

Water Quality Information for Carbon Steel Boilers

For optimum results, the feedwater supply should be tested prior to initial start-up. If the mineral content exceeds the following recommended limits, various external treatment processes (water softener, reverse osmosis, etc.) may be used to correct the problem.

NOTE: An analysis of the on-site boiler feedwater must be made by a recognized and reliable water treatment company to ascertain the existing condition and treatment required.

RECOMMENDED FEEDWATER QUALITY

HARDNESS, ppm	8 – 85 (~0.5–5 gpg)
P-ALKALINITY, ppm	85 – 410 (~5–24 gpg)
T-ALKALINITY, ppm	200 – 500 (~7–0 gpg)
pH (strength of alkalinity)	8.0 – 11.4
SPECIFIC RESISTIVITY	~50k Ω cm (50,000 ohm-centimeter)

Blow down the boiler on at least a once-a-day basis. If boiler water or feed-water are outside the above limits, a more frequent blowdown is required.

RECOMMENDED LIMITS WITHIN A BOILER

TOTAL DISSOLVED SOLIDS, ppm	3500
TOTAL ALKALINITY, ppm	850
SUSPENDED SOLIDS, ppm	300
SILICA (SiO ₂), ppm	125
SULFITE (SO ₃), ppm	25–50
PHOSPHATE, ppm	30–60
P-ALKALINITY AS CaCO ₃ , ppm	900
IRON, ppm	2

Water quality can affect efficiency or result in boiler damage if neglected. Boiler feedwater contains impurities in solution and suspension. These impurities concentrate in the boiler since the steam generated is essentially pure. The concentration of these impurities increases as more feedwater is introduced into the boiler and steam is produced. If the suspended solids are allowed to concentrate beyond certain limits, a deposit or “scale” will form on the boiler’s internal surfaces. This deposit can interfere with proper boiler operation and cause boiler failure.

The concentration of these impurities is generally controlled by the feedwater quality and by blowdown. Blowdown refers to removing a portion of the boiler water with high solids concentration and replacing it with make-up water of a lower concentration.