An introduction to testing and dosing water

MAINTAINING YOUR BRASS MONKEY

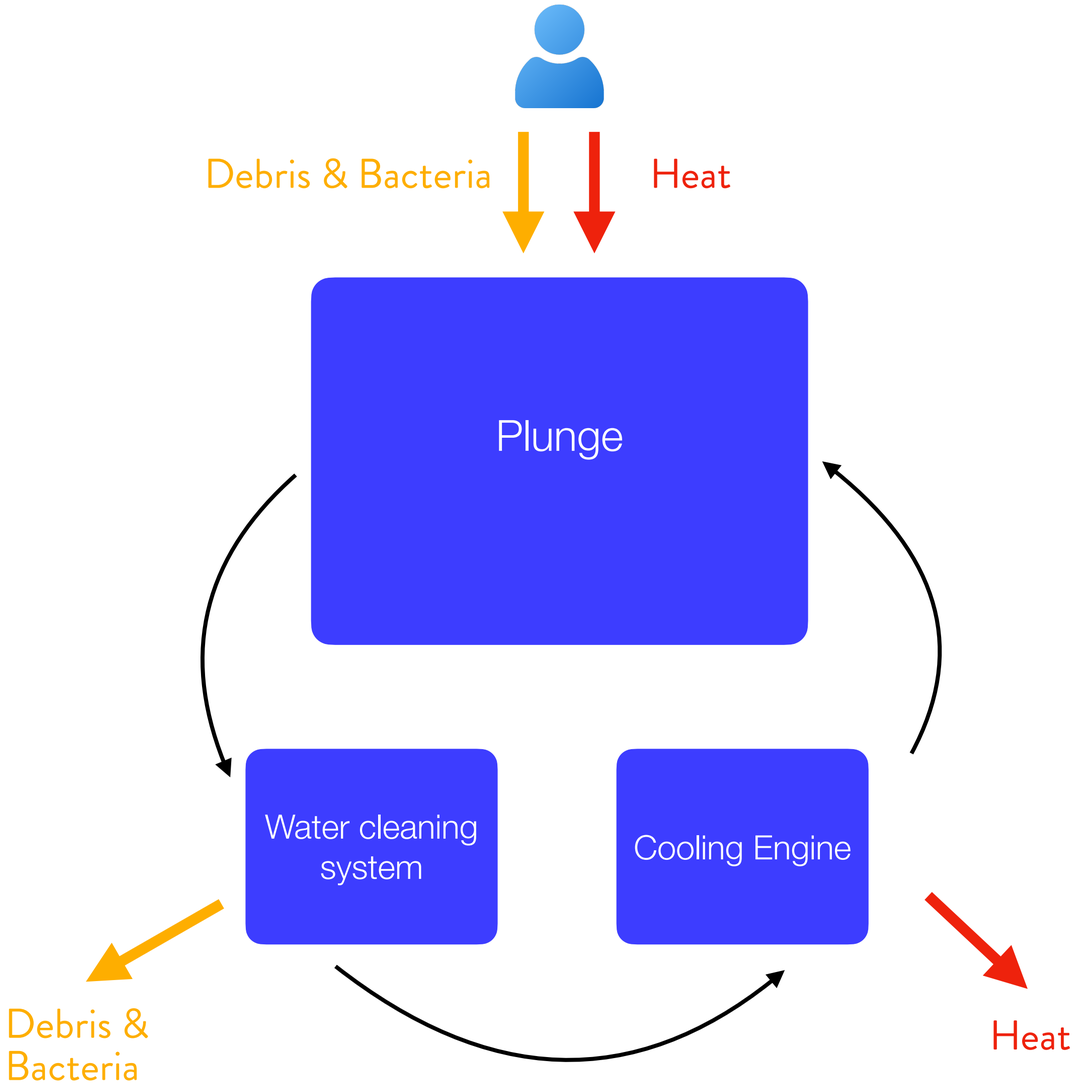
BRASS MONKEY

Chlorine plays a crucial role in maintaining the safety and hygiene of our ice baths. This briefing provides an overview of chlorine's function, how it is tested and dosed, and how it interacts with water chemistry. Understanding these aspects ensures that our ice baths remain safe and effective for all users.

