

# HYDROTHERAPY POOLS

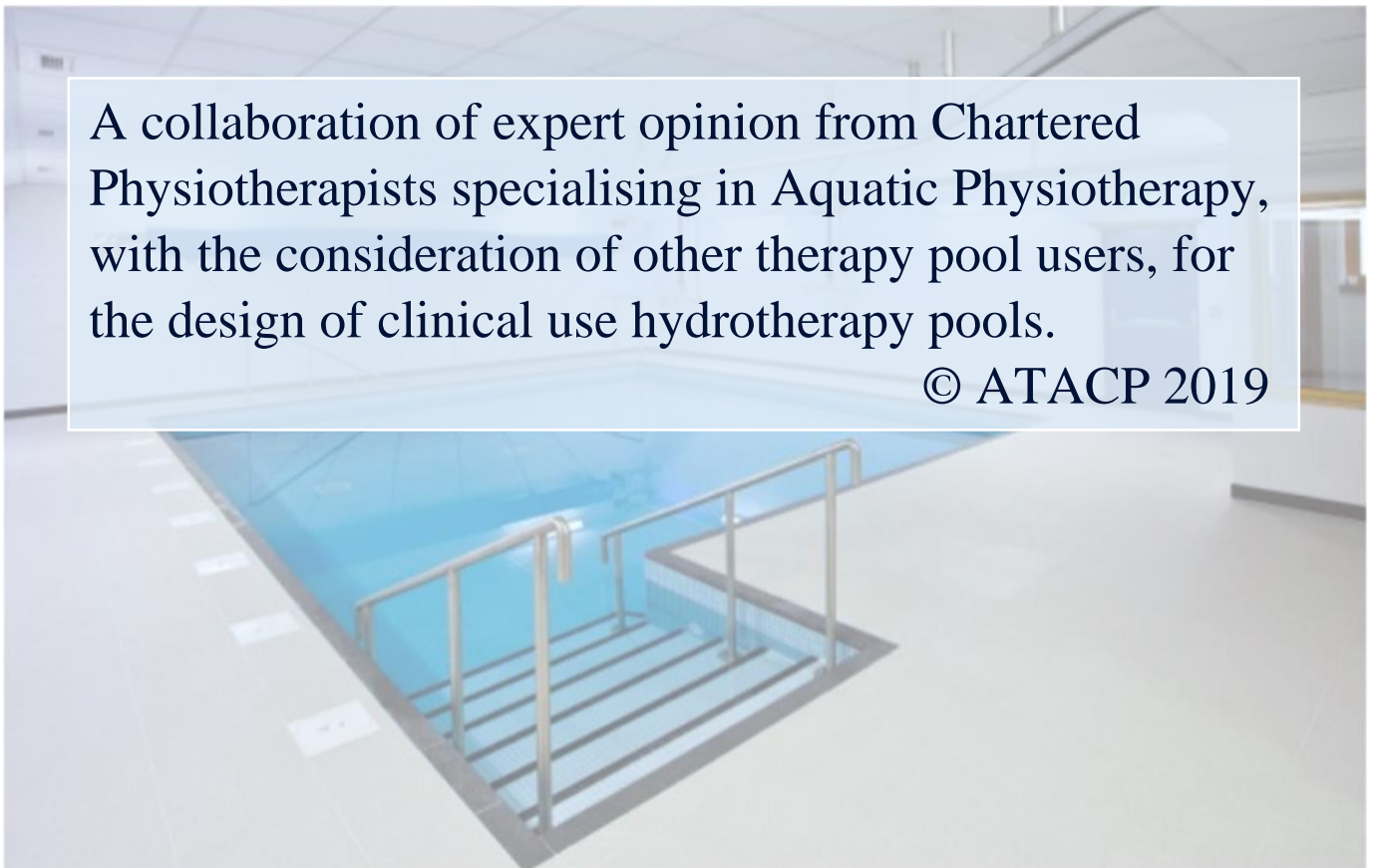
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## *Expert Clinical Considerations in Planning and Design*

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A collaboration of expert opinion from Chartered Physiotherapists specialising in Aquatic Physiotherapy, with the consideration of other therapy pool users, for the design of clinical use hydrotherapy pools.

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## **Acknowledgements**

The Aquatic Physiotherapy Association of Chartered Physiotherapists (ATACP) would like to thank all who have helped in the development of this document which originally started with a paper prepared by Helen Whitelock and Jane Barefoot in 1993. The original document has had input over the years from several committee members. We acknowledge all their work which has led us to writing this more detailed publication. This publication was produced by an ATACP sub-committee Sarah Cox MCSP, Sarah Wratten MCSP MMT HT, and Julie Dixon MCSP who are grateful to the current ATACP committee members and Olive Bowes for their editorial comments.

## **Foreword**

**Jacqueline Pattman**

**Chair of the Aquatic Therapy Association of Chartered Physiotherapists (ATACP)**

This document has been put together to help ensure new Hydrotherapy pools are built fit for the clientele they are due to serve, maximizing quality, usability and sustainability. It has been written by ATACP tutors and committee members, who have years of experience working in Hydrotherapy pools across the UK and abroad. The ATACP are a recognized professional network of the Chartered Society of Physiotherapy, with over 30 years of providing professional guidance on best practice in aquatic physiotherapy.

Building Hydrotherapy pools can be a costly business. The client's needs are paramount along with those of the therapists, teaching staff and maintenance staff, therefore it is important that the essentials are considered by all.

Infection control considerations are fundamental in minimising risk and ensuring a reliable usable pool, which is vital for the safe operation of a Hydrotherapy pool in a clinical setting.

