Engineered for Efficiency - Water

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Introduction

With natural resources scarce, with a luxury item such as a swimming pool it is vital to invest in engineering to reduce its water consumption to a minimum.

Water loss from a swimming pool is from 4 main sources. Water Loss permeating through pool shell, Evaporation, Filter Cleaning and Splashout / Bather Loss[1].

Water Gain is from 2 sources', Rainfall and Topup from mains water.

Compass Pools have developed the optimum system to reduce water consumption by the swimming pool to an absolute minimum.

This paper was written by Alex Kemsley Technical Director at Compass Pools and former President of the British Swimming Pool Federation and Member of the Institute of Swimming Pool Engineers. He sits on several industry boards within the Pool industry and has been in the industry for 16 years.

[1] https://www.spata.co.uk/wp-content/uploads/2018/10/Water-Losses-C7.pdf

Shell Water Loss

Outdoor swimming pools in the UK have typically been built of concrete and mosaic tiles. A pool built like this can lose up to 20mm of water over the entire surface area per week as concrete is inherently porous and relies on tanking to waterproof. This is a pool built to Spata (Swimming Pool and Allied Trade Association) and BS Standards prior to 1999. On an 11m x 4m pool this could be up to 1000L per Week

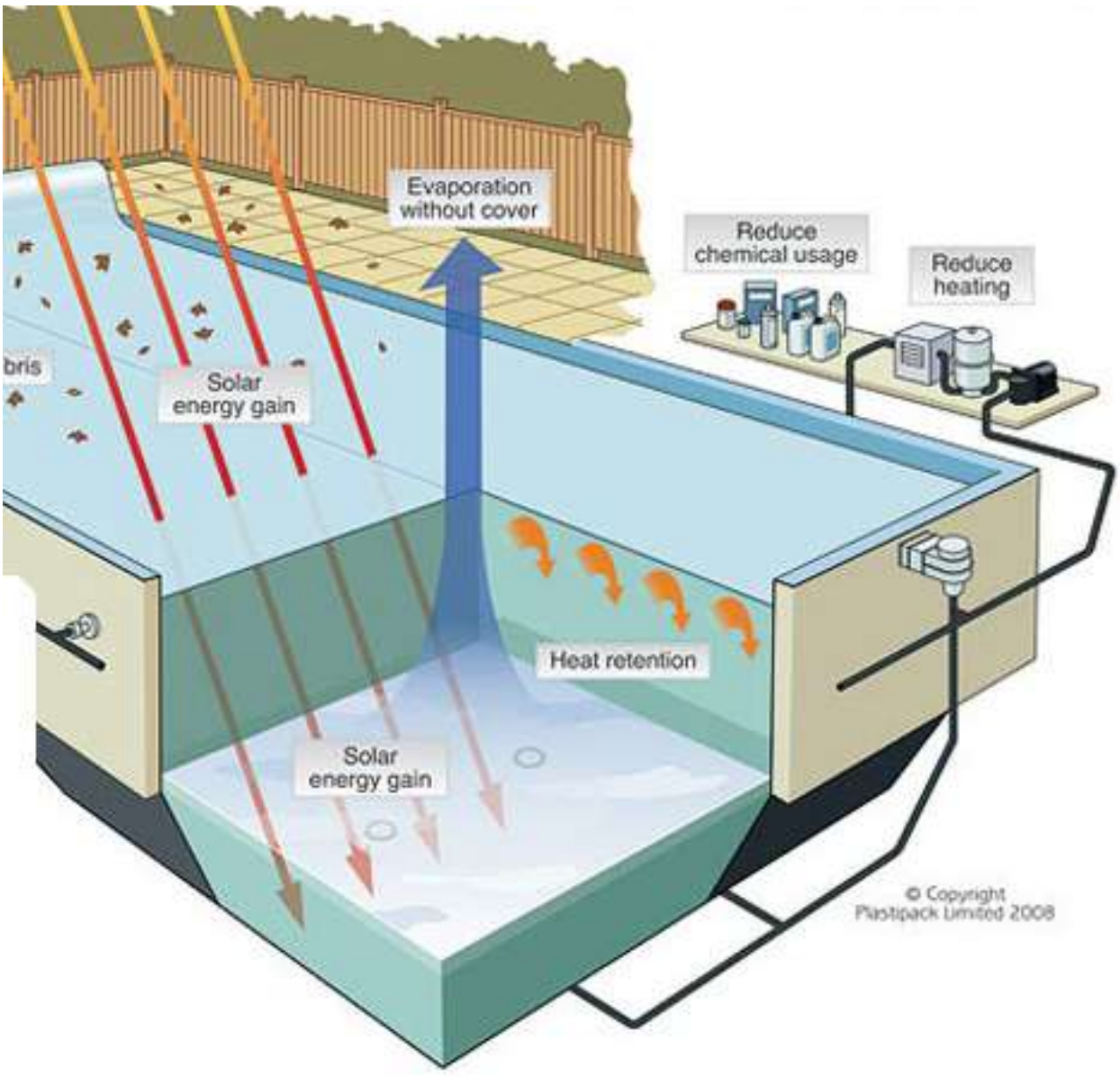
A Compass Pool shell is engineered like a boat in reverse using advanced Carbon ceramic composites in a multi layer construction. Because of this water loss from the pool shell is zero. [2]

