

General Corrosion in Boiling Chemicals				
Boiling Environment	Corrosion Rate, Mils/Yr (mm/a)			
	304		304L	
20% Acetic Acid: Base Metal	0.1	(<0.01)	0.1	(<0.01)
Welded*	1.0	(0.03)	0.1	(<0.01)
45% Formic Acid, Base Metal	55	(1.4)	15	(0.4)
Welded*	52	(1.3)	19	(0.5)
10% Sulfamic Acid, Base Metal	144	(3.7)	50	(1.3)
Welded*	144	(3.7)	57	(1.4)
1% Hydrochloric, Base Metal	98	(2.5)	85	(2.2)
Welded	112	(2.8)	143	(3.6)
20% Phosphoric Acid, Base Metal	<1.0	(<0.03)	--	--
Welded	<1.0	(0.03)	--	--
65% Nitric Acid, Base Metal	9.2	(0.2)	8.9	(0.2)
Welded	9.4	(0.2)	7.4	(0.2)
10% Sulfuric Acid, Base Metal	445	(11.3)	662	(16.8)
Welded	494	(12.5)	879	(22.3)
50% Sodium Hydroxide, Base Metal	118	(3.0)	71	(1.8)
Welded	130	(3.3)	87	(2.2)

*Autogenous weld on base metal sample.

In some cases, the low carbon 304L may show a lower corrosion rate than the higher carbon 304, as shown by the data for formic acid, sulfamic acid and sodium hydroxides. Otherwise, the 304 and 304L may be considered to perform equally in most corrosive environments. A notable exception is in environments sufficiently corrosive to cause intergranular corrosion of welds and heat-affected zones on susceptible alloys. 304L is preferred for use in such media in the welded condition since the low carbon level resists carbide precipitation in the heat affected zone, and thereby enhances resistance to intergranular corrosion.

4.2 Intergranular Corrosion

At high temperatures (800°F - 1500°F or 427°C to 816°C) during service conditions, these stainless steel alloys may experience chromium carbide precipitation in the grain boundaries. This is typically referred to 'sensitization' and, when exposed to very harsh, aggressive conditions, the steel alloys may undergo intergranular corrosion. It is the carbon content in 304 that causes sensitization under thermal processes; as is the case for autogenous welds and heat-affected weld zones. Lower carbon content prolongs, but does not eliminate, the likelihood for precipitation of harmful level of chromium carbides.