

SPA POOL TECHNICAL OPERATOR

SYLLABUS AND ASSESSMENT v8 27.08.19

THE Spa PTO SYLLABUS

This is what people studying for PWTAG-approved Paddling PTO qualification should be taught

THEORY

1. What is a spa pool

- a. Types of pool and uses, differences between spas and hot tubs, differences between commercial, business use and domestic
- b. Types of pool tank and finish
- c. How spa pools work – the recirculation cycle:
 - circulation system including balance tank
 - air and water booster jet systems
 - filtration
 - chemical disinfection

2. Pollution and hygiene

- a. Pollution from bathers – why people are the main source of pollution bathers:
 - skin scales, sweat, urine, mucus from the nose and chest, saliva, hair, faecal matter, cosmetics, suntan lotion
- b. Pollution not from bathers:
 - indoor and outdoor pools, dust, floating debris, grass, dirt (soil/stones) precipitated chemicals, sand from filters, byproducts of chemical treatment
- c. Pre-swim hygiene: · toilets and showers – the value of pre swim hygiene
- d. When not to bathe – exclusion policies

3. Management, health and safety regulation and training

- a. Staffing structure and management systems – their impact on water quality
- b. Health and Safety – the legal requirements
- c. HSG 179 – the written procedures (PSOP and method statement)
- d. COSHH – substances hazardous to health in a pool,

- chemicals and microorganisms
- e. ACOP - L8 Legionnaires' disease. The control of legionella bacteria in water systems 2013
- f. HSG 282 Control of legionella and other infectious agents in spa-pool system
- g. Confined spaces – and its application
- h. O&M manual and schematic drawing
- i. Training – who, when and how much is needed
- j. PWTAG Code of Practice – Spa Pool Technical Operations' role in written procedures
- k. EN17125 - 2018 - Domestic spas and hot tubs - Safety requirements and test methods

4. Design

- a. Design issues impacting on water quality
 - Changing rooms,
 - toilets and showers
 - Floors in wet areas
- b. Safe access – including people with disabilities, children
- c. The plant room – location, size and access
- d. Chemical store
- e. Temperature and humidity
- f. Energy management
- g. Indoor or outdoor

5. Hydraulics and water circulation including air and water boost jet systems

- a. Bather load – calculating the factors for safety and water quality
- b. Circulation rate – calculations
- c. Turnover period – calculations and alignment with PWTAG standards
- d. Hydraulic design – different design solutions, avoiding dead legs
- e. Surface water removal – focusing on removing pollution:
 - deck-level
 - skimmers
- f. Balance tanks – purpose, design and maintenance
- g. Outlet and inlet safety – the entrapment: PWTAG Code, BS EN 13451–1 and 3
- h. Circulation pumps – the principles, self priming pumps, variable speed drives
- i. water booster jet pumps giving details and reasons for rest periods
- j. Valves – types, uses and safe operation
- k. Flow meters and pressure gauges – calibration, maintenance
- l. I More than one pool – separate treatment systems

6. Filtration

- a. Clarity of water – importance

- b. Filtration rates – pros and cons:
 - medium-rate
 - high-rate
- c. The sand bed – grades and depths
- d. Underdrains – how they work, how they are best constructed
- e. Other types of filter:
 - bags and cartridges
 - pre-coat -diatomaceous earth, perlite
 - carbon
 - glass
 - membrane
 - zeolite
- f. Backwashing – the principles:
 - how to backwash, fluidisation of the bed, the rinse cycle
 - strainer basket – part of the process
 - when to backwash – PWTAG Code and guidance, HSG 282, on site risk assessment
- g. Filter design – materials, sizes and fittings. Filter maintenance – the annual programme
- h. Coagulation – what it is:
 - how it works – agglomeration and flocculation
 - high-rate filters – and coagulants
- i. Coagulants:
 - dosing – quantities and rates
 - injection – where to appl