[2] https://www.compass-pools.co.uk/our-technology/engineered-for-longevity/

Evaporation Water Loss

Evaporation water loss is affected by several factors, air temperature, wind speed, water level and water temperature. A typical uncovered pool in the UK can lose up to 0.5cm per day. On an average 11x4m family pool this relates to 50L per day.

Every Compass pool is equipped with an automatic pool cover. By covering the water this eliminates water loss from evaporation completely when the pool is not in use



Water Gain through Cover

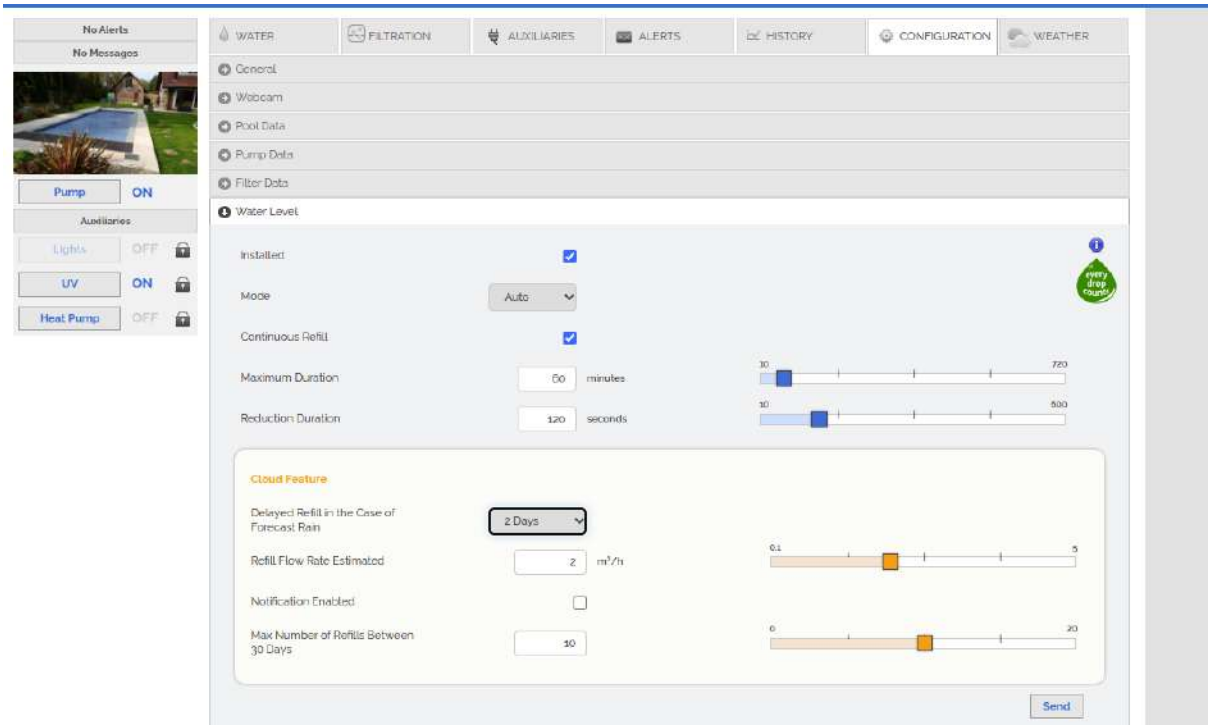
The South East on average has 794.7mm[3] of rainfall per year. This equates to 794.7L per m2 or on an average 11mx4m pool this equates to 34966.8L[4].

