www.bluepools.co.uk

Report on Inspection of the swimming pools, pool plant and equipment at the xxxxxx xxxxxxxx Fitness and Country Club at xxxxxx,,xxxxxxxxxx,xxxxxxxx in xxxxxx.

Table of Contents

1 Introduction

1.1 The Brief

Bluepools Ltd is a swimming pool consultant and was commissioned by XXXXXXXXXX to carry out an inspection and report on the condition of the swimming pools, pool plant and equipment at the xxxxxx xxxxxxxx Health, Fitness and Country Club at xxxxxx,,xxxxxxxxxx,xxxxxxxx in xxxxxxxxxx.

The Inspection was carried out by Mr Will Witt B.Eng. C.Eng. M.I.C.E. the Managing Director of Bluepools Ltd, in conjunction with the rest of the Workman Team on Wednesday 10th October 2018.

Bluepools is familiar with the typical electrical control panels and cabling systems in pool plant rooms but is not qualified to report on their adequacy. Bluepools will comment on the electrical system where there are any obvious issues but will not attempt to identify where the installation does not comply with the regulations.

There are three important issues to bear in mind when the condition of a swimming pool installation is being assessed and these are:-

1) Swimming pool plant and equipment works much closer to its maximum capacity than the electrical and mechanical equipment in the rest of the building. So whilst filter vessels and PVC pipework will have a virtually indefinite life, pumps, injectors, control and measurement devices etc will need to be continuously replaced in order to ensure that the pool is safe and fit for purpose.
2) Swimming pool running costs are so much higher than in a conventional building that the cost of replacing equipment before obsolescence can often be justified by a reduction in operating costs
3) Failure of monitoring equipment or deficiencies in operational management can result in illness in the visitors to the health club - such an incident could require new pool equipment to be installed as well as changes to operating procedures.

So for the pool section of the report the purpose of the survey was as follows:-

- To inspect the indoor pool, spa, outdoor pool and associated pool plant and equipment and report on current condition
- To identify the pool plant and equipment that will need to be regularly replaced and provide an estimate of the annual cost of doing so.
- To identify the pool plant and equipment that could be replaced by more economical equipment and provide an estimate of the cost.
- To identify any operational Health and Safety issues that could effect the value of the swimming pool installation

It is understood that the facilities at xxxxxxxxx, were built in 2001/2 and so the pools and equipment are approximately 16 years old.

It should be noted that there are no statutory requirements for the quality of swimming pool water in the UK.

The industry generally follows the Pool Water Treatment Advisory Group (known as the PWTAG) Code of Practice. This is not mandatory and many swimming pools are currently in use although they do not meet the standards recommended in this Code of Practice.

This report will identify the areas of concern that do not currently meet the recommendations of the PWTAG Code of Practice.

2 The Facilities

2.1 The pools

The pools at xxxxxxxxx, consist of:

1) A stainless steel wall indoor “Fitness” pool 20 metres long by 8 metres wide by 1.2 metres deep with deck level gutter drainage
2) A stainless steel wall indoor “Learner” pool 11 metres long by 8 metres wide by 1.2 metres deep with deck level gutter drainage
3) A stainless steel spa in the indoor pool hall approximately 10 square metres in area with deck level gutter drainage
4) A tiled outdoor pool 22.5 metres long by 7 metres wide

2.2 Overall Impression of the Condition of the Indoor Pools

The pools are attractive in appearance and as far as could be ascertained from a single short visit the maintenance staff are well trained and so they understand their responsibilities. As a result the pools are being maintained and operated to the standard that would be expected in a modern health complex.

However the water in the indoor pools and was not quite as clear and sparkling as should be the case in a modern pool installation.

It is likely that this is being caused because the pool equipment is 16 years old and does not include the most up to date equipment.

A detailed examination of the equipment and operating procedures would be required to identify the reason for this and to install appropriate equipment and procedures that will remedy the problem.

The spa was shut for repairs to a leak and so the water quality could not be assessed.

The outdoor pool was shut and the cover was fixed in place and hence the water quality could not be assessed.

3 The Indoor Pool, Plant and Equipment

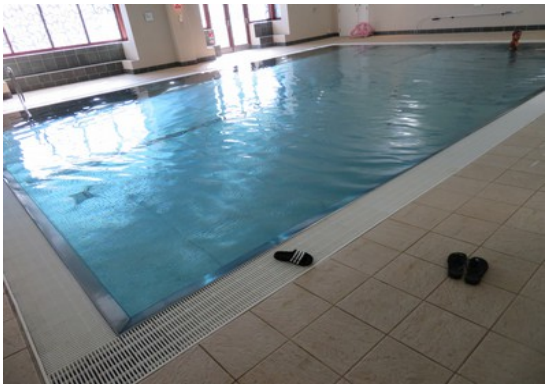
3.1 General

The indoor pools have stainless steel walls that are presumably attached to a waterproof floor covering of vinyl or butyl rubber. There was no reason to suspect there are any problematic issues with the pool tanks.

