****

School Swimming Pool

Normal Operating Procedures

(Name of School)

**(Insert Date)**

**Contents**

1 Introduction 3

2 Pool and Premises Details 3

3 Life Guard Arrangements 4

4 Dealing with the Public 4

5 Systems of Work 4

6 Detailed Work Instructions 4

7 First-Aid – Arrangements for Provision and Training 5

8 Alarm Systems. Emergency Equip. & Maintenance Arrangements 5

9 Water Quality 5

9.1 Pre Swim Hygiene 5

9.2 Daily tests 6

9.2.1 Test 1 - Free Chlorine 6

9.2.2 Test 2 - Total Chlorine 7

9.2.3 Test 3 - Combined Chlorine 7

9.2.4 Test 4 - Dilution Tests 8

9.2.5 Test 5 - pH Value 8

9.3 Weekly Tests 9

9.3.1 Total Alkalinity 9

9.3.2 Calcium Hardness 9

9.3.3 Total Dissolved Solids (TDS) 10

9.4 Monthly Tests 11

9.4.1 Bacteriological Testing 11

9.5 Acting on Failures: When to Close the Pool 12

9.6 Gross Contamination 12

9.7 Backwashing 12

10 References 14

11 Version Control 14

# Introduction

In the UK there exists no official standards or legislation specifically for swimming pools. Various other standards and pieces of legislation exist which cover various aspects of swimming pool operation as a workplace, such as the Health and Safety at Work etc. Act 1974, Management of Health and Safety at Work Regulations 1999 and the Control of Substances Hazardous to Health Regulations 2002.

To supplement existing legislation and provide more focussed guidance and establish standards in swimming pools the Health and Safety Executive (HSE) have published a guidance document, [HSG179 Managing Health and Safety in Swimming Pools](https://www.hse.gov.uk/pubns/books/hsg179.htm) and the Pool Water Treatment Advisory Group (PWTAG) have published a code of practice for [The Management and Treatment of Swimming Pool Water](https://www.pwtag.org/code-of-practice/) and which is based heavily on their [Swimming Pool Water Book: Treatment and Quality Standards for Pools and Spas](https://www.pwtag.org/swimming-pool-water-book/) and which is further updated with their published [Technical Notes](https://www.pwtag.org/technical-notes/).

By following the guidance given in the above referenced documents you will likely ensure that you are doing all that can be expected with regard to effectively controlling risk.

Where text appears in **[***red***]** it requires you to insert or replace with the appropriate information relevant to the premises where the pool is located and the arrangements in place for effective management of safe pool operation at that location.

# Pool and Premises Details

Competent Person responsible for completing normal operating procedure:

**[***Insert name of**Competent Person here***]**

* Pool Length **[**xxx Metres**]**
* Pool Width **[**xxx Metres**]**
* Pool Depth **[**xxx Metres**to** xx Metres**]**

Pool Turn Over rate (m3/hr) **[**xxx **m3/hr]**

Turn over period is the time taken for a volume of water, equivalent to the entire volume of the pool to pass through the plant and return back to the pool.

Turnover rate (hr) = Water volume (m3)

 Circulation rate (m3/hr)

**NB:** all pools should be fitted with a flow-meter on the main circulation line which shows the circulation rate and can be used to monitor any loss in performance.

**[***Insert a schematic plan of your pool to include position of pool alarms, fire alarms, emergency exit routes, plant equipment and any other relevant information***]**

# Life Guard Arrangements

**[***Number of life guards expected per session***]***.*

*When determining how many life guards are needed operators should consider:*

1. *Local circumstances including the needs of the children;*
2. *The pool structure and equipment;*
3. *The way the pool is used and the characteristics and any specific needs of those who may use it.*

*For more information please see:*

[*HSG179 Managing Health and Safety in Swimming Pools*](https://www.hse.gov.uk/pubns/books/hsg179.htm).

# Dealing with the Public

**[***Schools should specify their arrangements for:*

* *Customer care;*
* *Communicating safety messages to customers,*
* *Pool side rules for the public and for lifeguards, and*
* *Controlling access to unauthorised areas***]**

# Systems of Work

**[***Including lines of supervision, call out procedures, work rotation and maximum pool side working times***]**

# Detailed Work Instructions

**[***Including pool cleaning procedures, safe setting up and checking of equipment, diving procedures and setting up the pools for galas, etc*.**]**

As a guide it is recommended the following activities are completed in the designated timescales: Pool water can be used to clean in the pool hall, any chemicals used in the pool hall must not interfere with the chlorine in the pool water.