7. Primary disinfection

- a. Suitability and compatibility of disinfection types
- b. What is disinfection – in a spa pool setting , and the need for it to be continuous
- c. Oxidation – what it is, and does
- d. CT rates – an appreciation
- e. Choosing a primary disinfectant –sodium/calcium hypochlorite, bromine (soft water, hard water, costs and impurities)
- f. The chemistry of chlorine disinfection – an understanding:
 - how chlorine forms a residual – hypochlorous acid and hypochlorite ion
 - the effects of pH on disinfection – the values to pursue and why
 - breakpoint chlorination – understanding the crucial role of breakpoint
 - chlorine plus ammonia – urea, chloramines
 - nitrogen trichloride – its causes
 - organic chloramines – how they are caused, their effects and removal
- g. Free and combined chlorine – the relationship and target levels
- h. pH value – its influence on disinfection and the options

- i. Electrolytic generation of chlorine – the systems and applicability
- j. Bromine based disinfectants
 - BCDMH – what it is and the residuals:
 - sodium bromide
- k. Other forms of residual disinfection suitable for spas
- l. The importance of regular total water replacement – why disinfection and filtration is not enough

8. Secondary disinfection

- a. When secondary disinfection should be considered
- b. The effects of secondary disinfection
- c. Dealing with Cryptosporidium
- d. Ozone – what it is, how it is applied, the pros and cons
- e. UV – what it is, how it is applied, maintenance and monitoring, pros and cons

9. Dosing chemicals

- a. Principles – key requirements when dosing chemicals
- b. Components – the system design and infrastructure
- c. Dosing practice – where, when and how
- d. Hand dosing I
- e. Diluting chemicals – how and when to dilute
- f. Dissolving dry chemicals
- g. Dose strength – calculations
- h. Day tanks – use, construction and fittings
- i. Dosing pumps – type, construction and capacity
- j. Pipework – construction and application
- k. Valves and fittings – that may be incorporated into the dosing system
- l. Calibration – checking the dosing rate
- m. Faults – fail safe systems
- n. Automatic control – optimising dosing treatment:
 - closed loop – how the control works
 - sample mixing – representative sample
 - sampling – where to sample from
 - calibration – independent analysis of the sensor to verify the desired effect
 - sensors – amperometric, redox, pH value
 - controllers – the levels of sophistication
- o. Circulation feeders – what they are and how they work:
 - brominators
 - calcium hypochlorite
- p. Super-chlorination

10. Pool water chemistry

- a. Source water quality
- b. Alkalinity – the effect on pH
- c. Hardness – PWTAG guidelines, grout and scale
- d. Sulphate- effects on cementitious materials

- e. Dissolved solids – Corrosion, erosion and PWTAG guidelines
- f. Water balance – what it is
- g. Disinfection by-products – the health effects:
 - nitrogen trichloride – effects, monitoring and mitigation
 - THMs – role of humic acid, monitoring and removal
- h. Frequency of water replacement and how to calculate

11. Testing and controlling pool water chemistry

- a. Comparator and photometer – how to use them
- b. How to sample and test for:
 - free chlorine/total bromine
 - combined chlorine
 - pH
 - Total bromine
- c. Chlorine disinfection:
 - testing frequency
 - disinfectant residual tests – PWTAG Code and standards
 - understanding effects of free chlorine on chloramines
 - interpreting test results
 - acting on chlorine residual results
 - monitoring
- d. pH value – measuring and checking:
 - alkaline disinfectants – effect on pH
 - acidic disinfectants effects on pH
- e. Alkalinity – measuring and control
- f. Hardness –measuring and control
- g. Dissolved solids – measuring and control
- h. Sulphates – measuring and control
- i. Documentation and record keeping and storing test results
- j. Bromides:
 - measuring and control
 - interpreting results
- k. Documentation

12. Healthy bathing – the benefits and health risks

- a. Infectious hazards, including transmission:
 - gastro-intestinal infections – Shigella, Escherichi coli, Cryptosporidium
 - foot infections – verruca and athletes foot
 - skin infections – molluscum contagiosum, Staphylococcus aureus and MRSA
 - eye infections – including Acanthamoeba
 - ear infections – otitis externa – Pseudomonas aeruginosa
- b. Non-infectious hazards:
 - respiratory irritation – including Legionella and asthma
 - skin irritation – bromine, Pseudomonas aeruginosa, folliculitis

- ear infections, including otitis externa
- electrocution; slip, trip, falls; fainting; entrapment; drowning;
- Benefits
- Contra-indicators
- Advice to users