However the support structure to the stainless steel may be of mild steel and sensitive to corrosion but access to the undercroft to view these elements is so difficult it has to be carried out using confined space access procedures. The only viable access is from trap doors in the pool hall and so the undercroft cannot be inspected when the pools are in use. It will be necessary to undertake a further inspection when access is available to determine whether there are any corrosion issues in the pool tank support structure. In view of the age of the pools, if there are any corrosion problems, they are unlikely to require anything more than shot blasting and repainting .

The deck levels gutters are covered with white PVC covers that are conventional in design and type. The gutter is also in stainless steel and this makes the cleaning of the scum line in the gutter much easier – the gutters that were inspected were all very clean.

Fitness Pool



Learner Pool

3.2 Indoor Pool Balance Tank

The two indoor pools have a volume of approximately 192 and 88 cubic metres of water. They are both deck level pools and both use the same balance tank. The total water capacity of the system is approximately 295 cubic metres.

The balance tank is located underground beneath the pool hall deck and between the pool and the pool plant room. This is an ideal location because of the short pipe runs. The balance tank has two access points but could not be inspected because the pool was in use at the time of the visit.

A balance tank is needed in a deck level pool because the volume of water that can be held in the pool is fixed because the pool water continuously discharges over the weir that runs around the pool perimeter. As soon as a number of swimmers enter the pool, the water discharged is held in the balance tank before being pumped through the filters and back to the pool.

It is understood that there are no electronic level sensors in the balance tank to start and stop the pool pumps and so the pumps will be running on a not-stop basis when the pool is in use. It is probable that energy savings could be made if level control sensors were installed in the balance tank.

PWTAG recommendations for facilities where there is more than one pool with a single water treatment system state that a flexible zone system should then be employed where each zone should be provided with water inlets to ensure that the water circulation rate is adequate for the bathing load in that zone. This would require a separate valve controlled delivery pipe to each zone.

Indoor Pools Filters

Indoor Pools Pump and manifold

3.3 Indoor Pool Filtration

The two pools use 2 No 2.1m diameter filters each with a filtration capacity of 82.5 cubic metres of water per hour. These will be capable of filtering the pool water volume in under 2 hours and is satisfactory for a health club swimming pool.

The water is pumped through the system by 3 x 6.5 HP pumps connected to a manifold on the suction side that is connected by 8" pipework to the balance tank. The main drains located in the floors of both pools drain into the balance tank. When the pools were installed the flow from the main drains into the balance tank was was controlled by a pneumatically powered valve. The output from the 3 pool pumps was also controlled by pneumatic valves that were adjusted by signals from a transmitter that measured the water level in the balance tank from the pressure of the head of water in the tank. It is understood that that the pneumatic control system failed very frequently and has recently been removed from the system. It is not known whether the control that this was designed to provide has been replaced by another system – but that seems very unlikely as there was no evidence of this. Furthermore it is not known whether safety measures have been incorporated in the changed control system to ensure that the balance tank neither overflows or wastes water down the drains.

It is normal practice to connect the main drains in a pool floor to the suction manifold of the main circulation pumps. This enables direct control of the volume of water that comes from the main drains and ensures that the pool water is being continuously circulated throughout the depth of the pool. At xxxxxxxxx, this is not possible because the main drains discharge into the balance tank. Hence the more people there are in the pool the less the volume of water that will flow though the filters from the main drains because the flow from the deck level drains will predominate.

3.4 Indoor Pool Water Disinfection and Treatment

The indoor pools disinfection is managed by a single Bayrol Redox type controller that continuously measures the pH value and chlorine concentration of the water as it is delivered into the plant room from the balance tank and uses Granudos 10-S4 dosing equipment to inject the correct amount of acid and calcium hypochlorite to maintain the correct pH and chlorine concentration levels.

Normally there would be separate dosing systems for the learner pool and the lengths pool but this has not been provided at xxxxxxxxx, and consequently if the demand for chlorine in the learner pool is very high due to a high bathing load this will not be provided because the Bayrol unit will measure the average chlorine demand from both pools.

The Controller is a modern units that have probably been installed within the last 5 years and should continue to operate accurately but they will need to be replaced eventually.

The PWTAG Code of Practice strongly advocates the addition of coagulation dosing and UV or ozone water treatment systems. Neither of these are present on either of the pools or spa at xxxxxxxxx, .

Coagulation dosing is designed to agglomerate Cryptosporidium and Giardia cysts into large particles that will be trapped in the sand filters. Otherwise the cysts will remain in circulation as they are not killed by chlorine. Cryptosporidium is the most common cause of severe diarrhoea outbreaks in swimming pools. The most common dosing agent in current use is Polyaluminium Chloride (PAC).