**Daily**

* Dilution of pool,
* Easy flow injectors plunged at each pool / spa test, and
* Top up day tank

Pool floor should also be cleaned at regular intervals

**Weekly**

* Skimmers and filter baskets are removed and cleaned of debris (daily for outdoor pools), and
* Foot valves are removed and flushed with hot water, ensuring the china ball moves freely.

**Others**

* Scrub balance tank, every 6 months during super-chlorination procedure, and
* Flush chemical dosing lines every month.

Competent contractors must be used and records kept. Ensure that circulating and chemical dosing plant is safe at all times; do not be tempted to do a quick repair that is unsafe.

# First-Aid – Arrangements for Provision and Training

**[***Include equipment required, its location, arrangements for checking it, number of first-aiders required, first-aid training and disposal of sharps***]**

# Alarm Systems. Emergency Equip. & Maintenance Arrangements

**[***Detail all alarm systems and emergency equipment provided, including operation, location, action to be taken on hearing the alarm, testing arrangements and maintenance***]**

# Water Quality

## Pre Swim Hygiene

Good pre- swim hygiene is one of the most important factors in maintaining high pool water quality. The main reason chemicals are used in a pool, particularly disinfectants, is to counteract the pollution and potentially harmful bacteria brought into a pool by bathers that could result in cross infection from one bather to another. Trials by PWTAG showed that pre-swim showering does remove up to two-thirds of the sweat products and a third of the bacteria that otherwise end up in the pool.

**[***Schools should outline their procedures to encourage pupils to shower before entering the pool e.g. signs, direction from teachers****.*** *Children in particular should be educated to use the toilet and then shower before swimming to minimise involuntary urination / defecation in the pool***]**

## Daily tests

To ensure good water quality a number of tests must be undertaken several times per day. Assuming that the pool has an automatic dosing system the chlorine levels should be taken three times a day**.** Tests should be taken from the same spot in the pool each time and at a location at where the disinfection is expected to be low.

Before conducting any tests make sure all equipment and your hands are clean.

### Test 1 - Free Chlorine

This is the level of disinfectant in the pool, available to kill and absorb bacteria. The Free Chlorine should be at the lowest concentration that gives satisfactory microbiological quality.

At **[***insert name of pool***]** Free Chlorine levels should be **[***xxx* ***ppm*]**

Note Free Chlorine levels:

* Above 3ppm are unlikely to be necessary and chlorination should be reduced,
* Above 5ppm chlorination should be stopped immediately, and
* Above 10ppm bathing should cease.

The results of the free chlorine tests should be recorded.

**[***The methodology for testing for free chlorine will vary dependent on the equipment for each pool. The school should revert to the manufacturer’s instructions for their equipment and write their own methodology****.*** *Below is an example and should be rewritten or amended to suit your pool:*

* *Fill first test tube to 10ml mark for calibration sample (use a plastic syringe to fill tubes accurately, to correct level)*
* *Rinse second test tube with sample water leaving two or three drops in the tube*
* *Add one DPD No. 1 tablet, crush tablet then fill the test tube with sample to the 10ml mark (using syringe). Mix to dissolve tablet completely to ensure accurate reading*
* *Place caps on both tubes*
* *Take Photometer reading at 520nm immediately*
* *For correct parameters see the pool / spa log sheet*
* *Record result on the pool / spa log sheet*
* *If the result is outside of the parameters take remedial action and retest in 30 minutes*
* *When you are conducting this test if too much chlorine is present the solution in the tube will change from a* *dark red to clear. This is “bleach out”. A dilution test should then be performed***]**

### Test 2 - Total Chlorine

This is a combination of the free and combined chlorine**.**

**[***The methodology for testing for total chlorine will vary dependent on the equipment for each pool****.*** *The school should revert to the manufacturer’s instructions for their equipment and write their own methodology****.*** *Below is an example and should be rewritten or amended to suit your pool:*

* *Using the same test tube and solution from the Free Chlorine test;*
* *Add one DPD No.3 tablet, crush to dissolve;*
* *Place cap on tube;*
* *Leave for two minutes;*
* *Take the photometer reading at 520nm;*
* *Record result on the pool / spa log sheet; and*
* *If the result is outside of the parameters take remedial action and retest in 30 minutes.***]**

### Test 3 - Combined Chlorine

This is the disinfectant that has already killed and absorbed the bacteria. It forms the contamination level in the pool.