What this briefing is going to cover -

- XXXXX

HOW WE KEEP WATER CLEAN



Bacteria vs. Debris

Debris such as hair, skin cells and body oils are bacterias favourite food!

We combat debris through filtration, filtrations aim is to remove the debris to improve water clarity, user experience but also to reduce the amount of food for the bacteria.

Dosing

Dosing refers to the addition of chemicals, such as chlorine, to disinfect the water by killing harmful microorganisms.

Dilution

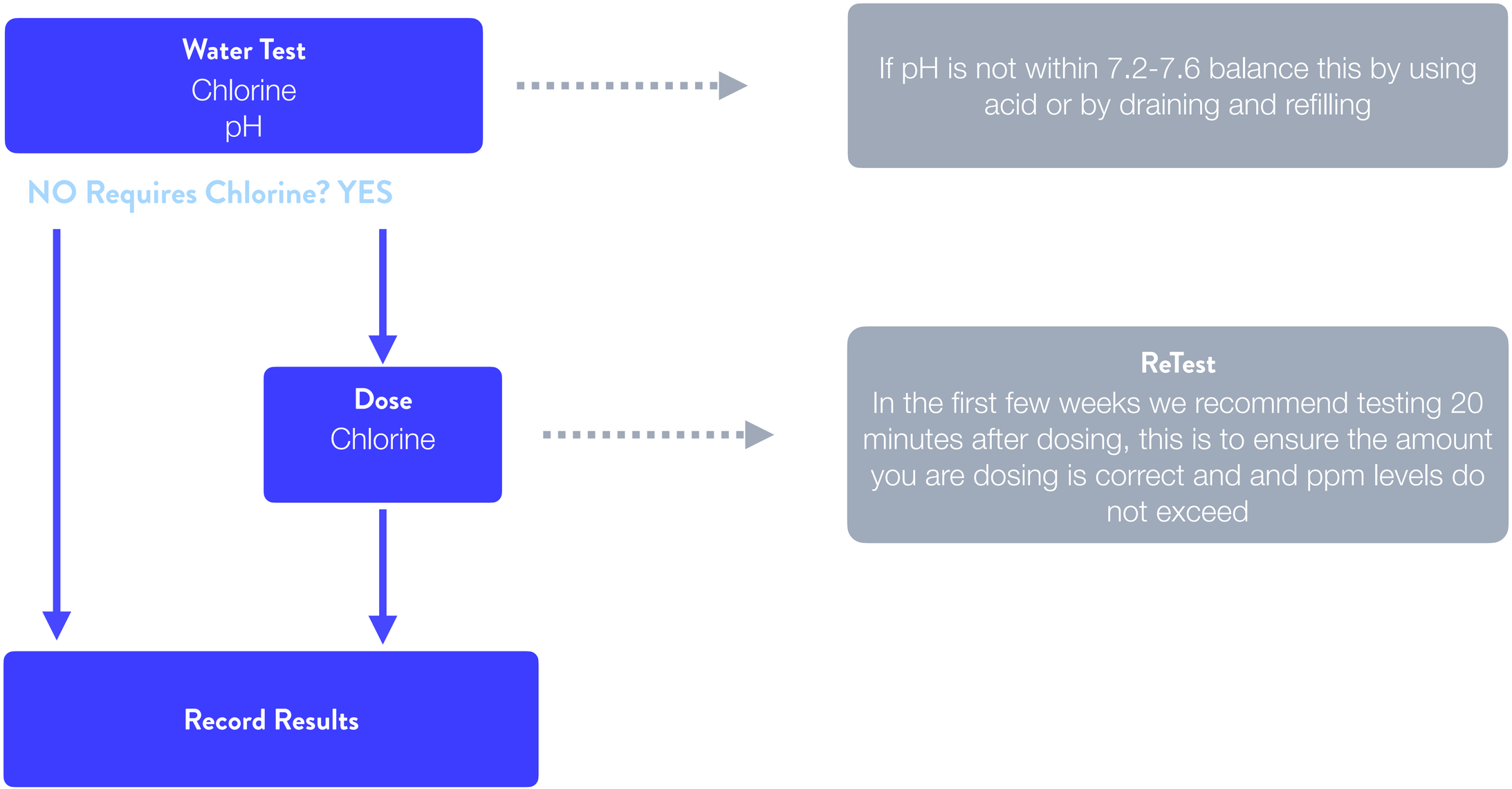
The solution to pollution is always dilution, draining water and replacing with clean fresh water is the quickest way to start a fresh.