13. Preventing outbreaks

- What goes wrong – definition of an outbreak
- Problems that have lead to outbreaks
- Dealing with a faecal incident – The PWTAG Code, technical note and NHS UK Cryptosporidium Reference Unit: Guidance for Investigators and Health Professionals:
 - solid faeces
 - runny faeces
 - procedure for medium-rate filters
 - procedure for high-rate filters
 - prevention
 - blood and vomit
- Legionella risk assessment – requirement and frequency

14. Microbiological testing

- Sampling – must include chemical tests
- Aerobic colony counts (TVC)
- Coliform and E coli – potential faecal or environmental pollution
- Pseudomonas aeruginosa – the reasons for testing
- Legionella – quarterly testing for spas, showers and water storage
- Test requirements – monthly analysis
- Interpreting results – assessing microbiological quality,
- Remedial action
- Gross contamination and closure of the pool
- Quality assurance

15. Pool chemical safety

- Safety data sheets – provision and use
- Risk and COSHH assessment – the process and elimination
- Delivery:
 - access
 - unloading
- Bulk deliveries and storage
- Transporting chemicals
- The chemical store
 - siting
 - fire risk
 - spillage
 - ventilation
- Storage of disinfectants and other chemicals including:
 - sodium hypochlorite

- calcium hypochlorite
- BCDMH
- sodium bisulphate
- hydrochloric Acid
- sulphuric acid
- soda ash (sodium carbonate)
- sodium bicarbonate

16. Plant maintenance

- a. Servicing and frequency
- b. Calibration
- c. Daily monitoring and maintenance, fault finding

17. Cleaning and hygiene

- a. Floor surfaces – dirt, slips trips and falls and bacteria
- b. Around the spa – PWTAG technical note
- c. Scale removal
- d. Pool covers – cleaning both sides to control mould and *Pseudomonas aeruginosa*
- e. Transfer channels and balance tanks – regular maintenance including cleaning
- f. Air and Water booster jet circuits - frequency and method of achieving effective cleaning
- g. The spa floor –particularly deck-level pools
- h. Stainless steel – preventing corrosion
- i. Safeguarding the fabric of the building – preventing stainless steel corrosion cracking - need for daily wiping, pool grout and effect of sulphate, filling and emptying pools
- j. Algae

18. PPE and plant room emergency procedures

- a. The regulations – assessment, provision and use
- b. Harmful effects – the potential risks to health from chemical exposure
- c. PPE – what to use and when, use of SDS
- d. In an emergency – what to do for chemical contact/inhalation/ingestion
- e. Emergency showers and eye baths
- f. Toxic gasses, fires and explosions
- g. Spillages – PWTAG Code and technical guidance (sodium hypochlorite) h PWTAG Code and emergency procedures – chemicals emergency part of the EAP

19. THEORY ASSESSMENT EXAM

A multiple choice exam shall at a minimum cover a fair representation of the essential topics as outlined in the theory element of the syllabus (above)

20. THE Spa PTO PRACTICAL

There are **four** basic areas of practical ability that can be **taught** in

any suitable location, and should then be **assessed** in the student's workplace, as part of the **exam**

1. Doing a full set of water tests for spa pool water

This should include:

- free chlorine
- total and combined chlorine
- pH
- total alkalinity
- calcium hardness
- total dissolved solids (TDS)

2. Drawing a schematic diagram of the layout of a spa pool plant

This should indicate clearly (using arrows to indicate the direction of flow) each of the main components, including:

- filters
- pumps
- strainers
- automatic dosing units
- monitoring equipment
- main valves

3. Demonstrate how to backwash the filtration system

This should be of a chosen spa pool, in accordance with normal operating procedures. It should include an explanation of why and when this must be carried out.

4. Making a risk assessment for one pool chemical

This should refer to a chemical stored in the plant room of a chosen spa pool. It should include identifying the requirements for storage, handling and use of the chemical.

ASSESSMENT

Documentation of these tasks shall be provided to the manager, who must sign them off to show that they are based upon the spa pool used in the assignment. The PWTAG Accredited Trainer course organiser will assess the evidence presented and determine if the student has demonstrated sufficient knowledge and practical skills and provide this as part of the assessment record.