the leisure review
an independent view for the leisure industry

Swimming pools: in the tank

In the first of a series of articles designed to inform and educate the non-specialist leisure manager, the Swimming Pool and Allied Trades Association (SPATA) considers that most basic of prerequisites for a successful swimming pool – the tank that contains the water.

It is vital to understand the importance of the swimming pool tank within a project as it is often constructed first with the rest of the building following. There is, of course, a need to comply with the relevant BS EN standards and there is a great deal of advice also offered in SPATA standards so the advice in this article is not exhaustive but addresses some of the major issues to consider. The subject of renders, screeds and finishes are to be covered in a future article.


Getting the tank right is a prerequisite of a successful pool

Design

Design and construction is critical. The tank must be fit for purpose and the current SPATA standards suggest that before design begins standard criteria should be established to ensure the finished pool will meet the requirements expected.

Most commercial pools tend to be either concrete with a tile or mosaic finish, or they have a heavy-duty liner. We consider both below but other pool types can include prefabricated and fibreglass pools. The choice of construction methods and the specification of materials associated with the build-up of finishes to swimming pools and ancillary areas is wide and varied. However, the goals to be achieved for a successful swimming facility are safety in use, the technical performance of a specialist facility and the end product's aesthetic appearance.

Concrete pool shells fall into two main design categories. The first is freeboard, where skimmer units are provided to draw off surface water to the filtration system. This contrasts with deck-level design, a system which allows for increased water circulation by providing for the pool water to flow over the top edge of the pool into a drainage channel and then into a balance tank.

"Design and construction is critical. The tank must be fit for purpose and the current SPATA standards suggest that before design begins standard criteria should be established to ensure the finished pool will meet the requirements expected."

The normal choices for pool construction are: steel-reinforced concrete blocks; cavity wall construction containing reinforced concrete or reinforced patent blockwork which when rendered becomes part of the watertight construction; traditional reinforced poured concrete using formwork or concrete blockwork as built in shuttering; and pneumatically placed concrete, such as Gunite or Shotcrete.

It may seem redundant to state that consideration should be given at this stage in the design to the eventual usage of the pool but evidence suggests that on many projects this simple planning step has been overlooked. It is also necessary to take into account any feature or equipment to be incorporated into the pool. Will the design need to incorporate moveable floors, booms, starter blocks, competition timing equipment, water features, heated benches, bubble seats and communal seats, aqua sports, gymnasium and sports equipment, ground-supported or suspended shell, and automatic pool cover pits? Will future use require recessed rest ledges? What types of pool ladders – recessed into pool tank or built in and tiled – will be needed? Will starting platform upstands, heat retention covers, counter-current units, lighting and wave machines or massage stations be a factor in your design brief? All of the above will have impact on the design and a wise commissioner will save time and money by ensuring all the relevant questions are asked and answered.

Basic requirements of a pool shell

The recommendations are that:

All pool shells/tanks/basins shall conform to the following:

In ground pool shells shall be designed and constructed to meet the internal and external water pressures, as well as withstand soil forces from additional structures or separate foundations which may be imposed upon them. Necessary provision shall be made for hydrostatic forces (sub soil water pressure) whether by under floor and general drainage, hydrostatic relief valve, mass concrete, pool side sump well or a combination of all or some of these methods.

It is therefore advised that this design be completed by a specialist such as a structural engineer or geologist. This work must be done in cooperation with the pool contractor advising of the requirements of the swimming pool shell and the usage.

Where there is a requirement of building regulations, this too must be incorporated in the shell design. Examples of this are disabled access and insulation.

Initial works

In terms of the excavation of the pool tank, it is vital to take into account the working space required for the construction. Leaving yourself too little room to work may have an adverse impact on getting plant and machinery in place to carry out the initial works. A high degree of accuracy is required and hand trimming may be necessary. Disposal of excavated soil and the cost of removing it, if it is not be used in any other part of the project, should form part of the quotation if the contractor is to carry out the work and agreement for its disposal off-site should be arrived at beforehand.

It is also important to confirm that the ground bearing pressure must be strong enough to take the pool construction, finishes and the pool water. A significant issue that could affect progress on site is the groundwater levels. It is likely that flotation of the pool tank could be a problem when it is empty if the ground water level is above the base of the pool. If groundwater levels are, or may become, an issue a de-watering system may have to be installed. Pools should not be built on made-up ground unless concrete foundations are laid to a solid sub-strata and designed by a structural engineer. Construction joints in structural pool tanks should be avoided at all times because of potential leakage at these joints. The construction should therefore be monolithic (as one). For competition pools the dimensions are vital, especially where they are meant to be for national or international competition use. As the length is critical ensure that there is sufficient space to take into account touch pads and finishes.

Watertightness testing

As the pool tank nears completion, the watertightness test is vital to ensure there will be no issues relating to pool water loss. For a number of years the relevant standards were laid out in BS 8007 but this has been superseded by Eurocode 2. Within the Eurocode the importance of the “Table of Water Tightness” confirms what level of water loss, if any, is permissible. The pool should be filled at rate of no more than 750mm over a 24-hour period until it reaches the top. Once full, the pool should left for a week to allow absorption to occur. Then the pool needs to be topped to the required test level, at which time the watertightness test can commence over the required test period in accordance with the specification.

To check for evaporation, a washing-up bowl or similar should be placed as near to the pool as possible. Often this will be put on the steps or suspended in the water. Mark both the pool wall and the bowl to indicate the level of water. At the end of the seven-day test period examine the water loss. If evaporation is the cause the pool and bowl will have lost the same amount of water. If water losses are greater from the pool that the washing-up bowl this may indicate a leak. At this point it would be necessary to inspect the pool tank, pressure test the pipes and check the other fittings to make sure they are watertight. After taking any remedial action, re-test and repeat until the required standard is achieved. During this water testing phase no back-filling of the pool should be carried out so that the external face of the pool tank can be examined for leaks and seepage; this should be the case until the watertightness test is finished and it is confirmed there are no leaks. When back-filling is permitted it must be carried out with 25mm down rejects, fine pea gravel or similar to provide free-draining backfill with no possibility of settlement. Spoil should not be used.

Access In public pools there shall be at least one set of steps for every 25m of pool perimeter. In other pools the number of steps or ladders provided will depend on the pool's dimensions and type of use. For example, a long, narrow pool would require egress from each end, while a diving section would require egress close by the boards but outside the diving area.

Where integral access steps are formed either internally or externally to the pool shell the treads should be of uniform height (riser) not exceeding 300mm and width (tread) not less than 200mm. If required to be designed in accordance with the Disability Discrimination Act (DDA) the risers should be a maximum of 140mm with treads a minimum of 300mm in width. Tread surfaces should be finished with an anti-slip finish and each tread should have a contrasting and defined edge with no sharp edges or protrusions. Hand rails to assist bathers should be provided in accordance with the client's requirements. Poolside barriers and pool hand railing shall be located and fixed to prevent the possibility of bathers being trapped.

Curing

To achieve full design strength correct drying and curing of the pool tank is critical prior to the application of the screed, render and finishes. The shell can then be left to dry slowly unless very hot weather occurs, when wetting should be continued at a reduced rate.

Conclusion

The advice above is not all-inclusive and other standards and recommendations will need to be considered dependent on the actual project and any specifications that might be contained in the overall design or intent of the project.

This article has been authored by Jim Gordon MISPE, AISRM, AISPAL of Jim Gordon Associates, specialist consultants in swimming pool construction, wet leisure facilities, pool water treatment systems and associated engineering services. Jim is a member of the SPATA technical committee.

The Leisure Review, April 2011