Sterilizer, Surgical Instrument and Dressing, NSN 6530-00-926-2151

Preventive Measures When Using Potable Water

Every steam-operated sterilizer relies on the high temperature of steam under pressure and the element of time to kill or cause coagulation of cellular contents of pathogenic bacteria and viruses. Typically, in a fixed facility, the source of the steam is taken for granted. It is generated someplace else delivered to the equipment by appropriate plumbing. For equipment located in the field, there is no source of steam except for the internal boiler of the autoclave itself.

Any manufacturer of an autoclave recommends in writing, that the boiler use water that is clean, potable and free of debris. Then to increase the longevity of the product, stress that the water should be as pure as possible, even recommending the use of distilled water.
In garrison, getting distilled or reverse osmosis (RO) water purified water is not generally a problem, but when in the field, that kind of water is generally not available in large quantities, therefore, the requirement for 5 gallons at a time for each autoclave sometimes exceeds the capability.

The problem begins with the boiler and most of the components of the autoclave itself. To save weight, the device is made of aluminum. Aluminum also corrodes easily, much more so than nickel-plated stainless steel (the material of conventional autoclaves), so it makes sense to use pH neutral (pH of 7) water to reduce the possible corrosion. In addition, even ordinary potable water may contain substantial amounts of dissolved magnesium, calcium, and iron salts (the stuff of hard water) that precipitate out of solution as the water is heated. These salts or carbonates coat the interior parts of the sterilizer and eventually form a layer over the lowest points of the sterilizer. This hard water scale or coating is in addition to the settling of any other organic materials or solids that got into the sterilizer through the filling funnel. Over enough time and use, the heating elements become covered and if the sterilizer is powered by electricity, the unit takes longer to heat because the deposits insulate the heating elements.

The heater assembly/clean out located on the back of the sterilizer is designed to be periodically removed to allow the BMET to remove the hard water deposits as well as to replace the heating elements if they are burned out. In fact, the long handle scraper (refer to part number 1-136) that is supplied with each sterilizer is intended to be used to clean out the bottom of the jacket when the heater assembly is removed for service.

Another way to reduce the clogging effect of hard water is to drain the jacket at the conclusion of daily use while there is still substantial pressure in the jacket. The rapid release of water causes the hard water deposits or scale to fall off the heating elements and be blown out the drain valve along with the water.

Since aluminum is sensitive to the use of corrosives materials, either strong acids (such as Hydrochloric acid, and Sani-proâ or alkali like Sodium Hydroxide, household Lye) or any chemical cleaner used to dissolve the hard water deposits should contain a weak organic acid such as Acetic Acid, or vinegar. A recommended chemical cleaner would be to use 32 ounces of 5% acetic acid (one quart of vinegar) per 4 gallons of water. Pour the vinegar into the water first and then into the jacket. Operate the heating system until 20 psi is reached, the cycle the steam through a conventional sterilize cycle, about 20 minutes or so for an empty chamber, then bring the chamber pressure to zero, turn off the heaters and drain the water vinegar mixture from the jacket. If there is a substantial amount of hard water deposits or scale evident in the drained water, repeat the procedure.

Because of the difficulty in getting and using RO or distilled water to operate an autoclave in the field environment, the USAMMA NMP recommends that local potable water be used for daily operations, and these preventive measures are followed to reduce the build-up of the hard water scale.

(1) Drain the jacket daily by venting the water under pressure. This will clean the boiler and the heating elements.

(2) Periodically use diluted vinegar and water to dissolve the hard water scale.

(3) Remove the heater assembly and manually clean out the bottom of the jacket.