

Appendix C27 Corrosion in Hydrofluoric acid

Corrosion rates of carbon steel and Alloy 400 in Hydrofluoric acid are shown in Table 1 and 2.

Table 1 Corrosion rate (mm/year) of carbon steel with temperature, velocity and HF concentration

Temp (°C)	Velocity (m/s)	HF-in-Water Concentration (%)								
		1	2	5	6	63	64	80	81	
									Low Residual	High Residual
27	< 3.05	0.05	3.81	3.81	20.32	20.32	0.13	0.13	0.05	0.15
	≥ 3.05	0.51	25.37	25.37	25.37	25.37	1.27	1.27	0.51	1.52
41	< 3.05	0.25	12.7	12.7	25.37	25.37	0.76	0.76	0.13	0.38
	≥ 3.05	5.08	25.37	25.37	25.37	25.37	7.62	7.62	1.27	3.81
60	< 3.05	0.25	12.7	12.7	25.37	25.37	0.76	0.76	0.25	0.76
	≥ 3.05	2.54	25.37	25.37	25.37	25.37	7.62	7.62	2.54	7.62
66	< 3.05	2.54	25.37	25.37	25.37	25.37	12.7	12.7	0.51	1.52
	≥ 3.05	25.37	25.37	25.37	25.37	25.37	25.37	25.37	5.08	15.24
75	< 3.05	2.54	25.37	25.37	25.37	25.37	12.7	12.7	1.27	3.81
	≥ 3.05	25.37	25.37	25.37	25.37	25.37	25.37	25.37	12.7	25.37
86	< 3.05	2.54	25.37	25.37	25.37	25.37	12.7	12.7	1.78	5.33
	≥ 3.05	25.37	25.37	25.37	25.37	25.37	25.37	25.37	17.78	25.37
93	< 3.05	12.7	25.37	25.37	25.37	25.37	25.37	25.37	2.54	7.62
	≥ 3.05	25.37	25.37	25.37	25.37	25.37	25.37	25.37	25.37	25.37

Table 1 Corrosion rate (mm/year) of Alloy 400 with temperature, velocity and HF concentration

Temp (°C)	Aerated?	HF-in-Water Concentration (%)							
		1	2	5	6	63	64	80	81
27	No	0.03	0.03	0.03	0.25	0.25	0.03	0.03	0.05
	Yes	0.25	0.25	0.25	0.64	0.64	0.25	0.25	0.38
52	No	0.03	0.03	0.03	0.38	0.38	0.13	0.13	0.08
	Yes	0.25	0.25	0.25	0.76	0.76	0.51	0.51	0.38
79	No	0.13	0.13	0.13	0.51	0.51	0.25	0.25	0.13
	Yes	0.51	0.51	0.51	2.54	2.54	1.27	1.27	0.51
93	No	0.25	0.25	0.25	0.51	0.51	0.51	0.51	0.25
	Yes	2.54	2.54	2.54	5.08	5.08	5.08	5.08	2.54