The aim of this document is to put forward the Expert Clinical Considerations to assist the architects and design team to ensure a successful pool is built. It is important at this stage to say we are not construction engineers or water treatment design engineers. We accept that water treatment design requires specialist engineering knowledge which needs to be recruited at the same time as architects, structural and environmental engineers. The water treatment consultant / engineer should have appropriate experience in the scale of the project and not linked to manufacturers, suppliers or pool builders.

## **Recommendation**

**Olive G. Bowes MBE**

**Chair of the National Co-ordinating Committee for Swimming for People with Disabilities (NCC-SPD)**

Editor and co-author of RLSS UK publication Specially Safe and NCC-SPD publication Safe at the Pool

*The NCC-SPD is a charitable organisation, the main purpose of which is to promote and support swimming for people with disabilities. The committee is comprised of representatives from national organisations which recognise the importance of this activity, either as a principal objective or as an integral part of their work.*

The Chartered Society of Physiotherapists is a founder organisation of the National Co-ordinating Committee – Swimming for People with Disabilities. It is represented by members of the Aquatic Therapy Association of Chartered Physiotherapists who liaise and collaborate with other organisations in the furtherance of aquatic activities for people with additional needs and for people who benefit from the therapeutic effects of aquatic activity. The importance and value of such activities is recognised by all participants.

When new pools are to be built potential users, who include physiotherapists, teachers, disabled people and managers, should be consulted as early as possible. This is so planners, pool designers and architects are aware of their needs and the issues around the use of the pool. Whenever possible a pool should have independent access to allow evening and weekend opening in order to generate increased usage and income.

Hydrotherapy Pools Expert Clinical Considerations in Planning and Design is a well researched publication and the guidance within is based on practical experience and an understanding of the importance of such facilities.

On behalf of the members of the NCC-SPD I recommend it to all those involved in building or refurbishing a Hydrotherapy pool.

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## **Definitions**

### **Aquatic Physiotherapy**

*A physiotherapy programme utilising the properties of water, designed by a suitably qualified Physiotherapist specifically for an individual to maximise function, which can be physical, physiological or psychosocial. The treatments should be carried out by appropriately trained personnel, ideally in a purpose built, and suitably heated Hydrotherapy pool. ATACP (2014).*

### **Hydrotherapy (Aquatic Therapy) Pool**

*A warm water pool (32-35.5°C) ideally kept at thermoneutral temperature 34.5-35.5°C designed for therapeutic use.*

## Introduction

This document provides the Aquatic Physiotherapist's information on requirements for building Hydrotherapy pools to ensure they provide the ideal environment to all pool users.

A well-planned, built and managed pool involving accredited Aquatic Physiotherapists can ensure they are clinically & cost effective. If poor decisions are made about design, user flow, energy use, lighting, pool chemical management for example, then it can be costly and time consuming to change, if it is possible to change at all.

There are advances in aquatic therapy treatment techniques and the effectiveness of using water. A good Hydrotherapy pool must be designed to accommodate a variety of requirements.

The ATACP are aware of an increase in pools being built by private initiatives; including sports clubs, private hospitals, domestic homes and independent healthcare companies. The aim of the authors of this guidance is to produce a document which ensures a Hydrotherapy pool is built fit for purpose and can be used for many years to come. It is intended for all involved in the process, from the initial decision to build and through to its opening. This includes managers, commissioners, hospital planners, architects & engineers for example.

The document is to be used in conjunction with National and European Standards / Regulations on design and build, specifically HSG179 and BS EN15288 swimming pool design. In addition, the Pool Water Treatment Advisory Group (PWTAG) Swimming Pool Water book provides further supporting information. Sport England produced Design Guidance Notes for Swimming Pools 2013 which is predominantly for the design of larger leisure use pools. There are common requirements, but this document provides the clinical considerations for the environment when pools are used therapeutically. British Standards and guidance documents have been used to support the information provided.

The ATACP cannot stress enough that this information is to contribute at the design stage. Aquatic Physiotherapists are prime placed to provide an invaluable contribution to the logistics of how a pool will work based on the fact we have all worked in challenging pools that are not built with the patient or therapist in mind. This document does not consider equine or canine Hydrotherapy pool requirements.

*“Aquatic Therapy is a booming business right now because we are all falling apart. Eventually, we're all going to wind up in water therapy.”*

Dr Alison Osinski (Lecturer in Aquatic Therapy USA).

# 1 Pre-design Considerations

## 1.1 Pool Justification

When considering building or refurbishing a Hydrotherapy pool, to justify it's requirement the two main considerations are the location (see 2.1) and user need (see 1.2).

It is important to identify what existing facilities are in the vicinity of the planned pool. Researching the population demographics and whether there is a need for an additional pool if one already exists which can offer users the same benefits.

Hydrotherapy pools can be used by many different users if designed in an inclusive way.

Their location can be at:

- Hospitals (inpatients and outpatients)
- Hospices
- Schools
- Private homes
- Sports clubs
- Leisure centres

It is important to look at all the different user populations which could provide revenue streams, even when at the design stage of the pool. This will have an impact on, for example; size of changing rooms, number and types of hoist and access to the pool, which will be considered later in this document.

## 1.2 Pool user condition considerations

The ATACP is aware of the need to justify a pool requirement with evidence-based support for specific individuals or conditions.