To calculate, take the Total Chlorine figure minus the Free Chlorine figure and that equals Combined Chlorine. Record the result on the pool / spa log sheet.

The combined chlorine should be as low as possible, ideally zero, and always half or less than the free chlorine.

If the result is outside of the defined safe parameters, take remedial action and retest in 30 minutes. To remove high levels of combined chlorine dilute pool water with fresh water.

### Test 4 - Dilution Tests

Free chlorine tests should always start with a drop of water in the test tube. When the DPD1 tablet is added and crushed it should go dark red in colour, if the sample remains clear, there is no chlorine in the sample. Chlorine needs to be added to the pool / spa.

Another scenario, sample water is added to the 10ml mark, after the DPD1 tablet has been mixed with one or two droplets. The sample then goes from dark red to clear. It is an indication of too much chlorine and the photometer cannot read the sample. It therefore needs to be diluted.

For a x2 dilution, the sample should be accurately made up of 50% pool water and 50% pure water. The test is then carried out in the normal way and the reading multiplied by 2. If this is unsuccessful, further dilutions may be necessary e.g. 25% x 4.

### Test 5 - pH Value

PH is a measure of acidity or alkalinity of water on a scale of 1 to 14.

The ideal for a swimming pool or spa bath is between 7.2 and 7.4.

For hypochlorite disinfectants to work properly the PH value of the pool is critical:

* Fill the tube with sample water to the 10ml mark using syringe;
* Add one Phenol Red tablet, crush to dissolve;
* Place caps on both tubes;
* Take the Photometer reading at 520nm;
* For parameters see the pool / spa log sheet;
* Record result on the pool / spa log sheet; and
* If the result is outside of the parameters take corrective action and retest in 30 minutes.

**To raise the PH an alkali can be added e.g. sodium carbonate.**

**To reduce the PH an acid can be added e.g. sodium bisulphate or co2.**

**[***School to insert procedures for raising or lowering the PH safely here.***]**

## Weekly Tests

### Total Alkalinity

Total alkalinity is a measure of the alkaline salts in the water, mainly bicarbonate and carbonate**.**

If the alkalinity is too low a condition call ‘pH bounce’ can occur making it very difficult to stabilise the pH. It causes corrosive conditions and can cause eye irritation.

If the alkalinity is too high then ‘pH lock’ occurs where it is difficult to alter the pH value. It can also cause cloudy water.

The ideal values should be between,

* 120 and 150mg/l or ppm when using sodium hypochlorite, or
* 80 to 120mg/l or ppm when using calcium hypochlorite

In order to raise the alkalinity add sodium bicarbonate and, conversely, to lower alkalinity dose with an acid or dilute with fresh water.

**[***Schools to insert their procedures for lowering or raising Total Alkalinity here****]***

**[***The methodology for testing for alkalinity will vary dependent on the equipment for each pool****.*** *The school should revert to the manufacturer’s instructions for their equipment and write their own methodology****.*** *Below is an example and should be rewritten or amended to suit your pool:*

* *Fill the first test tube to 10ml mark and use as calibration sample;*
* *Fill second test tube with sample to the 10ml mark (using syringe);*
* *Add one Alkaphot tablet, crush to dissolve;*
* *Place caps on both tubes;*
* *Take the photometer reading at 570 nm;*
* *For parameters see the pool / spa log sheet;*
* *Record result on pool / spa log sheet; and*
* *If the result is outside of the parameters take remedial action and retest in 30 minutes***]**

### Calcium Hardness

This is a measure of the dissolved calcium in the water. If it is too low the water may be corrosive. If the value is too high the water will become scale forming.

The ideal range for calcium hypochlorite disinfectant is between 75mg/l and 150mg/l. The normal range may extend to >350mg/l but not exceed 500mg/l.

The ideal range for sodium hypochlorite is between 75mg/l and 150mg/l.

In order to raise calcium hardness add calcium chloride. Calcium chloride, when added to water, generates a significant amount of heat. To therefore minimise this, calculate the amount to be added, half that amount and then apply to the pool by adding half at a time. ALWAYS add chemicals to water and **never** water to chemicals. The calculation should be based upon 1.5 kg of calcium chloride for each 50m3 of pool water to raise calcium hardness by 20mg/l.

