

LEGIONELLA IN SWIMMING POOLS

Pseudomonas in swimming pools was discussed earlier and how UV and chlorine are not very efficient in its eradication. *Legionella* is another bacteria that marks its presence in swimming pools and spas. *Legionella* is most often found in cooling tower waters. *Legionella* proliferation in cooling towers takes place since the cooling tower water is ideal for its growth. The temperature of 40-45 degrees Celsius, and the organic content of the water are most suited for its multiplication. *Legionella* is a bacteria that causes atypical pneumonia (symptoms like pneumonia, and very difficult to diagnose). People who have low resistance (older individuals undergoing rehabilitation, and young children), are most susceptible to contract the legionnaires disease. This happens when they accidentally get exposed to the drift (aerosol of cooling tower water) of the cooling tower that has been infected with the bacteria. Gestation is about 14-21 days before the patient begins showing symptoms. Very often, older people die. In Europe and in the US, there are very effective control systems to ensure that all cooling towers are safe and do not breed *Legionella*.

All the while it was thought that *Legionella* is only found in cooling tower waters. Off late, there has been numerous report of *Legionella* being present in swimming pool waters but whether they can produce the legionnaires disease will totally depend on the conditions present in the swimming pools and spas.

Legionella is only an issue where small droplets/ mist is breathed deeply into the bronchi region of the lung. Such a mist can be produced from pool and spa operation and possibly from continued splashing of the water by the pool user.

Legionella can be in 3 states of activity within a water system.

Planktonic (mobile in the system looking for a suitable area to multiply) which can be controlled/ killed with constant levels as low as 0.25 ppm free chlorine.

Sessile (living within a bio-film waiting for a chance to go planktonic and multiplying dependent on nature of biofilm). Standard chlorination will not kill the *Legionella* as it is protected from the free chlorine by the biofilm.

Finally, *Legionella* can be in the form of a spore which is highly resistance

to chlorine and can remain dormant for decades. This form is how the *Legionella* enters the system with dirt and dust. The spore will not become active unless conditions are correct for multiplication (i.e. no free chlorine present, temperature and lack of competitive bacteria). For example, a green and dirty pool with algae and high bacteria count are not conducive to *Legionella* multiplication. A 10 ppm free chlorine for a 1 hour exposure should kill *Legionella* but those (unless embedded within a protective bio film) are never killed even with 10 ppm of chlorine in pool water.

Ozone and Legionella

Ozone is by far the most effective disinfectant to eradicate *Legionella* in pools, because:

- ▶ It is effective in very small doses against *Legionella* and no resistance is seen, unlike chlorine, where more than 10 ppm residual is required for long periods.
- ▶ Ozone is effective against all forms of *Legionella* including spores and sessile forms, unlike chlorine that does not act against both these forms of *Legionella*.
- ▶ Ozone destroys all organic contents of the pool water and devoid food stuff for the planktonic forms of *Legionella* and this helps bring about self limitation of the bacteria.
- ▶ Ozone prevents the formation of bio film that protects the *Legionella* and hence the bacteria is always exposed to ozone disinfection. Both UV and chlorine are not effective against biofilms.

Important Factor

Whatever disinfectant system you use, it must be noted that sand filtration systems are the perfect place for *Legionella* to hide from free chlorine or even ozone. Sand should be changed as per manufacturer's recommendations or a direct dose of chlorine/ ozone to sand filter, during backwash in every 3-6 months, is often deemed as a good maintenance practice.

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