It was identified in the National Standardised Data Collection (HyDAT) Study (2009), which provided a snapshot of the Aquatic Physiotherapy population, that aquatic physiotherapy is a modality used to provide treatment for a vast number of diagnoses and *“a relatively high proportion of the population of aquatic physiotherapy patients are complex and have more than one diagnosis” (HyDat 2009)*. It is vital that all established services are identified and a clear business plan with patient demographics and users is confirmed in order to best follow the design decisions. Knowing the population the pool is predominantly aimed at and also considering other populations that may provide other revenue streams is a priority step in building a new pool.

Consideration must be given to the types of pool users as they will all have differing needs. There are randomised control trials into specific Aquatic Therapy interventions, as well as published systematic reviews, reports, studies, expert consensus evidence with support for different patient / client groups. A review of

specific literature to your client / patient group can support your justification for the pool. The ATACP have written literature supporting a case for Aquatic Physiotherapy across different user groups.

The following are just some examples of user group population specific considerations in addition to the more detailed information within this document:

- **Amputees:** Pool access is important to consider. Ensuring the provision of a suitable hoist system for those users without swim leg prostheses, a deck level pool design is recommended for independence entering and exiting on poolside.
- **Special needs:** These groups can benefit from sensory lighting, jet / bubble flow and music. It is important to consider appropriate signage and changing spaces.
- **Neurological:** Hoists and changing facilities are key considerations if the pool user group use wheelchairs. Easier access steps with lower tread may be an option to incorporate.
- **Orthopaedic:** Varying depth of water is essential for offloading body weight of different height patients who may have weight-bearing restrictions. These conditions can be treated individually or in group format once water confidence has been established. A pool with enough space for a group both within the water itself and changing facility will be required.
- **Paediatric:** The depth of the pool is important. There must be space for carers and parents within the changing rooms and potentially in the pool with the child. Children respond well to sensory lighting and music. The surroundings shouldn't appear too clinical to facilitate compliance with treatment. Storage is important especially for pushchairs / wheelchairs and toys.
- **Pain management:** Pool water temperature at thermoneutral is important for the physiological benefits in pain management. Good changing facilities will be required to enable this user group to have greater independence in dressing. The waiting / rest area needs to have enough space to accommodate a group as there are known benefits from peer support in a social setting.
- **Rheumatological:** Soft tissue diagnoses can benefit from warm water immersion due to improved circulation. The waiting / rest area needs to have enough space to accommodate a group as explained above in pain management.
- **Spinal Cord Injuries:** The depth of water is important with deeper water required for swimming and prevention of skin damage if feet contact the pool floor. There should be adequate space for storage of wheelchairs, plus suitable changing and showering facilities including shower chairs or shower trolleys. Consideration should be given to those who wish to get in and out via the poolside promoting independence, therefore deck level pools are recommended.
- **Sports injuries:** Equipment, depth and water space are key. Deep water (1.5m-1.8m) is necessary for deep water running and high-level stability training.



- **Women's Health:** Often attend in a group format and so size and adaptability of pool depth to accommodate a variety of patient heights is important. This group respond well to sensory additions with lighting and music.

## **2.0 Building Design Considerations**

### **2.1 Location and external considerations**

A new pool location should consider the local area for the need of the pool and accessibility to it. A location with public transport and parking would be advantageous as many pool users are likely to have reduced mobility. Consider the number of users who may be attending at one time and therefore the required parking for the outside area. Local planning permission should be obtained with intended class of use.

### **2.2 Access considerations**

To allow access for all into and out of the pool building the user groups must be considered. Access should allow free flowing routes which avoid areas of congestion, constriction and obstructions. It should control the number of users. Access should restrict unauthorised or unwanted entry, particularly when the pool is closed, to the pool but also any areas of the building not appropriate for public free access.

Evacuation routes and emergency support access must be planned to allow for a rapid obstruction free route. They should adhere to pertinent regulations and consider that the evacuees may be barefoot. All areas should avoid changes in floor level and steps where feasible.

Width of doors and positioning of ramps for wheelchair users, and clear signage at an appropriate height for all users are important considerations.

It is advantageous for the pool to be ground level. Upper level and basement pools will need access via stairs and lifts. Emergency evacuation plans must be forethought through.

For pools with variable depths access into the pool hall should ideally be at the shallow end as a health and safety measure to reduce accidental submersion in deeper water.

### **2.3 Internal building requirements**

The space within the building should not be considered the pool hall alone but include the associated essential facilities of reception / rest area, changing rooms, storage and

plant rooms. The area must accommodate the potential number of users, their level of supervision / disability requirements and the activities the pool would be intended for.

Along with facility size requirements the layout is important with the main consideration for cleanliness and infection control. This is pertinent for any type of pool but especially a Hydrotherapy pool with warmer water and air temperatures and potentially higher risk users eg. due to wounds or being immunosuppressed. It is the flow from what is considered 'dirty areas' i.e. those where outdoor footwear or mobility aids have been used to 'clean areas' which are from the pre-swim hygiene shower onto the pool concourse. It is of utmost importance the pool design layout ensures the clean areas are not contaminated from outdoor footwear, mobility aids or wheelchairs.

## 2.4 Type of Pool

Pools will either be deck level or freeboard. Deck level is where the pool water is level with the surround. The water runs over into a transfer channel. Freeboard pools have a surround higher than the water level. With freeboard pools there will usually be skimmers to remove surface water pollution.

Deck level pools are regarded as having the best circulation systems and therefore removal of water pollution. For Hydrotherapy pools they are the safest for emergency evacuation procedures. The minor negative is the noise level which can make communication harder if acoustics are not addressed with appropriate design and use of materials (see 3.2).