Working together

Both filtration and dosing work together to maintain high water quality.

Filtration removes contaminants that would otherwise react with chlorine and reduce its effectiveness.

REGULAR TESTING AND DOSING



PH - THE BASICS

What is pH?

- pH measures how acidic or alkaline the water is, on a scale from 0-14.

What is the ideal?

- Ideal pH for chlorinated water is 7.2-7.6.

Tap water in the UK is usually between 7 and 8.5pH , due to our ice baths generally having a small volume of water pH easy to manage.

Our recommendation is Sulphuric Acid no stronger then 16%

Why is pH important?

- If pH is too high (>7.8), chlorine becomes less effective.
- If pH is too low (<7.0), the water can become corrosive and irritate skin and eyes.

How to balance the pH?

For typical low-alkalinity water, rough estimates suggest:

- To drop pH from 7.5 to 7.0, you might need 5–10 mL of 16% H_2SO_4 per 100 litres.(sulphuric acid)
- For a larger pH shift, you will need more.
- You will need to know current pH, your target pH, your volume of water and you will need to follow manufacturers guidlines

CHLORINE – THE BASICS

What is Chlorine?

Chlorine is a powerful disinfectant used in pools, spas, and ice baths to kill bacteria, viruses, and algae. According to PWTAG (Pool Water Treatment Advisory Group) Technical Note 71, chlorine is an essential component in water treatment, ensuring safe water for public and commercial use.

What Can Chlorine Be Effective Against?

- Bacteria (e.g., *E. coli*, *Legionella*)
- Viruses (e.g., Norovirus, Adenovirus)
- Fungi and algae
- Organic contaminants introduced by bathers (sweat, body oils, etc.)

How Chlorine Works

Chlorine sanitises water by forming hypochlorous acid (HOCl) when dissolved.

This acid penetrates the cell walls of microorganisms, disrupting their internal processes and effectively neutralising them.

The efficiency of chlorine is influenced by pH levels and organic load.

How much is too much

Chlorine is measured in parts per million. (This is the same as parts per litre)
The aim is to have between 1-3 parts per litre, above this is acceptable but over 5ppm and we advise to dilute.

WATER TESTING - THROUGHOUT THE DAY

Using a Photometer

To complete a water test you will need to take a sample.
You will then need to add a reagent (the amount and type will be dependent on your photometer)
The reagent will react with the bath water allowing the photometer to provide you with the readying.

How to take a water sample

Away from the skimmer and water inlets
Mid depth (think elbow depth!)
Before dosing the water / At least 20 minutes after
Always use a clean container to take the sample

How often do you need to test?

The water should be tested regularly, based on a risk assessment and taking account of the number of users, volume of water and the results from routine monitoring. We recommend you begin with 2 hourly testing and adjust from here.

Record Keeping

It is essential you record your water testing data, inline with PWTAG these records should be kept for 5 years.

