

All water heating products, regardless of material, are vulnerable to scale buildup, which can reduce efficiency, increase energy consumption, and shorten lifespan. Proper water treatment and regular maintenance help minimize scale and extend system longevity. These water quality guidelines are based on internal testing, ASPE codes, and EPA limits and outline critical thresholds for system design, maintenance, and warranty considerations. They are designed to serve as a reference for determining the need for water softening and other conditioning systems to enhance the longevity and performance of water heating equipment. ASPE recommends water conditioning or softening equipment when water hardness exceeds 3.5 grains per gallon. Customers are encouraged to consult PVI for tailored solutions, especially during the design phase, to ensure optimal performance and durability.

Parameter	Heat Exchanger Type and PVI Limit					EPA Limit ¹ (Reference)	Common Values ¹ (Reference)
	COBREX	U-Tubes	Brazed Plate/ Plate & Frame	Incoloy Electric Elements	AquaPLEX		
Dissolved Chlorides	< 250 ppm			< 200 ppm	< 200 ppm	250 ppm max	< 120 ppm
Free chlorine ²	1.5 ppm max					4 ppm max ²	0.2 to 1 ppm
Hardness	See Supplementary Table NOTE: Per ASPE, “Generally speaking, almost any building supplied with water having a hardness of 3.5 grains per gallon or more (60 mg/L) should have a water softener”. ³					Not addressed	< 200 ppm (11.7 gpg)
Total Dissolved Solids (TDS)	Less than 500 ppm					500 ppm max	< 500 ppm
pH	Between 6.5 and 8.5					Between 6.5 and 8.5	Between 6.5 and 8.5
Alkalinity	There is no strict limit, but it should have similar limits to hardness—you need 1 molecule of hardness and 1 molecule of alkalinity to make 1 molecule of scale.					Not addressed	Not addressed
Manganese	0.05 ppm					0.05 ppm	Not addressed
Copper	1.0 ppm NOTE: ASME recommends a copper concentration of 0.01 to 0.05 ppm for boiler feed water.					1.3 ppm	Not addressed
Iron	< 0.3 ppm					0.3 ppm	Not addressed

NOTES:

¹ “Common values” refer to the values typically found at the building. EPA limits are indicated for water as it leaves the treatment facility and enters the municipal distribution network—they are intended for *human* health. For a list of National Secondary Drinking Water Regulations from the EPA: [EPA Drinking Water Regulations](#)

² The PVI free chlorine limit is a routine or day-to-day maximum maintenance level. Occasional chlorine shocking for system-wide sanitation per ASHRAE guidelines is permissible and will not void the warranty provided the water heater is bypassed during disinfection. The EPA limit of 4 ppm is not intended as a recommendation for a premise plumbing system.

³ from ASPE Data Book: A Plumbing Engineer’s Guide to System Design and Specifications Plumbing Components and Equipment.

● Consult PVI for additional guidance if the water heater contains brass fittings (e.g., Cobrex), the alkalinity is 30 ppm or less, and the pH > 8.0, as you may see de-zincification in the brass fittings

Inspection and Cleaning Maintenance Frequency (months)

		Setpoint Temperature °F		
		< 130	130 - 160	> 160
Hardness grains per gallon OR {mg/L}	< 3.5 / < {60}	24	18	12
	3.5 – 7 / {60 – 120}	18	12	6
	7 – 10 / {120 – 171}	12	6	3
	> 10 / > {171}	6	3	2