An example of a deck level pool

Freeboard pools can be in the ground, semi-raised or raised. There is the advantage that those within the pool are at a similar height as those on poolside. The disadvantages are; the emergency evacuation procedures are more difficult and often require greater staff numbers or reduced pool user weight limits. The step entry / exit requires an up and over design which can be more challenging for those with reduced mobility to manage. There may be limited hoist options. This type of pool may be the only option for the constraints of the site.



An example of a semi-raised freeboard pool

Pre-fabricated free standing pools are becoming more available often incorporating treadmills and jets. These pools are usually smaller but can be an economical option. They often have limitations for Aquatic Physiotherapists who treat patients in a lying position and they often don't have the space required for group sessions. There may be access limitations if a step up and over entry / exit and no handrail within the pool.

## 2.5 Shape of Pool

Square or rectangle shaped pools are recommended for Hydrotherapy pools because they provide:

- good visibility
- easier equipment installation of hand rails, pool cover, removable plinths which are all standard design to straight edges
- corners for patient fixation with exercises and treatment techniques

Freeform pools are not recommended due to difficulty maintaining visibility of all pool users from any position in the pool hall.

## 2.6 Pool and pool concourse size

A Hydrotherapy pool will need to be a size which can accommodate the bather numbers wanted in any group activity (instantaneous bather load) and required in a 12 hour period of a day (operational bather load). Designing a pool based on one user group can be a shortfall if the pool is to be hired to other external users, which is important for income generation. If the pool is too small the bather loads may be insufficient to meet the use required of it. Consider how many users may be in the pool at one time permitting 2m<sup>2</sup> per bather for treatment space (ATACP) but also how many sessions the pool may be used for in a day to ensure the operational bather load is not exceeded for water quality management (PWTAG).

For example: A pool 4m x 6m size with depth 1-1.35m

- Instantaneous bather load (the number of users in the pool at one time)

$$4\text{m} \times 6\text{m} = 24\text{m}^2 \div 2\text{m}^2 \text{ (ATACP recommendation for treatment space)} \\ = 12 \text{ bathers}$$

- Operational bather load (the number of bathers in a 12 hour period). This must be adhered to for maintaining pool water quality. It's calculated by using the instantaneous bather load (calculated with 2.7m<sup>2</sup> instantaneous PWTAG recommendation) multiplied by 12 (the hours in one day use) and using 50% as a maximum.

$$4\text{m} \times 6\text{m} = 24\text{m}^2 \div 2.7\text{m}^2 = 8.9 \times 12 = 106 \\ 50\% \text{ of } 106 = 53 \text{ bathers in one 12 hour day}$$

Based on this pool calculation you would only be able to run four groups (if maximum instantaneous size) in one 12 hour period.

To achieve an operational bather load of 100 bathers you would need a 5.5m x 8.5m size of pool or equivalent.



The pool concourse should be a minimum width of 2m on at least 2 sides to allow for stretchers, wheelchairs, and turning circle of the hoist. With a minimum of 1.5m on the other 2 sides for emergency access.

## 2.7 Pool depth

The depth of the pool should not only take into consideration the patient user group but the therapists working within the pool too. The ATACP support the recommendation based on water depth to thoracic level T11 (mid chest height) being considered the maximum depth to maintain stability of the therapist. A one depth pool will not be appropriate for every individual using the pool therefore multi-levels are required.

As a guideline paediatric use pools often require a shallow end depth of 0.85m and / or a seat along one side, whereas adult only pools usually have a shallow end depth starting at 1m. Orthopaedic or pain management patient treatment often requires body weight offloading. At T11 (mid chest) this equates to approximately 25% weight-bearing whilst at neck level 10% weight-bearing. For the treatment of spinal cord injury and neurological patients a deep end greater than 1.35m is advantageous for training pool entry independence and rotational body control techniques. For sports rehabilitation a deep end, greater than 1.5m provides an environment for deep water running and high-level stability training.

The pool floor can be:

- Graded BS EN 15288-1 2018 Design states the gradient of ‘the pool basin floor shall be  $\leq 10\%$  with a pool basin floor inclination  $\leq 6\%$  generally recommended’.
- Stepped In a small pool a dual depth can be achieved with a floor step, although the BS EN 15288-1 Design states ‘abrupt changes in depth are not permitted, except for access steps’. Ensure all changes in depth are clearly visible.
- Moveable floor A full moveable floor would not be recommended if the pool is required for group use as it would have to be set at the appropriate depth for the shortest person within the pool. Part moveable floors provide more flexibility, especially when the size of pool does not permit variance in depth within the recommended

maximum gradient standards. These floors are more expensive but do provide greater flexibility and ease of entry and exit.

Changes in pool depth must follow the BS EN 15288-1 Design stating all ‘changes in inclination (from horizontal to inclined, or from one inclination to another) shall be marked by a contrasting colour and / or with a floor finish of different tactile quality.’

## 2.8 Pool entry and exit

The mobility of all pool users should be considered when considering access. Ladder access is not recommended in Hydrotherapy pools as many clients are unable to use them and they often block valuable corner positions for treatment.

