

DID YOU KNOW?

NO: 1

May 5, 2009

Water Quality is Extremely Important

In mid-May, Primus will begin selling a Primus branded reverse osmosis system as an option with vertical door units. The system will be fully integrated with the sterilizer and the boiler. Stay tuned for further information from Sales and Marketing.

Water quality is one of the most important factors in determining the overall sustained performance of a steam sterilizer. Poor water quality can lead to a needlessly shortened boiler life, excessive maintenance costs, and unnecessary downtime for the hospital or laboratory. **In evaluating the Primus Service Call Log over the past three years, poor water quality has been the root cause of a significant percentage of the calls.**

In most operating environments you will encounter, the quality of incoming feed water is determined by the following parameters:

Total Dissolved Solids (TDS) – when minerals are dissolved in water, ions are formed. The sum of all the minerals or ions in the water is the TDS.

Hardness – is the measure of calcium and magnesium content (measured as carbonate equivalents). Water Hardness is the primary source of scale build-up in the boiler and contamination of valve and plumbing surfaces. Primus recommends using supply water with hardness levels of 8 to 85 ppm.

Suspended Solids (SS) – represent the undissolved matter in water including dirt, silt, biological growth, vegetation, and insoluble organic matter.

Chlorides – significant chloride concentration in water can lead to rapid chloride stress corrosion in the stainless steel pressure vessel and ultimately cause leaks. As noted in the Primus Equipment Warranty, presence of chlorides voids the warranty. **Hence, chlorides must be prevented from coming in contact with the sterilizer!**

Common Solutions

Two methods that can be used to ensure high quality water is presented to the steam sterilizer are:

Reverse Osmosis (RO) – a process where feed water is forced through three filters and a semi-permeable membrane leaving a concentrated solution of impurities which is rejected to waste.

Primus recommends RO as the preferred solution for three important reasons:

- Eliminates any Suspended Solids (SS)**
- Removes Chlorides**
- Greatly reduces Total Dissolved Solids (TDS)**

Ion Exchange (Soft Water Conditioner) – the most widely used method of water treatment for producing saturated steam. Ion exchangers typically use a resin bed activated by passing a brine (sodium chloride) solution through it which leaves the resin bed rich in sodium ions. The water to be softened is then pumped through the resin bed and ion exchange occurs. Harmful calcium and magnesium ions that cause hard scaling displace sodium ions from the resin, leaving the flowing water rich in sodium salts. **The sodium salts stay in solution at very high concentrations and temperatures and do not form harmful scale in the boiler.** Periodically, the boiler is blown down to remove the resulting soft sludge build-up.

(See Attached Sussman Boiler Water Quality Information)



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Water Quality Information for Carbon Steel Boilers

FOR OPTIMUM RESULTS, THE FEEDWATER SUPPLY SHOULD BE TESTED PRIOR TO INITIAL STARTUP, 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 BOILER ON AT LEAST A ONCE A DAY BASIS. IF BOILER WATER OR FEEDWATER 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 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 MAKEUP WATER OF A LOWER CONCENTRATION.