

HOT TUB TECHNICAL OPERATORS COURSE

SYLLABUS AND ASSESSMENT - v6 27.8.19

THE Hot Tub TO SYLLABUS

This is what people studying for PWTAG-approved Hot Tub TO qualification should be taught.

THEORY

1. What is a Hot Tub

- a. Definition of a hot tub and types of settings
- b. How Hot Tubs work – the recirculation cycle:
 - circulation system
 - water booster jet systems
 - filtration
 - chemical disinfection
- c. EN 17125 and Business Use

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 hot tubs, dust, floating debris, grass, dirt (soil/stones) precipitated chemicals, sand from filters, by-products of chemical treatment
- c. Pre-swim hygiene: - toilets and showers – the value of pre swim hygiene
- d. When not to use – 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 systems 2013
- g. O&M manual and schematic drawing
- h. Training – who, when and how much is needed
- i. PWTAG Code of Practice – Hot Tub Technical Operators role in written procedures
- j. PWTAG Hot Tubs for Business 2018
- k. BS8580-1 2019 Water quality. Risk assessments for Legionella control. Code of practice
- l. EN17125-2018 - Domestic spas and hot tubs - Safety requirements and test methods

4. Design

- a. Safe access – including people with disabilities, children
- b. The plant – location, size and access
- c. Chemical store
- d. Temperature

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. Surface water removal – focusing on removing pollution: skimmers
- e. Outlet and inlet safety – the entrapment: PWTAG Code, BS EN 13451-1 and 3
- f. Circulation pumps – the principles, self-priming pumps
- g. Air and water booster jet pumps giving details and reasons for rest periods
- h. Valves – types, uses and safe operation

6. Filtration

- a. Visual appearance and clarity of water –importance
- b. Cartridge Filters – how they work and how they should be cleaned. Frequency of replacement

7. Disinfection

- a. Suitability and compatibility of disinfection types
- b. Disinfection – in a hot tub setting
- c. Oxidation – what it is, and does
- d. Choosing a disinfectant –sodium/calcium hypochlorite, bromine, isocyanurates (Dichlor and Trichlor) (soft water, hard water, costs and impurities)
- e. The chemistry of chlorine/bromine disinfection – an understanding:
 - how chlorine/bromine forms a residual
 - the effects of pH on disinfection – the values to pursue and why
 - breakpoint chlorination – understanding the crucial role of breakpoint
 - chlorine/bromine plus ammonia – urea, chloramines
 - nitrogen tri chloride – its effect
 - organic chloramines – how they are caused, their effects and removal
- f. Free and combined chlorine/Total bromine – the relationship and target levels
- g. pH value – its influence on disinfection and the options
- h. The importance of water replacement – why disinfection and filtration is not enough

8. Dosing chemicals

- a. Principles – key requirements when dosing chemicals
- b. Dosing practice – where, when and how
- c. Hand dosing I
- d. Dose strength – calculations
- e. Pipework – construction, application and cleaning
- f. Feeders , circulation, continuous, floating – what they are and how they work:
 - brominators/chlorinators
 - calcium hypochlorite
- g. Super-chlorination

9. Pool water chemistry

- a. Source water quality
- b. Alkalinity – the effect on pH
- c. Hardness – PWTAG guidelines, scaling
- d. Dissolved solids – Corrosion, erosion and PWTAG guidelines
- e. Water balance – what it is, its applicability or otherwise
- f. Disinfection by-products – the health effects:
 - nitrogen trichloride – effects, monitoring and mitigation
- g. Frequency of water replacement and how to calculate

10. 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

11. 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 eruginosa, folliculitis
 - ear infections, including otitis externa
 - electrocution; slip, trip, falls; fainting; entrapment; drowning;
 - Benefits -circulation, stress, mental health
 - Contra-indicators
 - Advice to users

12. Preventing outbreaks

- a. What goes wrong – definition of an outbreak
- b. Problems that have led to outbreaks
- c. Dealing with a faecal incident – The PWTAG Code, technical note and
 - solid faeces
 - runny faeces
 - procedure for cartridge filters
 - procedure for high-rate filters
 - prevention
 - blood and vomit
- d. Legionella risk assessment – requirement and frequency

13. Microbiological testing Sampling – must include chemical

- a. Aerobic colony counts (TVC)
- b. Coliform and E coli – potential faecal or environmental pollution
- c. Pseudomonas aeruginosa – the reasons for testing
- d. Legionella – quarterly testing for hot tubs, showers and water storage
- e. Test requirements – monthly analysis
- f. Interpreting results – assessing microbiological quality
- g. Remedial action
- h. Gross contamination and closure of the pool
- i. Quality assurance

14. Pool chemical safety

- a. Safety data sheets – provision and use
- b. Risk and COSHH assessment – the process and elimination
- c. Delivery:
 - access
 - unloading
- d. Chemical storage and Security
- e. Transporting chemicals
 - siting
 - fire risk
 - spillage
 - ventilation
- g. Storage of disinfectants and other chemicals including:
 - sodium hypochlorite
 - calcium hypochlorite
 - chlorinated isocyanurates
 - BCDMH
 - sodium bisulphate
 - Hydrochloric Acid
 - sulphuric acid
 - soda ash (sodium carbonate)

- sodium bicarbonate

15. Plant maintenance

- a. Servicing and frequency
- b. Calibration
- c. Daily monitoring and maintenance, fault finding
- d. Frequency for emptying and cleaning

16. Cleaning and hygiene

- a. Floor surfaces – dirt, slips trips and falls and bacteria
- b. Around the pool – PWTAG technical note
- c. Scale removal
- d. Pool covers – cleaning both sides to control mould and *Pseudomonas aeruginosa*
- e. Air and Water booster jet circuits - frequency and method of achieving effective cleaning
- f. The pool bottom
- g. Stainless steel – preventing corrosion
- h. Algae

17. 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. Toxic gases, fires and explosions
- f. Spillages – PWTAG Code and technical guidance (sodium hypochlorite) g PWTAG Code and emergency procedures – chemicals emergency part of the EAP

18. THEORY ASSESSMENT EXAM

A wholly written 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 Hot Tub TO 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 hot tub pool water

This should include:

- free chlorine

- total chlorine
- pH
- total dissolved solids (TDS)

2. Drawing a schematic diagram of the layout of a hot tub plant

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

- filters
- pumps
- strainers
- main valves

3. Demonstrate how to clean the filtration system

This should be of a chosen hot tub, 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 hot tub. 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 hot tub 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.