### Types of pool entry:

#### Steps

- ATACP recommend that steps have a maximum riser height 150mm, minimum tread width 300mm and minimum step width 600mm. If space permits 100mm rise and 375-450mm tread will give access to a wider range of patient disabilities
- Uniform height solid steps with no open risers
- Clearly marked at the edge with contrasting colours
- Surfaces should be non-slip & without sharp edges
- Steps can be made of;
  - metal marine grade stainless steel is recommended
  - tiles important to make sure non-slip factor is high and that grouting is able to withstand prolonged high temperatures
  - plastic must be able to withstand continuous higher temperature and maximum weight expected of mobile patients
  - wood not recommended as it does not last as long and can become slippery if pool chemistry is not maintained appropriately
  - concrete and liner covering will not last long and can be at risk of tears
- Steps should deliver to the shallowest part of the pool
- Stainless steel handrails on both sides which should not finish before the last step
- Width of space between handrails to ideally be wide enough to allow 2 people to pass
- Remember to exclude steps from useable pool space



## Ramp

Ramp access is not frequently seen in Hydrotherapy pools as it takes up a considerable amount of space. They may be appropriate for specialist settings such as spinal cord injury centres for independent wheelchair access.

Ramps should have a maximum gradient of 1:14 and deliver to the shallowest part of the pool. They should have at least 1200mm of landing at the lowest point. The distance between handrails should be 1000mm minimum.



Ramp position should not impede the emergency evacuation route.

## Hoists

Positioning of hoists is an important consideration. The patient should enter the pool at a depth which the therapist can maintain their stability (maximum mid chest position). If too shallow the water will not support the patient sufficiently to maneuver them on / off the hoist system whereas if too deep, it will be unsafe for the therapist / carer.

Sufficient space should be available for all hoists to operate in accordance with the manufacturer's operating instructions. They should have unencumbered space for its turning circle.

### Tracking hoist

- Enables the patient to reach the pool with ease and minimum transfers between changing cubicle and poolside
- Reduces equipment on poolside
- Only able to hoist in a sitting position therefore potentially limiting patient use to those cannot flex the hip greater than 90°
- Used for high level disability users, would still require additional hoist system for more able bodies users

### Rigid chair hoist

- Suitable for all patients who can adopt a sitting position
- Requires transferring onto and will take up more space than a tracking hoist
- Often felt less undignified than a tracking hoist

### Stretcher hoist

- Ideal for patients who require transferring in lying
- Often has a chair attachment as well



- Can be a slide transfer from a bed / plinth but may require additional mobile hoist to transfer the patient
- Ensure adequate space for turning circle

Partial floor lowering

- Can be attached retrospectively or integrated into the pool build
- Allows independent access in suitable waterproof chair or standing
- Concourse needs to be sufficient in size to access from the rear and turn to access changing facilities and showers

Mobile chair hoist

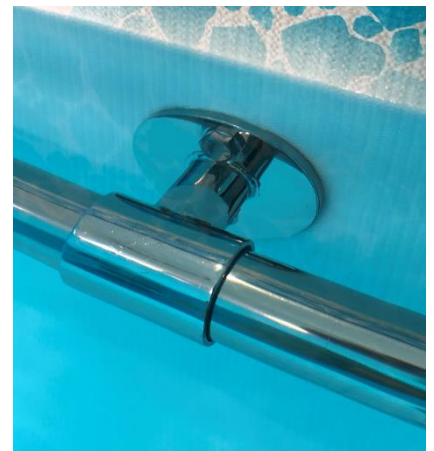
- Maybe the only option but requires storage space, have reduced user weight limits and often don't lower sufficiently into the water

No hoist should be used as part of an emergency medical evacuation procedure as it is deemed too slow versus a rescue board evacuation.

## 2.9 Pool fixtures

Handrails are an essential requirement for Hydrotherapy pools as they enable therapeutic treatment techniques which require the patient to use them for support. They should be continuous from the step entry handrail and on at least three sides of the pool. They should be:

- Stainless steel Marine grade Type 316
- Dimensions: Approximately 40mm diameter  
Fixed 50mm from pool wall  
Fixed 75mm below water surface



Moveable floor pools cannot have handrails under the water level which is another reason why whole pool floors should not be moveable. If it is a part moveable floor handrails can be installed on the sides apart from the moveable floor section.

## 2.10 Pool materials and finishes

The pool should be:

- Non slip for the floor and walls as this is vital for grip and fixing for patients and therapist. Most of therapy time will be with feet on the bottom of the pool.
- Tiles should be non-abrasive, easy to clean, temperature resistant and durable, suitable for warm water pools.

- Tile grouting must be higher temperature resistant and preferably epoxy based to withstand the higher chemical and heat load on it. Consider maintenance for re-grouting every 20-25 years if applied correctly.
- Extra thick pool liners will provide adequate wall and flooring with no sharp edges to catch on but with warmer water there is a reduction in lifetime maybe to 10-12 years.

BS EN 15288-1 Design states the slip resistance of the pool floor shall comply:

- In water depth 0.8m to 1.35m with rating group A according to 5.6.2.
- The surface finish of the pool basin floor in areas with a water depth  $\leq 1.35\text{m}$  shall not cause discomfort to the users walking on it (e.g. due to the quality of floor tiling, edges of the tiles and/or the grout).

The concourse should be:

- Non-slip, non-abrasive and easy to clean.
- Have an adequate gradient for drainage according to pool type.
- Tile grouting with poly resin additives adequate to withstand cleaning (including high pressure hosing) and the prolonged high water temperatures.
- Pool walls and fittings to be resistant to humidity is essential.

