Bead Profile	Uniform tight stringer beads with adequate penetration. Minimize base metal dilution. The weld bead should have convex profile.
Technique	Stringer beads should be used, with careful attention paid to eliminating notches, crater cracks and areas of stress concentration. Use backstep technique to avoid crater cracks.
Helpful Hints	Be extra cautious of notches and crater cracks.
Preheat	Austenitic keep cool (300 Series), Martensitic keep hot (400 Series).
Base Metal ID	Austenitic materials are non-magnetic to slightly magnetic. Martensitic materials are magnetic and harder than typical stainless steel.

Group		Preheat °F	Postheat °F	Minimum Interpass °F	Maximum Interpass °F	Description
A – Austenitic – 200 and 300 Series Stainless	<1"	70°	N/A	N/A	225°	The easiest group of stainless steels to weld. Minimize base metal dilution by keeping heat input low. A wet rag can be immediately applied to weld area to keep interpass temperature low.
	1" – 2"	70°	N/A	N/A	225°	
	>2"	70°	N/A	N/A	225°	
B – Most Stainless and Dissimilar Steels	<1"	N/A	N/A	N/A	N/A	If there is any doubt as to the base metal composition or joining dissimilar grades together, use Cronatron 333 or Certanium 707®. Preheat is typically not necessary.
	1" – 2"	N/A	N/A	N/A	N/A	
	>2"	N/A	N/A	N/A	N/A	
C – Nickel Alloys	<1"	70°	N/A	N/A	400°	Moderately easy to weld, nickel alloys can be welded with little or no preheat. To weld properly, maintain a short arc length while using a slight drag angle along with a weave not to exceed 2 times the electrode diameter. Try to not overheat the base metal to minimize excessive grain growth.
	1" – 2"	70°	N/A	N/A	400°	
	>2"	70°	N/A	N/A	400°	
D – Duplex Stainless	<1"	100°	N/A	N/A	300°	Prevent rapid cooling after welding.
	1" – 2"	150°	N/A	N/A	300°	
	>2"	200°	N/A	N/A	300°	
E – Martensitic – 400 Series Stainless Steels	<1"	500°	Slow cool	500°	N/A	Difficult to weld because of the higher carbon content and susceptibility to cracking. A thorough preheat followed by a slow cool after welding yields the best success.
	1" – 2"	550°	Slow cool	550°	N/A	
	>2"	600°	Slow cool	600°	N/A	
CAUTION – Difficult to Weld Stainless Steels – 303, 416, 440s	<1"	N/A	N/A	N/A	N/A	The only way to weld these is to "butter" the mating surfaces while minimizing dilution and then join with 333 or 707. Even doing everything right, successful joining without cracking is difficult.
	1" – 2"	N/A	N/A	N/A	N/A	
	>2"	N/A	N/A	N/A	N/A	

For appropriate product selection, refer to previous page.

For optimal operating parameters, refer to tech sheets or the Cronatron Maintenance Welding Guide (C555).