Ultra-Violet or Ozone treatment systems are also advocated by the PWTAG Code of Practice. Basically these systems do the same thing as chlorine but do not involve the dosing of pool water with chemicals. Some residual chlorine is required because neither UV nor ozone kill all the pathogens than can exist in swimming pool water. But the amount of dosing and so the volume of chemicals required is substantially reduced.

3.5 General Conclusion on the Water Treatment system for the indoor Pools

The existing system is not safe and needs to be upgraded to meet PWTAG standards. This could involve additional pipework, controls and dosing equipment. A detailed survey would be required in order to identify the existing pipework schematic and develop the design of a new measurement and dosing system. The addition of a modern UV water treatment system would make the system safe and reduce running costs at the same time.

The situation has arisen partly because the original design was unconventional and partly because water quality standards in swimming pools have increased substantially since the pools at xxxxxx xxxxxxxx were built.

The description “Not Safe” means that there is some risk of an outbreak of disease because the water treatment systems do not comply with modern standards. The actual degree of risk will vary depending on the bathing loads in any of the pools at any one time and the effectiveness of the dosing systems. In this respect use of a single balance tank and a single dosing system for a learner pool and a fitness pool increases the risk. The complicated piping schematic reduces the ability of the operator to directly control the water quality in the learner pool, This is exacerbated by the lack of UV treatment.

It is not necessary to close the pools but improvement works are urgently needed as if the pools were to be closed following an outbreak of disease the reputation of the xxxxxx xxxxxxxx Club would be adversely affected.

3.6 Indoor Pool Air Handling Unit

The humid stale air in the pool hall is removed by a ceiling level vent to an Air Handling Unit (AHU) that discharges a substantial proportion of the humid air to atmosphere and re-injects part of it back into the pool hall along with fresh air. The unit can probably handle 5 cubic metres of air per second and as the pool hall is about 2000 cubic metres there will be about 9 complete air changes per hour. This is acceptable in public health terms but because the air temperature and humidity is not controlled there will be periods when the air quality in the pool hall is not pleasant.

Modern AHU's are extremely economic to operate because they carry out the following on a continuous basis:-

- Remove stale hot humid air from the pool hall and extract the heat energy from it and thus maintains the humidity at the level set on the control panel (normally about 60%)
- Discharge the stale air to the atmosphere, take in fresh air and heat it using the energy extracted from the stale air and more heat energy as required to the temperature set on the control panel.
- Maintain the pool water temperature at the level set on the control panel by measuring its temperature and adding the heat energy required

Such modern AHU's do require a heat source to maintain the indoor pool air and water temperatures. This is normally provided by very high efficiency condensing boilers that are designed to provide a Low Temperature Hot Water (LTHW) supply that provide water at about 65 degrees C and reheat the return water from about 55 degrees C.

At xxxxxxxxx, the main building heating boilers are being used to provide heat energy to the heat exchangers in the plant room for both pools and the spa. This must be very inefficient as well.

In effect the current air handling system at the xxxxxxxxx, indoor pool is a total loss system with continuous discharge of valuable heat energy created by an inefficient heating source straight into the atmosphere. It is highly uneconomic and does not provide the sort of environment that users of a modern health club might expect. It should be replaced by a modern AHU that will repay the capital cost in reduced operating costs in a few years.

3.7 Indoor Pool Water Heating

Indoor pool water heating is provided by a plate heat exchanger using water from the main building boilers and driven through it by a small boost pump. There is a temperature senser shown on the pipework schematics but it is not clear how or if this controls the water temperature and whether it is working or not. A modern AHU will control water temperature, air temperature and humidity and provide these at the required levels at minimum operating cost.

4 Spa

4.1 General

The spa is about 5m long by 2.5 m wide and has a deck level drainage system like the indoor pool. The spa was empty during the inspection and so it was not to view the water condition with the spa in operation.

It has massage jets around the periphery powered by a 2.2kW three phase boost pump pump that is fed directly from the spa balance tank. The jets are not augmented by air and so will not be very powerful.

There are also bubblers that are fed air from an air blower in the plant room.

The spa has its own balance tank, circulation pumps and water treatment systems.

4.2 Spa Filtration

The spa water is filtered though a single filter of 1.3m diameter that is more than adequate in size to filter the spa water in about 15 minutes.

The water is pumped through the system by 2 x pool water circulation pumps of 2.5HP and a pumping capacity of 25 cubic metres each. This will provide a water turnover rate of about 15 minutes and is satisfactory. The pumps are connected to a manifold on the suction side that is connected by the pipework to the balance tank that receives water under gravity from 4 No gutter outlets and 1x main drain located in the well of the spa. This is a conventional system and is satisfactory.