This size pool would typically have 50’000L total volume so rainfall will makeup roughly ⅜ of the total volume of water. While we can't make use of all of this water, it goes a long way to offsetting the total water consumption.

Typically automatic pool covers are impermeable fabric type material with a pump on the top to discharge to waste that cannot take advantage of this rainfall.

A Compass pool cover is made from a permeable pvc or polycarbonate slat material that lets the rainfall through to make the most out of rainfall gain.[5]

In addition, Compass Pools’ optional cloud based filtration system actively monitors the weather and when there is a need to top the pool up but it's due to rain, it will hold off topping the pool up with source water and let the rain do the work.



[3] https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/u100y2zh2

[4] https://www.fao.org/3/r4082e/r4082e05.htm#:~:text=In%20terms%20of%20volume%2C%20with,square%20metre%20of%20the%20field.

[5] https://www.compass-pools.co.uk/our-technology/engineered-for-saftey/

Bather Loss

Water loss from bathers jumping into and coming out of the pool is an inevitable byproduct of using a swimming pool. SPATA estimates that water loss per bather is 0.75L[6]. An average family of 4 using the pool once every weekend during the summer months would equate to roughly 72 Litres or the equivalent of one Bath. [7]

While we cant eliminate total water loss from bathers, we estimate that we reduce some of this spash out by 20% through the use of an overlip coping stone. The design of this stone means when the water is going up and down in waves it is deflected back into the pool instead of going over the sides.

[6] https://www.spata.co.uk/wp-content/uploads/2018/10/Water-Losses-C7.pdf

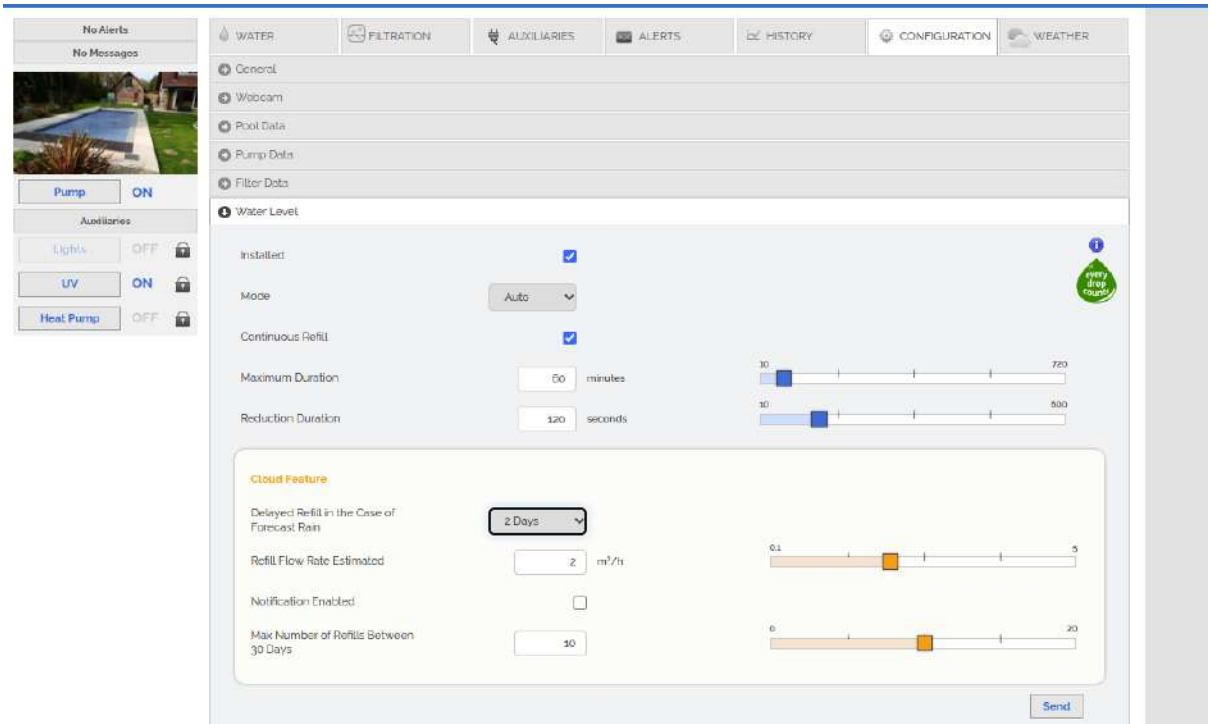
[7] https://www.sciencefocus.com/science/how-long-does-a-shower-have-to-be-to-use-the-same-amount-of-water-as-a-bath/

