

Pool Performance & Safety Factor

Public pools must comply with water quality and air quality requirements, but it is often difficult to know how well a pool is actually performing or to compare one pool against another. The **Pool Performance Factor** is an easy approach used to quantify the performance of any pool water treatment system on a scale from 1 to +10. The **Pool Factor** can be used as a tool to mitigate the risk to the public, pool staff and avoid structural damage to the building, as well as a tool to help reduce running costs and save money. Indeed we have found that a typical public pool could save between 30% and 50% of their running costs, but only if you are aware that there is the possibility to improve efficiency. In this context the **Pool Factor** lets you know how well you are performing, or if there is scope for improvement.

Most pools with high rate sand filters have a **Pool Factor** over 6, the **Factor** can normally be reduced to less than 2 by modifying the existing system, which makes for a 70% to 80% saving in chemicals and water, plus a 15-30% energy saving, which all translates into a 30% to 50% reduction in running costs. The cost of the system improvement can usually be recovered out of revenue savings in less than 12 months.

The **Pool Factor** is based on a simple approach; the less chlorine used per bather, the better the system performance. The **Pool Factor** is therefore a unifying measurement which encompasses all chlorinated public and private swimming pools irrespective of the size or design of the facility, because it is calculated from two simple measurements;

1. **Average daily bather load**
2. **Average daily consumption of chlorine**

A zero chlorine demand would be impossible, but a **Pool Factor** under 1 can be achieved, and is considered to be the best possible water quality that cannot be surpassed. A **Pool Factor** under 1 also means you have eliminated most of the chlorine by-products and have near perfect air conditions above the water and in the pool building, so no stress corrosion cracking of the building structure or ventilation systems. Dryden Aqua has now achieved this objective in public pools, which means we have reached the end-point of pool water treatment. Measure the efficiency of your pool or let us know the average daily attendance and chlorine consumption and we will let you know how much you could save on running costs to improve your pool.

Pool factor Kg.Cl ₂ /day/1000 bathers	Rating	Potential savings	Pool Performance & Safety Factor
< 1	Excellent	0%	Extremely low risk associated with water quality and air quality, achieved using Dryden Aqua fully Integrated system operated properly with good overall hygiene and pool management. AFM, ZPM, APF, ACO and ZPMr. DIN standard Filters operating at less than 15 m/hr
1 - 1.9	Very good	2%	Very low risk associated with water quality and air quality, very good pool, fitted with AFM, ZPM and APF. No structural corrosion, of the building. Filters operating at less than 20 m/hr
2 to 3.9	Good	5%	Low risk pool but could do better. There may be high combined chlorine but no smell or sore eyes which indicates organic chloramine but low inorganic chloramines. Pool may be using AFM but flow rates are too high or poor quality filters are used. There may be equipment or operational problems. Filters operating at less than 25m/hr
4 to 4.9	Above average	15%	Low to medium risk pool, staff may be at risk from respiratory issues, there will be a distinct smell of nitrogen trichloride, some of the public may complain about sore eyes. There may be a risk to regular bathers. Performance Factor is typical of sand filtration systems operating at water flows below 25 m/hr with poor coagulation and flocculation.
5 to 5.9	Average	25%	Medium risk, staff may be at risk from respiratory issues. Some of the public will complain of sore eyes and skin irritation or allergic reactions. Regular users of the pool may be at risk from respiratory issues. Performance Factor is typical of sand filtration systems operating at water flows above 25 m/hr with poor coagulation and flocculation.
6 to 7.9	Below average	35%	Medium to High risk pool, staff and public are at risk, structural damage to the building and stainless steel may be evident. High levels of trichloramine, probably also high levels of volatile lipid soluble organic and inorganic chlorine molecules such as chloroform and cyanogen chloride. Potential health risk to children under 2 years of age.
8 to 10	Poor	50%	High risk associated with using the pool or for the staff working in the pool environment. Potential bio-hazard from bacteria, oocysts, bacteria exotoxins and endotoxins. Public may experience an allergic response to the pool water and / or the atmosphere. Increasing potential risk of health problems especially for children under 2 years of age because their blood:brain barrier is not fully developed.
>10	Very poor	+50%	Very high chlorine consumption indicative of a poor system design and operating conditions. In the opinion of Dryden Aqua any pools with a DAP Factor greater than 10 should be treated with extreme caution, especially for the pool staff, children, elderly or immune depressed individuals. The water and air quality may be okay but only if the pool is exchanging or dumping large quantities of water. High chlorine demand may also be experienced with UV and ozone systems.

Pools may have a high performance factor but satisfactory water and air conditions, but only if they are dumping large quantities of water, which makes them very expensive to operate. The performance of the ventilation system is not applicable to the conditions 50mm above the surface of the water, so out-door pools can also have poor atmospheric conditions for the bathers, and even higher levels of lipid soluble chlorinated gas as a consequence of exposure to UV irradiation from the sun. Lipid soluble chlorinated gas has no smell, so you will not be aware of the situation.

How to calculate the Pool Factor

The Dryden Aqua **Pool Factor** relates the chlorine oxidation demand for 1000 bathers per day expressed as Kg of chlorine used.

1. Calcium hypochlorite, chlorine is approx equal to 0.68 x the Kg of calcium hypochlorite used per day
2. Sodium hypochlorite solution, chlorine is approx equal to 0.12 x the litres of sodium hypochlorite used per day

Example; in a well operated pool using AFM, APF, ZPM and the clients filters

Average bather load per day = 1150 per day

Average calcium hypochlorite consumption per day 1.8 kg

Chlorine level in 1.8 kg of calcium hypochlorite = 1.8 x 0.68 = 1.22 kg per day for 1150 bathers

Relate the chlorine consumption to 1000 bathers = 1000/1150 x 1.22 = **1.1 = Pool Factor = a very good pool**