



# Hot Water Troubleshooting

*Stop treating scale – prevent it!*

by Lance Pettyjohn

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As any service technician in the pool and spa industry knows, a build-up of scale in a spa or hot tub can be a pain to remove – literally. Once the scale has formed, the only thing left to do is grab a mild scale remover and start scrubbing. After draining and several hours of elbow grease, you may have made some progress and the pain will be over...until next time.

Fortunately, scaling in most cases can be easily prevented. After one good scrub-down, it is plain to see how much easier and more cost-effective it is to prevent water problems from the start than it is to treat them after they've occurred. Unfortunately, in today's fast paced world, many key elements of proper water management are simply overlooked. In particular, checking the calcium hardness level is a step many operators tend to skip. This is a mistake for two important reasons: first, low calcium hardness can result in a corrosive environment that is harmful to bathers, equipment and the surface itself.

## High Calcium Hardness Can Result In Cloudy Water

Second, high calcium hardness can result in cloudy water, stains and scale.

Calcium scale is typically more of a problem in spas and hot tubs due to their higher water temperature. Scale forms when calcium attaches to carbonate in the water. Calcium carbonate becomes more insoluble at higher water temperatures, especially at the heat exchanger of the heater. Also, because of increased temperatures and aeration, the evaporation rate of a spa is very rapid. This leads to increased calcium carbonate build-up. Thus scaling in a spa can be especially difficult to treat once it occurs and can even result in damage to the finish. However damaging the spa is not the only concern here; calcium scale also causes discomfort to bathers and can even cause skin abrasions and rashes.

Calcium hardness testing (also referred to as total hardness) is a measurement of the mineral salts present in spa water. Some of the mineral salts measured include: calcium, magnesium, aluminum, iron and manganese. When it comes to spa water, 70 per cent to 75 per cent of total hardness is made up of calcium. According to the National Swimming Pool Foundation, the ideal range for calcium hardness in a spa is

150 ppm to 250 ppm. Calcium hardness is raised by adding a chemical known as calcium chloride. This mostly comes in a powder form which must be diluted in a bucket before adding to the spa. There is a liquid version of calcium chloride for spas available that is much more convenient to use and it gets into solution much quicker than the powder form.

Lowering calcium hardness can only be done by draining and replacing water. Once properly adjusted though, the calcium hardness level should stay within range until the spa is drained and refilled, which should typically be done every six to 12 weeks. There is also a formula for the number of users per day that can be used to determine when the spa water should be drained and replaced. The formula for draining based on daily users is as follows:

$$\frac{\# \text{ of gallons in the spa}}{3} \div \text{users per day} = \text{the number of days between drainings}$$

Treat the spa with a stain and scale inhibitor each time you refill. This should be done prior to adding calcium chloride (calcium hardness). In areas with extremely hard water, you



*Regular testing and treating for scale prevention will help to ensure that your customer's spa is a pleasant backyard experience, not an irritation to their backside.*

*Photo: Cal Spas*

should also treat the water with a stain and scale inhibitor on a regular maintenance basis. A mild form of acid such as sodium bisulfate may also need to be used regularly to control water balance in naturally high calcium areas.

## Scaling Below Water Line A More Critical Issue

A more critical issue can be scaling on the surface of spa below the water line, especially in hard water areas where the majority of inground spas are finished in plaster. This type of scale occurs when spas are originally built, refinished or when the finish is neglected for a long period of time. The problem becomes more unsightly when leaves, dirt or algae accumulate on top of the scale and it takes on the colour of the debris. This type of scale is usually costly and time-consuming to treat but can be avoided.

Once scaling of the spa surface occurs, use a descaler to slowly breakdown and lift the scale and stain or drain and carefully acid wash the surface. If you decide to drain and acid wash the spa it is strongly recommended that you consult the spa manufacturer or surface supplier to insure you do not damage the spa. Either process is expensive, time consuming and causes some degradation of the spa surface. Again, it is much easier to avoid the scale than it is to treat it.

To insure you avoid this unsightly problem, be sure to add a metal and scale inhibitor upon start-up. Beware however that many of the products used to inhibit metal and scale formation also contribute complex forms of phosphate to the spa water. These eventually breakdown to a form of phosphate which can be detrimental to overall water quality.

Spa water should be tested regularly for phosphates, especially if they are tied into a salt system to generate either chlorine or bromine. Test kits are available and spa water should be maintained no higher than 200 ppb. Keep in mind that phosphates are a major pollutant to our water ways so spas should always be tested and treated for phosphate removal before each draining.



## Brush New Spa Surfaces Daily

It is recommended to brush new spa surfaces daily and existing surfaces weekly. Remember to use a metal and scale sequestrant on start-up and a stain and scale inhibitor on a maintenance basis. Oil, bather waste and scum build-up above the water line can attract calcium as part of the scaling process. To avoid this happening, add a natural-based clarifier weekly as this will trap and filter out contaminants that add to the unsightly scaling and will reduce the build-up above the water line. As always, proper water chemistry is the key to preventing scaling above and below the water line in spa water especially at the recommended operating temperature of 40°C (104°F).

So unless you are looking to burn a few extra calories with regular scrub-downs, start testing the calcium hardness level as part of a regular maintenance program along with all the elements of proper water chemistry: alkalinity, pH, calcium hardness and total dissolved solids. Regular testing and treating for scale prevention will help to ensure that your customer's spa is a pleasant backyard experience, not an irritation to their backside. **PSM**

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