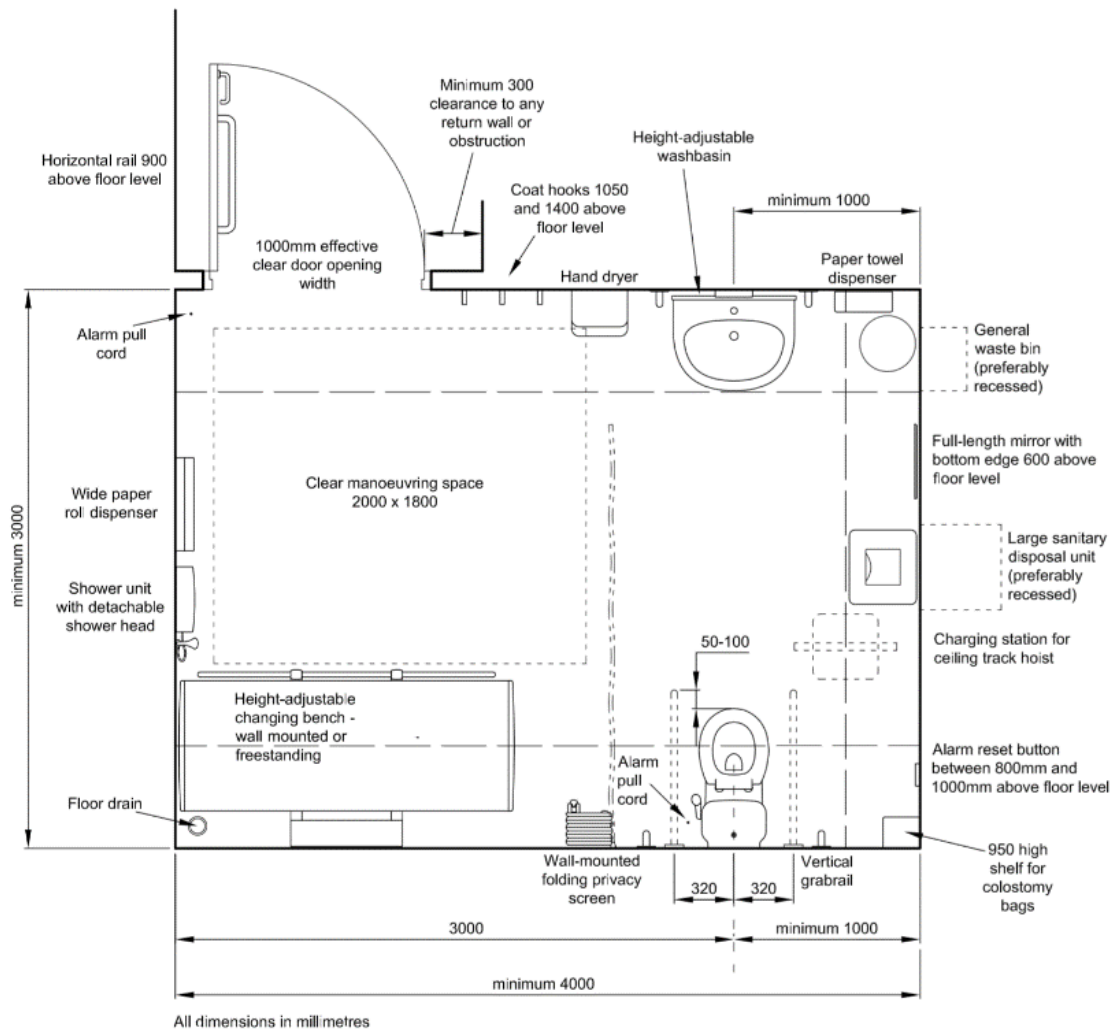
## 2.11 Changing rooms

Leisure use swimming pools have a small ratio changing room facility to pool size due to a constant variable flow through of bathers. A Hydrotherapy pool runs to an appointment schedule with either individual or group sessions and users often require longer periods of time to get changed. Therefore, more space is required than a leisure centre facility. The changing room space should be calculated based on the maximum potential numbers using the changing rooms at one time. If there were group sessions of 10 users, there could be 20 users either changing to enter or exit the pool.

Consider whether to have individual changing room spaces, open changing rooms or a combination.

- **Individual disability changing rooms** which can accommodate plinth change, shower and toilet. The Changing Places standards of 3m x 4m space with tracking hoist into the pool would be gold standard to provide a facility adapted for all disability levels.





BS 8300 Changing Places facility example

**Open changing room space** can permit greater space required for assisting with dressing versus small individual cubicles. They permit more users at one time but there is limited privacy. Individual changing cubicles within the open changing area can be incorporated to provide privacy for those who require it. An open changing area should still be wheelchair accessible.

The recommendation for Hydrotherapy pools would be a combination of individual disability changing room/s and open male and female changing space. It is recommended to have separate staff changing facilities to maintain professionalism.

Within the changing rooms bench or chair seating should be provided and the provision of personal items storage such as lockers, which enables other bathers to use the changing facility whilst maintaining security. An alarm system should be within the changing room as well as pool hall. Mirrors, swimming costume dryers, clothes hooks are desirable.

The layout should be to enter the changing room into a 'dirty area' so outdoor footwear and mobility aids can be used. There should be space to change and store

clothes and personal belongings within this area. There should be toilets and post immersion showers that permit privacy to remove swimwear and use soap. Just prior to the pool concourse entry there should be pre-immersion hygiene showers. These showers can be open and usually as a walk through onto the pool concourse. They can be located on the poolside concourse as long as the drainage is separate and dirty water not permitted to enter the pool. After the pre-immersion showers the area will be 'clean' and no outdoor footwear and mobility aids or non-designated cleaning equipment should be permitted.

All changing rooms should have direct access onto the pool concourse.

## **2.12 Showers and toilets**

The minimum requirement of 1 shower per 6 people per hour is a guideline for leisure use swimming pools with a variable flow of bathers. In a Hydrotherapy pool with set appointment times and potentially back to back groups this minimal requirement would not be sufficient. Consider the numbers required to be showering at one time. Don't make the mistake of only having post 'dirty area' changing room showers as bathers from one group will block these preventing the next group being able to pre-shower, which is an essential requirement for maintaining water quality.