To lower calcium hardness dilute with mains water, however this only works if the mains water is soft. Lowering calcium hardness is a difficult thing to do.

**[***The methodology for testing for calcium hardness will vary dependent on the equipment for each pool****.*** *The school should revert to the manufacturer’s instructions for their equipment and write their own methodology. Below is an example and should be rewritten or amended to suit your pool:*

* *Fill the first test tube to 10ml mark and use as calibration sample;*
* *Fill second test tube with sample to the 10ml mark, using syringe;*
* *Add one Calcicol No. 1 tablet, crush and mix to dissolve;*
* *Add one Calcicol No. 2 tablet, crush and mix to dissolve;*
* *Place cap on tubes;*
* *Wait for two minutes;*
* *Take the photometer reading at 570nm;*
* *For parameters see the pool / spa log sheet;*
* *Record result on pool / spa log sheet; and*
* *If the result* *is outside of the parameters take remedial action and retest in 30 minutes.***]**

### Total Dissolved Solids (TDS)

Total Dissolved Solids (TDS) is the sum of the weight of soluble material in water. Mains water can sometimes have a TDS of several hundred mg/l.

Disinfectants and other pool chemicals produce significant TDS levels.

Pollution, introduced by bathers for example, will also boost TDS levels.

Total dissolved solids should not be allowed to rise more than 1000mg/l above source water with an absolute maximum of 3000 mg/l.

Knowing the TDS levels in you pool can provide a warning that pool water is becoming overloaded with soluble materials which must be controlled by dilution of the pool water with fresh water.

Dilution of the pool water by backwashing of filters and draining water to waste is important in limiting the increase in concentration of dissolved solids (waste 3cm of pool water and replace with fresh water every day). One European standard is to replace up to 30 litres of water per bather per day. Although dilution is the main way to reduce TDS, using fewer chemicals can prevent it rising.

High TDS does not endanger the pool’s water treatment, but does marginally encourage corrosion.

**[***Schools to insert their own procedures for measuring TDS (Total Dissolved Solids) here and record the result on the pool / spa log sheet***]**

## Monthly Tests

### Bacteriological Testing

Providing that correct chlorine levels are maintained, microbiological samples taken once a month should provide adequate assurance of quality. It is important that samples are taken during normal opening hours. More frequent samples should be taken if there is any reason to suppose that there has been a deterioration in quality, a reported infection or where equipment failure has occurred.

**NB:** If the tests are not ‘Satisfactory’, action needs to be taken and records maintained**.**

Laboratory testing will be required to test for a range of bacteria, namely:

1. **Colony Count (37°c for 24 hours)**

The count should normally be 10 or less colony forming units (cfu) per ml of pool water**.** If a colony count above 10cfu/ml is the only unsatisfactory microbiological result, and chlorine levels are within recommended ranges the water should simply be retested. However, if on retesting a consistently raised colony count of 10 - 100cfu/ml is recorded it would indicate that the results require further investigation. Colony counts in excess of 100cfu/ml indicate that operating conditions are unsatisfactory and requires immediate investigation to determine cause and appropriate remedial action.

1. **Total Coliforms**

If Total Coliforms are also present there is likely to be a serious defect in the pool operating system such as failure of the disinfection process and / or a problem with the chemical balance of the pool including the pH value.

Occasionally, a few (less than 10) coliforms may be found in the absence of e-coli and with a colony count of no different than usual. This may be acceptable provided that the residual disinfectant and pH values are satisfactory and coliforms are not found in consecutive samples.

1. **E-Coli**

E-coli are bacteria found in the gut of warm-blooded mammals and as such is transmitted via contact with faeces and faecal matter. Evidence of e-coli should be absent in a 100ml sample. However, as most bathers will have some faecal contamination on their skin a single positive sample may be the result of superficial contamination by a bather. A repeat sample should be taken.

1. **Pseudomonas**

Pseudomonas are a bacteria which grow in slow or stagnant water and can cause lung, ear and skin infections. If the count is over 10 per 100ml repeat testing should be undertaken. If a repeated sample contains Pseudomonas the filtration and disinfection processes should be examined to determine whether there are areas within the pool with poor circulation where the organism is able to multiply.