4.3 Spa Water Disinfection and Treatment

The spa disinfection is managed by another Bayrol Redox type controller that continuously measures the pH value and chlorine concentration of the water as it is delivered into the plant room from the balance tank and uses Granudos 10-S4 dosing equipment to inject the correct amount of acid and sodium hypochlorite to maintain the correct pH and chlorine concentration levels.

4.4 Spa Water Heating

1 The spa water is heated by a heat exchanger in the pool plant room that is fed by hot water from the main building heating boilers. There is a temperature senser shown on the pipework schematics but it is not clear how or if this controls the water temperature and whether it is working or not. The provision of an air source heat pump dedicted to the spa would reduce running costs considerably.

5 Outdoor Pool, Plant and Equipment

5.1 General

The outdoor pool is understood to be 22.5m long x 7 metres wide and between 1.2m and 1.5m deep with a paddling pool at one end and roman steps. It had been taken out of operation at the end of the summer season and was fitted with a cover so that it could not be inspected.

It is understood that the outdoor pool has recently been retiled and that there are some repairs required under the tiling contract. It is very common for disputes to occur in the re-tiling of pools and it is recommended that the details of this problem are examined to make sure that there is not an ongoing contractual dispute.

Outdoor Pool

5.2 Outdoor Pool Filtration

The outdoor pool has a volume of approximately 250 cubic metres of water. It is equipped with 2 No 1.6m diameter filters each with a filtration capacity of 80 cubic metres of water per hour. These will be capable of filtering the pool water volume in less than 2 hours and is satisfactory for a health club swimming pool.

The water is pumped through the system by 2 x 5 HP pumps connected to a manifold on the suction side that is connected by the pipework to the 5 No skimmers and 2 main drains located in the floor of the pool and returning the water to the pool via 6 x returns. This is a conventional system and is satisfactory.

Outdoor pool filters and pumps

Outdoor pool water heaters

5.3 Outdoor Pool Water Heating

The outdoor pool water is heated by 2 x gas fired water heaters that allow the water temperature to be set on the heater controls. The installation of an source heat pump would reduce the running costs of this outdoor pool by a substantial amount.

5.4 Outdoor Pool Water Disinfection and Treatment

The outdoor pool disinfection is managed by another Bayrol Redox type controller that continuously measures the pH value and chlorine concentration of the water as it is delivered into the plant room from the balance tank and uses Granudos 10-S4 dosing equipment to inject the correct amount of acid and calcium hypochlorite to maintain the correct pH and chlorine concentration levels.

6 Cost Estimates

6.1 Pool Plant and Equipment that will need to be Regularly Replaced

The following costs assume that the equipment is purchased and installed by the maintenance staff at xxxxxxxxx, .

The costs do not include consumables such as sand for the filters and chemicals etc.

The plant and equipment includes 8 No water pumps and one air blower and the total replacement cost would be about £20,000 + VAT. If they last five years on average the annual replacement cost will be about £4,000 + VAT.

The chlorine and acid measurement and dosing systems will probably last about 5 years on average. A heavy duty commercial measurement and dosing system will cost about £4000 + VAT There are three systems at xxxxxxxxx, and so the annual replacement cost will be about £2500 + VAT.

The heat exchangers are also likely to need replacement every 5 years. It is difficult to size these up without knowing the rate of heat loss from the pools but they are likely to cost at least £1500 each on average and so the annual cost will be around £600 + VAT

There will also be an ongoing requirement for various types of valve and other small components that could amount to £2000 per annum.

So the average annual cost of replacing pool plant and equipment will be of the order of £9000 + VAT and appertain for every year the facility is open. The year to year actual spend will very significantly.

6.2 Pool Plant and Equipment that could be replaced by more Economical Equipment or to Improve the Quality of the Pool Water

The following costs are for the purchase of the new equipment. The cost of removal of the old equipment and installation of the replacement are not included. The installation costs will only be a small proportion (Say 10-20%) of the cost of purchasing the Equipment.

The replacement of the AHU and the provision of Air Source Heat pumps are energy saving measures and hence are not urgently required.

The rest of the items should be installed as soon as is practicable.

Indoor Pools

Item	Estimated Cost Exc. VAT
Coagulant Dosing	£2,000
UV Water Treatment	£12,000
Upgrade water circulation system to PWTAG standards (Survey and design will be required)	£10,000
Replacement of the AHU	£75,000.00

Spa

Item	Estimated Cost
Coagulant Dosing	£750
UV Water Treatment	£1,200
Air Source Heat Pump	£4,000

Outdoor Pool

Item	**Estimated Cost**
Coagulant Dosing	£1,500
UV Water Treatment	£8,000
Air Source Heat Pump	£10,000