There should be a minimum of one shower built to wheelchair usage standards providing vertical and horizontal handrails, adjustable height hand held shower head, thermostatic mixing valve with temperature pre-set to a maximum of 43°C. Sport England state a minimum area for a wheelchair accessible shower cubicle is 2m x 2.2m and for a shower and WC cubicle is 2.4m x 2.5m.

In a disability changing room ensure the site of the shower is where the overhead tracking hoist and plinth can be reached.

There should be a ratio of 1:6 toilets with a minimum of one being wheelchair accessible. Ensure the toilets are accessible from the changing room, as part of the pre-swim hygiene is to toilet prior to pre-showering. After being in the pool bathers will have the need to toilet due to the physiology of immersion.

## **2.13 Reception / Waiting / Rest area**

A reception area may be required to control the flow of Hydrotherapy pool users especially when using an appointment system.

There should be an area with seats for resting pre and post pool use. Consider variable height seats and chairs with arms for users with limited mobility and space around the chairs for carers to assist as required. The rest area must have the provision of drinking water as bathers can be dehydrated due to the physiology of immersion.

If the user group of the Hydrotherapy pool includes children or high level disability individuals there should be sufficient space for the storage of buggies and wheelchairs.

## **2.14 Staff facilities**

There should be a separate changing area with shower and toilet for staff with lockers for storage of personal belongings. Consider hooks or a drying area where staff can leave wet costumes. Staff should have the same flow, from changing area to pool, that considers the hygiene and infection control risks, and therefore also requires direct access onto the pool concourse post pre-shower.

An office with a desk for staff to write notes and lockable storage for associated documentation such as; patient notes, microbiology and pool chemistry testing records, policy file and risk assessments. Desks, computers and paperwork kept on poolside can be damaged by the humidity so the office door should be kept closed. The office should ideally have a full view of the pool via a large window.

## **2.15 Storage**

There needs to be the provision of several storage areas for cleaning and therapy equipment.

Cleaning equipment:

Consider the two environments to be cleaned; a) Dirty Area (reception, changing rooms, corridors and toilets for example) and b) Clean Area (pool concourse and therapy equipment storage). The two storage areas should be within their respective environments to ensure no cross contamination. Any cleaning chemicals should be stored according to local policy, preventing unauthorised access.

Therapy equipment:

This can include fixed hoist attachments (chair or plinth) or a mobile poolside hoist. There could be designated stainless steel poolside wheelchairs, or shower chairs, to be kept in the 'clean area' on poolside. All of these are sizeable, so storage space is important to consider so not to block pool access or emergency exit routes. There will be the pool therapy equipment such as floatation aids, fins, or collars for example which need to be stored in the 'clean area' on poolside or directly off the poolside on drainable surfaces. This is to maintain infection control standards in warm environments.

## **2.16 Plant room**

The plant room is important and should be considered at the start of the design for adequate space provision and layout. Its size will typically be 15-30% of the pool water area. It should be located as close as possible to the pool for effective hydraulics and efficiency. Its access should not be directly from the pool concourse. Maintaining a 'clean area' on poolside when pool operators need to walk across the pool concourse

to access the plant room would not be practical, or appropriate for maintaining privacy during patient treatment, nor would it be safe for delivery of chemicals.

It is important to consult a pool engineer in the design of the plant room to ensure the installation of an appropriate plant system for the size and type of pool based on bather load and its necessary circulation and turnover period needed.

Considerations:

#### Filters

- At the time of this publication sand filters are still recommended for hydrotherapy pools
- Sufficient size to handle the turnover rate
- Medium-rate
- Use of coagulation
- Good access for maintenance and replacement

#### Pumps / Pipes

- Size to have capacity for the turnover period to be 60 minutes or less

#### Water Disinfection

- Hand dosing is not recommended therefore automatic chemical dosing systems should be installed
- Chlorine Donor, such as Sodium or Calcium Hypochlorite, is recommended as the primary disinfectant with UV or Ozone secondary disinfection as the gold standard
- Bromine has not been recommended due to the high incidence of skin irritation

#### Chemical storage

- Stored in separate, secure rooms with space for liquids to be stored in separate bunded areas taking 110% of the volume stored
- Good access for delivery of chemicals considering size of delivery vehicle
- Adequate room ventilation and environment control of humidity and temperature

#### Heat Exchanger

- Have the capacity to maintain the pool water between 32°C and 35.5°C ideally at 34.5°C to 35°C (thermoneutral)

## **3 Environment considerations**

### **3.1 Ventilation**

Ventilation is a critical area to get right and more challenging in hydrotherapy pools with warmer water. The ventilation system is often the only means of removing chlorinous smells, controlling the pool room air quality, temperature and humidity (which should be 60% or below), controlling condensation and therefore maintaining comfortable environmental conditions.

PWTAG recommend:

- 10 litres of ventilation air per second per m<sup>2</sup> of total pool hall water area plus all wet surrounds
- 6 air changes per hour are recommended depending on the height of the pool room
- Pool ceiling should be approximately 4.5m above the level of concourse
- 12 liters per second of fresh air per pool room user
- If recirculation is used a minimum of 30% of fresh air should always be provided with 100% fresh air available when necessary
- Positive and negative airflow to give 10-12 air changes per hour
- De-humidifying air conditioning

Air temperature should be maintained at approximately 25-30°C with a recommendation of a maximum 5°C below the water temperature. If the difference between air and water temperature is too high condensation can be a problem.

