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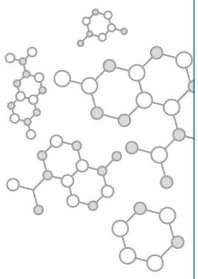
Developing the Solutions For You



September 20, 2013

ACID Magic® can be safely used in High Efficiency Water Heaters

ACID Magic has phosphorous containing chemicals in its formulation that can migrate into active phosphates that have the potential to increase the phosphate levels in the pool water. Phosphates when combined with high calcium hardness, high pH, and high temperatures can form different insoluble chemical complexes of calcium phosphate. As the temperature increases the solubility of these calcium phosphate species decrease. This could lead to scale formation within the heat exchanger under certain narrowly defined circumstances. In order to circumvent this potential issue, the following guidelines should be followed when using ACID Magic in combination with a high efficiency water heater.

Calcium Hardness: The calcium hardness of the pool should be monitored and maintained between 150 ppm and 1000 ppm, with an ideal range of 200-400 ppm per the NSPF® Pool & Spa Operator™ Handbook 2012. By limiting the amount of available calcium, the probability of scale formation is greatly reduced. If the calcium hardness exceeds 1000 ppm, action should be taken to effectively reduce the calcium hardness of the pool water. If any pool hardware has an upper limit as recommended by the manufacturer for calcium hardness, this should also not be exceeded.

pH: The pH of the pool should be maintained between 7.2 to 7.6 with an optimal range of 7.2 to 7.4. By maintaining a pH in this range, the solubility of calcium phosphate is maximized while still maintaining a pH in the recommended range. If the pH exceeds 7.6, the pH should be reduced by the addition of acid to the pool water. If a chemical is to be added to the pool that could potentially raise the pH above 7.6 (i.e. shocking the pool, pH up, etc.) the heater should be shut off and bypassed. The heater should remain shut off until the pH has been lowered and stabilized in the recommended range. The pH range recommended of 7.2 to 7.6 will greatly enhance bather comfort, since the pH found in eyes is approximately 7.4.

Phosphate Hardness: It is recommended that phosphate levels be kept under 12 parts per million (12,000 ppb). This should be monitored using a phosphate test kit designed for pool water. Certol International recommends the use of the HACH® Phosphate Test Kit, Total Ortho-/Meta-, Model PO-24 (Product # 225001). It is recommended to use the High Range 0-50 mg/L test instructions in order to obtain results (1 ppm = 1 mg/L = 1000 ppb). In order to obtain accurate results, demineralized (distilled water) is needed to make the dilutions per the instructions. In order to decrease phosphates, please see the "Recommendations for the Removal of Phosphates in Pool Water" memo. The recommendations above are only concerning phosphates contributions to the scaling process. There are concerns of algae growth at lower phosphate levels, however if the disinfectant is kept at appropriate levels the algae growth will not occur.

Outlet Temperature: The solubility of calcium phosphate decreases as the temperature of the pool water increases. The high temperatures seen in high efficiency heaters increases the likelihood that scale will form in the heat exchanger under certain conditions. The minimum temperature differential from the inlet to outlet that will still maintain the pool temperature will optimize the conditions for preventing scale formation.

If the conditions above are met, scaling will not occur in a high efficiency pool heater.