BEWARE the Dip Strip Tests

Dip strips work best in water above 10°C , If this is your only form of testing then you will need to leave your sample to warm up naturally - do not heat your water sample as this could skew your results. We recommend you use a digital photometer.

CHLORINE - PARAMETERS

Free Chlorine

Free Chlorine: The active, available chlorine that sanitises the water.It is the amount of this sanitiser in your pool water after it has dissolved, this is what we are aiming for levels to be between 1 and 3 ppm.

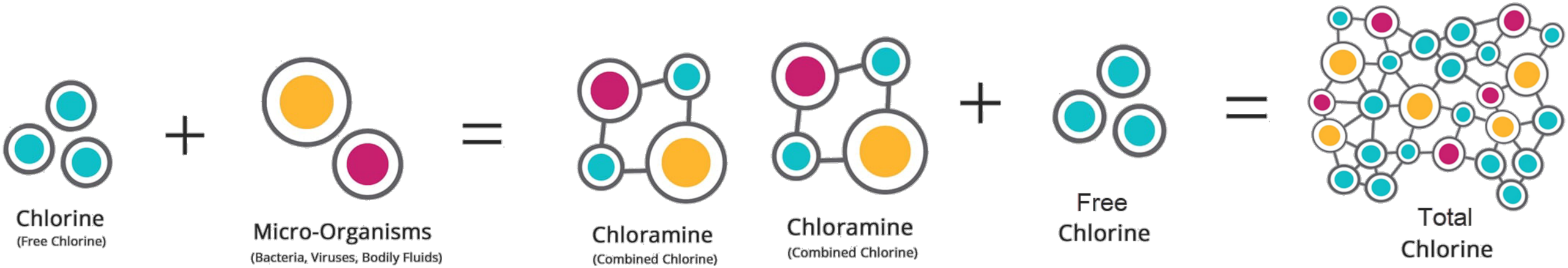
Over 5ppm then the bath requires closing (water to be diluted) until levels are safe again.

Combined Chlorine

This is what is produced when the free chlorine reacts with all the contaminants in the water which reduces its effectiveness . It shouldn't exceed 1mg/l.

Exceeding this isn't an immediate reason to close the pool but signals a problem needing urgent attention. It may indicate issues with water treatment or contaminants like detergents. If unresolved, closure might be necessary and a full system flush.

Total Chlorine: The sum of free chlorine and combined chlorine.



PHOTOMETER KIT

Example Water Testing Kit

This is an example of a digital Photometer and the accessories to go with it for testing.
This can be purchased through Brass Monkey

WEEKLY TEST LOG

Weekly Water Test Log - W.C -

Day	Time	Water Temp	Air Temp	Free Chlorine	Total Chlorine	Combined Chlorone Total Chlorine - Free Chlorine =	pH	Clarity	Initial and Comments
Monday									
Tuesday									
Wednesday									
Thursday									
Friday									
Saturday									
Sunday									

CHLORINE - HOW TO DOSE MANUALLY

Getting ready

Chlorine Type

There are different types of chlorine suitable for pool use. Available in granules or as a liquid.

Our suggestion is Sodium Hypochlorite in 11-12% or 14-15% strength. This is a liquid based Chlorine.

PPE + Safe prep area

It is vital you have a safe space to store and measure the chlorine.

You will need protective clothing when handling chlorine, follow the COSHH guidelines issued with the product.

Calculate the dose

The amount of chlorine required will be dependent on the type and brand.

Always check manufacturers guidelines.

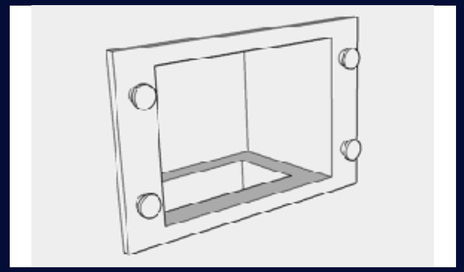
You will need to know the amount of water in your bath. This is calculated by the width x length x depth = amount of water.