Winterising

A typical outdoor concrete pool during the winter has upto ⅖ of its water volume drained in order to stop pipes freezing above the frost layer. This could be upto 20’000L. A Compass Pool's filtration equipment has a winter mode that keeps the water moving through the pipes when the weather gets cold. By doing this water level can be maintained without the need for draining.

Filter Cleaning

In addition, Compass Pools' optional cloud based filtration system can measure the exact pressure on the filter so it's only cleaned automatically when it needs to. This would typically run approximately once per month and use 500l of water for each clean. In comparison to a standard pool that would typically be done manually by the pool user upto once a week.



Initial Fill

The initial fill of the pool is either done with mains water over the course of a few days or with tankered in water for speed. While tankered in water is less environmentally friendly due to the hgvs used to transport, this is occasionally used where construction process (backfill method) or program dictates. This tankered water can also be brought in areas where water neutrality is of importance. As described through this paper this is the first and only time the pool is filled.

Draining of the Pool

It is a misconception that pools are regularly drained, Draining of a Compass Pool is an extremely unlikely occurrence. For context in 10 years and over 500 instals in the UK Compass Pools has only had to do this twice. Once for a pool repair where a scaffold pole was dropped into the pool and once for a deer that had fallen in the pool. The warranty of a Compass pool is invalided should the customer do this themselves.

Where this is done for repair the usual process is to drain the pool to a pillow tank, repair the pool and refill with the same water. This is primarily done for speed but does mean that no new water is required.

Conclusion

When taking all the water losses and gains into account, it becomes clear that the technology developed on a Compass pool all adds up. When calculating across the gains and losses there is actually a net gain of 30709.2L on a Compass pool. In practice this would go into groundwater as runoff but would not add any additional water taken from mains water.

This compares to a net loss of 67355.2L on an average concrete pool built prior to 1999.

This water demand would be taken from the mains and equates to 184L Per day. To put this into context current water demand across England is around 140L / Per Person / Day [8] so the equivalent is adding an extra 1.2 people to the household. If the pool had an automatic fabric cover this would be increased to 102322L or 280L Per Day. The current government target is just 80L Per Person Per Day.

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8 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/766894/water-conservation-report-2018.pdf

In summary, by installing a Compass pool there is no net increase in water demand for the pool to the mains supply.

Litres/ Year	Evaporation	Bather Loss	Winterising	Filter Cleaning	Shell Loss (1999 standard)	Rainfall	Total (consumption / excess)
Standard Concrete Outdoor - no cover (11m x 4m x 1.5m)	-18250	-72	-20000	-12000	-52000	34966.8	-67355.2
Compass Pool Outdoor - with cover (11m x 4m x 1.5m)	-1200	-57.6	0	-3000	0	34966.8	30709.2