



Recommendation of Water Quality for BPHE

WATER CONTENT	CONCENTRATION (mg/l or ppm)	Plate material			Brazing material		
		AISI 304	AISI 316	SMO 254	Copper	Nickel	Stainless Steel
Alkalinity(HCO ₃ ⁻)	<70	+	+	+	0	+	+
	70-300	+	+	+	+	+	+
	>300	+	+	+	0/+	+	+
Sulfate ^[1] (SO ₄ ²⁻)	<70	+	+	+	+	+	+
	70-300	+	+	+	0/-	+	+
	>300	+	+	+	-	+	+
HCO ₃ ⁻ /SO ₄ ²⁻	>1.0	+	+	+	+	+	+
	<1.0	+	+	+	0/-	+	+
Electrical Conductivity	<10 µS/cm	+	+	+	0	+	+
	10-500 µS/cm	+	+	+	+	+	+
	>500 µS/cm	+	+	+	0	+	+
pH ^[2]	<6.0	0	0	0	0	+	0
	6.0-7.5	+	+	+	0	+	+
	7.5-10.0	+	+	+	+	+	+
	>10.0	+	+	+	0	+	+
Ammonium(NH ₄ ⁺)	<2	+	+	+	+	+	+
	2-20	+	+	+	0	+	+
	>20	+	+	+	-	+	+
Chlorides(Cl ⁻)	<100	+	+	+	+	+	+
	100-200	0	+	+	+	+	+
	200-300	-	+	+	+	+	+
	>300	-	-	+	0/+	+	-
Free chlorine(Cl ₂)	<1	+	+	+	+	+	+
	1-5	-	-	0	0	+	-
	>5	-	-	-	0/-	+	-
Oxygen	<0.02 or as low as possible	+	+	+	+	+	+
Hydrogen sulfide(H ₂ S)	<0.05	-	+	+	+	+	+
	>0.05	-	+	+	0/-	+	+
Free (aggressive) carbon dioxide(CO ₂)	<5	+	+	+	+	+	+
	5-20	+	+	+	0	+	+
	>20	+	+	+	-	+	+
Total hardness(CaCO ₃)	71-151.8	+	+	+	+	+	+
Nitrate ^[1] (NO ₃ ⁻)	<100	+	+	+	+	+	+
	>100	+	+	+	0	+	+
Iron ^[3] (Fe ³⁺)	<0.2	+	+	+	+	+	+
	>0.2	+	+	+	0	+	+
Aluminum(Al)	<0.2	+	+	+	+	+	+
	>0.2	+	+	+	0	+	+
Manganese ^[3] (Mn ⁴⁺)	<0.1	+	+	+	+	+	+
	>0.1	+	+	+	0	+	+

Explanations	
+	Good resistance under normal conditions
0	Corrosion problems possible especially when more factors have value 0
-	Use not recommended

- [1] Sulfates and nitrates inhibit pitting corrosion caused by chlorides in pH neutral environments
 [2] In general low pH (below 6) increases corrosion risk; high pH (above 7.5) decreases corrosion risk
 [3] Fe³⁺ and Mn⁴⁺ are strong oxidants and may increase the risk of localized corrosion on stainless steels
 [4] in combination with copper brazing material SiO₂ above 150 ppm increases the risk of scaling