The dose is going to be small,

If dosing granular you will need a small set of scales to measure the dose

If dosing liquid you will need a pipette or a small measuring tube.

*Start small, you can always add more!



Introduce to the water

When hand dosing we want to introduce the chlorine into the **skimmer**, this ensures the chlorine gets pulled through the filtration and mixes with the water.

If using granules it is important to pre-mix these with warm water in a beaker and then dose into the skimmer. They will take longer to dissolve in cold water and not doing this could affect your test results.

Leave. Test. Check

Once you have dosed the water, leave this for 20 minutes and then test your chlorine levels.

When you test the water you are checking that your chlorine levels are within the parameters advised by PWTAG.

Check your results, if you have gone too high you can wait and check again later, or you can drain some of the water out and re-fill

If not enough, you can repeat the dosing and then re-test

BALANCING WATER

You may hear the term "**balancing the water.**" While we cover the basics in our flash cards, **regular balancing isn't essential if you're frequently diluting or changing the water—this aligns with PWTAG guidelines.**

However, if you plan to keep the same water for longer or simply want to monitor and fine-tune water quality, here's a quick guide:

Key Weekly Checks:

✅ pH (7.2–7.6) – Maintain for optimal chlorine effectiveness and bather comfort. Adjust with sulphuric acid if needed.
✅ Chlorine (1–3 ppm) – Keeps the water clean and safe by eliminating bacteria and contaminants.
✅ Alkalinity (80–120 ppm) – Helps stabilise pH, preventing sudden fluctuations.
✅ Calcium Hardness (150–250 ppm) – Prevents corrosion (too low) and scaling (too high).

By keeping these levels in check, you'll extend water life, protect equipment, and ensure a comfortable experience for users.

MONTHLY BIOLOGICAL TESTING

Inline with PWTAGs guidance, commercial ice baths should be microbiologically tested monthly by a ISO 17025 UKAS- accredited laboratory.
Testing should include:

- aerobic colony count (37oC)
- coliforms
- *E coli*
- *Pseudomonas aeruginosa*

Studies show that E coli, coliforms and other bacteria can be found in ice and if the ice is produced from contaminated water, or becomes contaminated, there may be a chance of infection.

Completing the monthly biological testing is the only way you will know for sure that your maintenance and dosing regime is working.
If you

If the results show your maintaining good levels of water sanitation then continue as you are remembering to adjust your regime as and when required.
We still recommend you complete a system flush which will mean draining and replacing the water.

