

## WATER QUALITY STANDARDS

**Table 3: Water Quality Standards**

<i>Water Quality Parameter</i>	<i>HX Material</i>	<i>Closed Recirculating</i>	<i>Open Loop and Recirculating Well</i>		
<b>Scaling Potential - Primary Measurement</b>					
Above the given limits, scaling is likely to occur. Scaling indexes should be calculated using the limits below.					
pH/Calcium Hardness Method	All	-	<b>pH &lt; 7.5 and Ca Hardness &lt;100ppm</b>		
<b>Index Limits for Probable Scaling Situations - (Operation outside these limits is not recommended)</b>					
Scaling indexes should be calculated at 150°F for direct use and HWG applications, and at 90°F for indirect HX use. A monitoring plan should be implemented.					
Ryznar Stability Index	All	-	<b>6.0 - 7.5</b> If >7.5 minimize steel pipe use.		
Langelier Saturation Index	All	-	<b>-0.5 to +0.5</b> If <-0.5 minimize steel pipe use. Based upon 150 °F HWG and Direct well, 85°F Indirect Well HX		
<b>Iron Fouling</b>					
Iron Fe <sup>2+</sup> (Ferrous) (Bacterial Iron potential)	All	-	<b>&lt;0.2 ppm (Ferrous)</b> If Fe <sup>2+</sup> (ferrous)>0.2 ppm with pH 6 - 8, O <sub>2</sub> <5 ppm check for iron bacteria		
Iron Fouling	All	-	<b>&lt;0.5 ppm of Oxygen</b> Above this level deposition will occur.		
<b>Corrosion Prevention</b>					
pH	All	<b>6 - 8.5</b> Monitor/treat as needed	<b>6 - 8.5</b> Minimize steel pipe below 7 and no open tanks with pH <8		
Hydrogen Sulfide (H <sub>2</sub> S)	All	-	<b>&lt;0.5 ppm</b> At H <sub>2</sub> S>0.2 ppm, avoid use of copper and copper nickel piping or HX's. Rotten egg smell appears at 0.5 ppm level. Copper alloy (bronze or brass) cast components are OK to <0.5 ppm.		
Ammonia ion as hydroxide, chloride, nitrate and sulfate compounds	All	-	<b>&lt;0.5 ppm</b>		
Maximum Chloride Levels			Maximum Allowable at maximum water temperature.		
			50°F (10°C)	75°F (24°C)	100°F (38°C)
	Copper	-	<20ppm	NR	NR
	CuproNickel	-	<150 ppm	NR	NR
	304 SS	-	<400 ppm	<250 ppm	<150 ppm
	316 SS	-	<1000 ppm	<550 ppm	< 375 ppm
	Titanium	-	>1000 ppm	>550 ppm	>375 ppm
<b>Erosion and Clogging</b>					
Particulate Size and Erosion	All	<10 ppm of particles and a maximum velocity of 6 fps. Filtered for maximum 800 micron size.	<10 ppm (<1 ppm "sandfree" for reinjection) of particles and a maximum velocity of 6 fps. Filtered for maximum 800 micron size. Any particulate that is not removed can potentially clog components.		

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**Notes:**

- Closed Recirculating system is identified by a closed pressurized piping system. Recirculating open wells should observe the open recirculating design considerations.
- NR - Application not recommended.
- "-" No design Maximum.