## Acting on Failures: When to Close the Pool

* If a result is not satisfactory, the test should be repeated as soon as practicable.
* If the second test is also unsatisfactory, the pools management and operating procedures should be investigated and the test repeated.
* If this results is also unsatisfactory, immediate remedial action is required which may mean closing the pool.
* The pool should be closed if there is chemical or physical evidence of unsatisfactory disinfection.
* The pool should be closed if microbiological testing discloses gross contamination.

## Gross Contamination

E.coli over 100cfu per 100ml, PLUS

Either colony count over 10cfu per ml, OR

Pseudomonas over 10cfu per 100ml (or, of course both), OR

Pseudomonas over 50cfu per 100ml and colony count over 100 per ml.

## Backwashing

Backwashing will maintain the filter media for pool and spa water at its maximum level. It involves cleaning the filter beds with pool or spa water by reversing the flow of water through the filters to waste. The filters are full of sand which become clogged over time if backwashing is not carried out. By backwashing you are naturally dumping dirty water which results in the removal trapped dirt, bacteria that is not killed during the normal disinfection process and dilutes the pool as fresh water replaces the water dumped to waste. Excessive backwashing can cause problems in the effectiveness of the filter media.

Backwashing should generally be done when the pool is closed. Water levels in the pool will drop during the backwashing process as pool water is used, it is therefore safer for bathers if they are not present when this is being done.

The filters can then be run overnight which gives the sand filter time to mature and ensures they are working at optimum efficiency when swimmers are present in the pool during the day.

Back washing should be carried out, whichever comes first, either weekly or when the normal running pressure between the pump and filter has increased by 25% as this is an indicator that there is a build-up of debris in the filter and therefore time for a backwash.

Backwashing should also be carried out when there is an incident in the pool e.g. contamination with runny faeces so as to flush out any cryptosporidium and giardia spores and any other faecal matter in the filters after the pool has been sufficiently disinfected and filtered.

**[***Schools should insert here their own, bespoke, pool / spa backwashing procedure.**Following is an example of a pool / spa backwash and fill procedure you should liaise with the manufacturer or your pool contractor to create a similar procedure bespoke to your own pool / spa.*

1. *Turn spa filter off on main panel in plant;*
2. *Close orange valve A, and the two blue valves under the control pane;*
3. *Open backwash valve 4, in front of silver filter;*
4. *Turn multi-port to backwash;*
5. *Turn filter on - wait for water level to drop to spa seat level;*
6. *Turn filter off;*
7. *Turn multi-port to rinse;*
8. *Turn filter on;*
9. *Rinse for 1-2 minutes;*
10. *Turn filter off;*
11. *Turn multi-port to filter;*
12. *Close backwash valve;*
13. *Close valve (24), underneath and to the right of main electrical panel;*
14. *Open valves (11), behind valve (24);*
15. *When spa is overflowing, open valve (24) and close valve (11); then*
16. *Turn filter on.*

*Once your procedure has been defined it is recommended that the guide is laminated and displayed in the plant room for team members to refer to***]**

# References

[Health and Safety at Work etc. Act 1974](https://www.legislation.gov.uk/ukpga/1974/37/contents)

[The Management of Health and Safety at Work Regulations 1999](https://www.legislation.gov.uk/uksi/1999/3242/contents)

[The Control of Substances Hazardous to Health 2002](https://www.legislation.gov.uk/uksi/2002/2677/introduction)

[HSG179 Managing Health and Safety in Swimming Pools](https://www.hse.gov.uk/pubns/books/hsg179.htm)

[Pool Water Treatment Advisory Group (www.pwtag.org) – Code of Practice](https://www.pwtag.org/download/pwtag-code-of-practice/?wpdmdl=2378&refresh=61483edc46a791632124636)

[Pool Water Treatment Advisory Group (www.pwtag.org) – Technical Notes](https://www.pwtag.org/technical-notes/)

# Version Control

|  |  |  |  |
| --- | --- | --- | --- |
| **Version Control** | **Date Released** | **Approved By** | **Amendment** |
| 1 | Oct 2015 |  | Document created. |
| 2 | Jan 2022 |  | Updated file format from Word 97-2003 (.doc) to Word (.docx).ToC fixed.Changes to wording & grammar throughout.Formatting changes throughout.Added Introduction section.Added References section. |