SHOCK DOSE VS SYSTEM FLUSH

Shock Dose

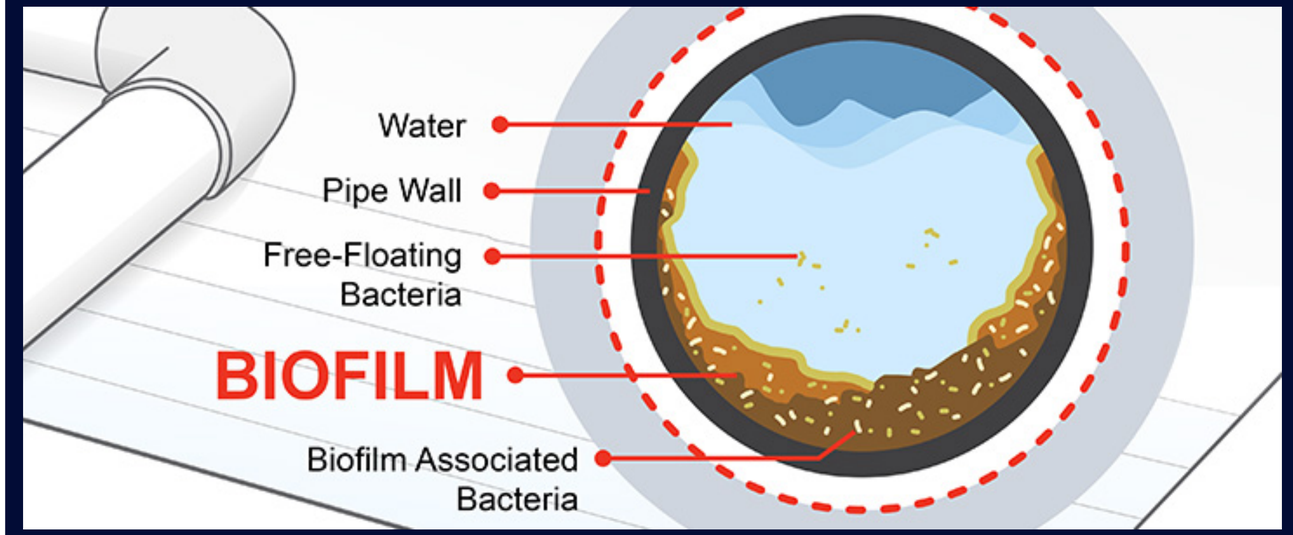
A shock dose is when you increase the chlorine levels above 10ppm. The unit should be running for 1 hour and then draining and refilling. The aim of this is to kill any bacteria living within the pipework and filters.

You might need to do a shock dose following a poor result from a monthly bacteria test or if someone had an accident in the bath.

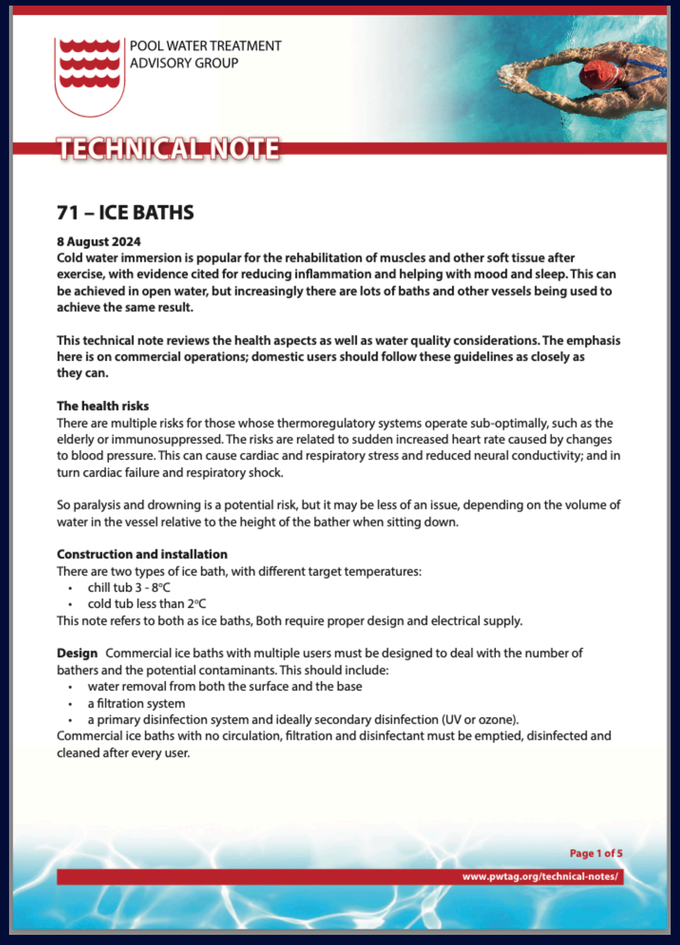
System Flush

A system flush is when you a run a chemical through the bath (length of time will depend on manufacturers guidance).
A system flush will break down body fats, grease and bio-film within the pipework.

We recommend this is done on a monthly basis, this will help with flow rates and combined chlorine levels.