### **3.2 Acoustics**

Pool rooms can be noisy and echoey which can make communication difficult between the patient and therapist. Walls and ceilings should be designed and constructed with acoustics in mind.

The acoustics will vary depending on the size and shape of the room, if jets and bubbles are in use, or if there are no rough surfaces or objects to break up the soundwaves. Wood and changes in the ceiling contours will allow sound to be absorbed and not resonate. Separate panels can be supplied made of non-hygroscopic material and coated in membranes to stop from sagging in the humid environment.

Plant room pool pumps create noise and therefore the positioning of the plant room should be considered and whether insulation is required.

### 3.3 Lighting and reflection

BS EN 15288-1 state a 200 lux level of lighting as a minimum in the pool hall. For visibility windows should be placed appropriately to minimise reflections on the water, higher up is better. Pools with sky lights and windows in the roof can be pleasant for patients when they are floating on their backs but may cause glare and shadows if there is bright sunshine. Blinds can be used on windows if they are a suitable humidity resistant material.

Artificial lighting should be indirect and evenly distributed. If situated directly above the pool the lighting must be accessible for maintenance purposes.

Underwater lights are beneficial for better vision of the pool floor and patients. Coloured lighting or ‘mood lighting’ help to influence serotonin and melatonin levels enhancing mood, this can be beneficial for special needs populations, or other user groups to optimise relaxation. Light projectors can be used to shine moving pictures onto the walls and ceiling to increase the visual sensory stimulation.



### 3.4 Sound system

An underwater sound system can be beneficial in pools used by clients with additional needs or those who are using the pool for relaxation. Consideration should be given to a sound system above the water, considering the acoustics in the pool hall and the size of the pool, as music can be an integral part of rehabilitation. If group classes are going to be held then having a sound system linked to a microphone will help carry the instructors voice.

### 3.5 Jets and bubbles

These additions to the pool can have many uses. Swim jets will allow your clients to swim against a counter current to swim on the spot in a small pool.

The jets should:

- be quiet
- have sufficient adjustability to suit all client strengths and speeds
- not cause any splashing of water
- be sited in a good position (which for swimming will be at the deep end)
- be low energy consumption
- be easy to operate from the pool itself



The jets could be used to provide a hydromassage. Consideration will need to be given to achieve stability of the client within the jet stream. Alternatively, smaller less powerful jets or a bubble system could be used to provide an area of relaxation for the pool users.

## 4 Pool equipment

A Hydrotherapy pool can have a lot of required therapy equipment with consideration needed of its storage not to obstruct fire exits or evacuation routes. The following would be recommended for the running of a Hydrotherapy pool:

- Pool water testing kit. A digital photometer reading free and total chlorine, pH, total alkalinity and calcium hardness.
- Thermometer and hygrometer.
- Wall clock, preferably with a second hand.
- Alarm system accessible from pool, concourse, shower, toilet and changing area.
- Emergency evacuation equipment:
  - telephone
  - rescue board
  - towels and scissors
  - rescue face mask
  - foil blankets for evacuation from the building
- Therapeutic pool aids such as neck collars, floats, noodles, fins, hand bats, aqua jogging belts, suspended plinth, submersible step, beach balls, and toys. Please note any squeazy toys or sponges will hold water inside and cannot be effectively cleaned therefore are a high risk for Pseudomonas growth. They are not recommended for use in Hydrotherapy pools.
- Underwater treadmills, rowing machines, water turbulence and laminar flow machines can be useful for sports injuries and high level or specific functional rehabilitation.
- Storage equipment is vital for the therapeutic pool aids as they cannot be stored in sealed containers or on the pool concourse directly. The equipment must be stored off the ground on drainable surfaces, whether stainless steel shelves or purpose built wheeled plastic storage trolleys.
- Pool vacuum.
- Pool cover (if required). Ensure location of removed cover does not obstruct pool entry, exit or evacuation route.
- Poolside designated walking frames, stainless steel wheelchairs or shower chairs. No outdoor walking aids or wheelchairs should be permitted on the pool concourse to comply with infection control measures.



## **5 Environmental Options**

### **Insulation**

A Hydrotherapy pool has warmer water than a leisure use swimming pool so the heat loss and humidity are greater. Being able to counter this with good design to reduce the expenditure on heating the pool water will contribute to a pools longevity. The following should be considered:

- below ground pool will reduce heat waste
- pool covers are extremely important to maintain temperature and reduce humidity when the pool is not in use
- windows should be double or triple glazed with trickle ventilation

### **Solar heating systems**

Using solar panels to provide the electricity to heat the pool is one way to keep the utility bill down. Using solar heating alone is not an option in the UK and for pools kept at a constant warm temperature. Solar heating can be either where the water is heated directly by the sun in black pipes or pods, this is very weather dependent, or photo-voltaic panels to harness the suns rays into electricity.

### **Heat Exchange Systems**

Can be used as part of the ventilation system. They can reroute up to 95% of the heat drawn out through the ventilation system into the fresh air going back into the pool room at the cost of running a light bulb. The more sophisticated systems can even take the heat from the air in the pool room and transfer it to the pool water heat exchange system. This will again assist with longevity and economic impact of a pool over its lifetime.

### **Other considerations**

Include having:

- the showers and water systems set so the water is not too hot when pre and post showering
- thermostatic regulation valves on all the radiators and heating systems in the changing rooms, corridors and offices
- timers or motion sensors on the lighting systems in all areas of the pool facility
- recycling on all aspects from staff paper and cups to the chemical and hazardous waste debris
- grants may be available either locally or nationally.



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