RESOURCES



POOL WATER TREATMENT ADVISORY GROUP

TECHNICAL NOTE

71 – ICE BATHS

8 August 2024

Cold water immersion is popular for the rehabilitation of muscles and other soft tissue after exercise, with evidence cited for reducing inflammation and helping with mood and sleep. This can be achieved in open water, but increasingly there are lots of baths and other vessels being used to achieve the same result.

This technical note reviews the health aspects as well as water quality considerations. The emphasis here is on commercial operations; domestic users should follow these guidelines as closely as they can.

The health risks

There are multiple risks for those whose thermoregulatory systems operate sub-optimally, such as the elderly or immunosuppressed. The risks are related to sudden increased heart rate caused by changes to blood pressure. This can cause cardiac and respiratory stress and reduced neural conductivity; and in turn cardiac failure and respiratory shock.

So paralysis and drowning is a potential risk, but it may be less of an issue, depending on the volume of water in the vessel relative to the height of the bather when sitting down.

Construction and installation

There are two types of ice bath, with different target temperatures:

- chill tub 3 - 8°C
- cold tub less than 2°C

This note refers to both as ice baths, Both require proper design and electrical supply.

Design Commercial ice baths with multiple users must be designed to deal with the number of bathers and the potential contaminants. This should include:

- water removal from both the surface and the base
- a filtration system
- a primary disinfection system and ideally secondary disinfection (UV or ozone).

Commercial ice baths with no circulation, filtration and disinfectant must be emptied, disinfected and cleaned after every user.

Qualification Specification

STA Level 2 Award in Swimming Pool Water Testing

Version 22.1

BRASS MONKEY

W/C ___ / ___ / ___

STEP 1 - Record the following test results

	Day	Total	Initials	Comments
Alkalinity				
Calcium Hardness				
Temperature				
Ph				
Total Dissolved Solids				

Lanagelier Scale for Balanced Water Test.

Temperature	T. Factor	Calcium hardness	C. Factor	Total alkalinity	A. Factor
1°c	0.0	5 ppm	0.3	5 ppm	0.7
8 °c	0.2	50 ppm	1.3	50 ppm	1.7
15 °c	0.4	100 ppm	1.6	100 ppm	2.0
16 °c	0.5	150 ppm	1.8	150 ppm	2.2
25 °c	0.6	200 ppm	1.9	200 ppm	2.3
27 °c	0.7	300 ppm	2.1	300 ppm	2.5
32 °c	0.8	400 ppm	2.2	400 ppm	2.6
37 °c	0.9	800 ppm	2.5	800 ppm	2.9
49 °c	1.0	1000 ppm	2.6	1000 ppm	3.0

ppm = Parts per million

STEP 2 - Use the Lanagelier scale to to find water balance:

Factor Totals	
T.Factor	
C.Factor	
A.Factor	
pH	
Sub Total (X)	
	-12.1
Water Balance	

T.Factor + C.Factor + A.Factor + Ph = X

X - 12.1 = Water Balance Index

Interpretation of results

Tick	Level	Meaning
	+ 0.5	Scale forming
	+ 0.2 to + 0.5	Acceptable Balance
	+ 0.2	Aim for +0.1
	- 0.1 to + 0.1	Ideal Balance
	- 0.1 to - 0.5	Acceptable Balance
	- 0.5	Corrosive & Erosive

Record the index on the table to find the water balance

Day	Time	Water temp	Air temp	A Chlorine Available to kill bacteria (DPD1)	B Total amount of chlorine in water (DPD3)	C B – A = Combined Chlorine	Ph	Clarity	Initials and comments
MON									
TUE									
WED									
THU									
FRI									
SAT									
SUN									

Maintaining chlorine and pH balance is essential for safe, clean, and effective ice baths. Regular testing, proper dosing, and correct PPE use ensure that users have a safe experience while extending the lifespan of the equipment.

For further guidance, refer to PWTAG's recommendations or consult our internal team.

BRASS MONKEY