COMPASS
CERAMIC POOLS EUROPE



Architects, Garden Designers & Contractors Guide to Indoor & Outdoor Domestic Pools

Index

1. Introduction
2. Initial Questions
3. Pool Construction Types
4. Ground Conditions
5. Indoor / Outdoor - The Differences
6. Outdoor Pools
    a. Planning Permission
    b. Pool Location
    c. Landscaping
    d. Surfaces & Paving
    e. Plants
    f. Access routes
    g. Domes
7. Indoor Pools
    a. Planning Permission / Building Regs
    b. The Pool Hall (building)
    c. Building Layout
    d. Vapour Control
    e. Air Handling
    f. Pool Layout
    g. Showers, Changing & Toilets
    h. Surface finishes
8. Insulation
9. Covers
10. Lighting
11. Heating



These notes are for guidance only, and relate to the installation of a domestic pool in general terms. An experienced pool specifier should be commissioned to oversee drawings, design the circulation and filtration system, to advise on heating and treatment systems and specify equipment. Onsite inspections and project management will also be needed. For this service please contact Compass Pools.

Planning Consent for Swimming Pools

Statutory Instrument No 418 of 1995 The Town and Country Planning General Development Order 1995, Page 30 Class E of Part 1 of Schedule 2 permitted development. This indicates that planning permission is not required for an outdoor swimming pool.

However it will be required if it is in: -

- Listed building.
- National park.
- Area of outstanding beauty.
- Conservation area.
- Area as in Wildlife and Countryside act 1981.
- In front of building or 20 m of a highway of any sort or usage.

For an indoor pool Building Regulations approval must be sought regarding Part L - insulation of the pool shell.

In general terms it is better to contact the local Planning Dept and ask, they are always happy to advise

SOME BASIC QUESTIONS

Before the designer can start there is some information which is essential and, generally, can only come from the end user.

What is the pool to be used for?

- Swimming up and down for exercise?
- Diving from the side or off a low board?
- Aerobics?
- Wallowing?
- Recreation?

All these will have an impact on the shape and size of the pool.

Where is it to be sited?

When deciding on the site of an outdoor pool, facing south to maximise exposure to the sun is usually the best option. However take into consideration shadows and the time of day the pool is to be used. Many people think that trees are a nuisance. Perhaps they are, but a completely tree free site is almost impossible to find except in the middle of the desert, and trees also provide a natural protection of privacy and shade. Most outdoor pools tend only to be open from Spring, through Summer and into early autumn and, as such, are closed and covered for the main part of autumn and into winter. If a client wishes to use the pool for a greater part of the year, thought must be given to siting it in relation to trees to minimise falling leaves getting into the water.

An indoor pool, contrary to popular belief, does not have to be in the middle of its designated pool room.

What is the size and shape?

This will mainly be decided by the usage. Remember that the bigger the pool the greater the running costs; the wider the pool the greater the cost of spanning it; the deeper the pool the greater the volume of water that is rarely swum in.

What fuel services are available on site?

This affects the choice of heating equipment. See section on heating.

What temperature is required?

In general terms, the greater the temperature, the higher the running costs, which is logically to be expected. However, it is important to understand that as water temperature increases, the energy consumption - and therefore the cost - of doing so increases exponentially. In simple terms, disproportionately more energy will be consumed raising the pool from 25°C to 30°C and maintaining it there than from 20°C to 25°C, even though the intervals between the two - i.e. 5°C - are the same. This is because as the water temperature increases the difference between it and the ambient temperature also increases, which therefore increases the rate of heat loss. This means that the heating system has to work that much harder to achieve the higher set temperature; as does the heat reclamation / dehumidification / ventilation plant in an indoor pool in order to maintain comfortable conditions for people in the pool hall, as well as maintain humidity at levels which will not be detrimental to the fabric of the building.

The water temperature in a swimming pool is generally whatever is desired by the customer and on occasions that is the ambient temperature in an outdoor pool. However most bathers in this country require a constant temperature somewhat warmer than ambient in their pool regardless of whether it is outside or indoors. The temperature in the pool water should generally be dependent on two things:

The comfort of the bathers
The budgetary constraints of the person paying the heating bills!

The comfort of the bathers will also depend on the activity in the pool. Swimming for exercise will require a lower temperature than those learning to swim or for very young children. A very general range would be:

Serious swimming: circa 26°C

General: circa 27°C - 28°C

Learners and children: circa 28°C - 31°C

Hydrotherapy: circa 32°C+ degrees



Pool Construction Types

Pool Shell Construction Methods - Differences, Advantages & Drawbacks

There are essentially five types of pool shell; those erected above ground; the concrete, the liner, the ceramic modular, and the stainless steel.

Most domestic pools are of the 'freeboard' design. That is to say that the water level is approximately 150mm below the level of the pool deck or 50-100mm in the case of a compass design line. Surface water draw-off is via a number of surface water skimmers (quantity dependent on overall volume of pool) set into the pool wall at finished water level. A skimmer is connected to the pool's filtration plant and is under suction from the circulation pump drawing water off the surface and the top few centimetres where the majority of dirt and debris collects. Water passes through a basket which strains out large contaminants before being passed through the filter via the pump.

Alternatively, the pool can be designed with the water level at the same height as the pool surround, know, as 'deck level', like pools in the commercial sector. In this case the water overflows into a channel in the deck around the perimeter of the pool and gravitates to a balance tank which is separate from the pool. This tank holds an additional volume of water. By drawing water from this tank and pumping it into the already full pool shell, the water in the shell rises and overflows into the channel, and so back to the balance tank. By this system the water level is maintained at the same level as the pool surround. Deck level pools are generally accepted to offer more efficient filtration and circulation given that the surface draw-off takes place constantly over the entire perimeter, whilst filtered water returns to the pool via inlets near or in the floor, thus eliminating any dead-spots of uncirculated water. However, pools of this type are much more demanding, and therefore more costly, from a construction point of view.

Whilst either type of construction can be considered for indoor or outdoor pools, it is more common to see

deck-level pools indoors and a greater proportion of freeboard pools outdoors. Any of the pool construction types described in this section are suitable for either indoor or outdoor installation. There are, however, some specific design considerations though which pertain to one or the other which are covered specifically in their corresponding sections later on in this document.

CONCRETE POOLS

The concrete shell should be designed to BS EN 1992 (Eurocode 2), Parts 1, 2 and 3.
In general terms Parts 1 and 2 replace BS 8110 and deal, as before, with the construction of reinforced concrete structures. It is Part 3 which deals with the construction of water retaining structures and consequently replaces BS 8007. Therefore a reinforced concrete pool shell is designed and built to either BS EN 1992 (Eurocode 2), Part 1 or BS EN 1992 (Eurocode 2), Part 3.

Absolute water tightness is required and demands that the concrete shell will hold water before the internal rendering is applied in cases when it is to be installed over or immediately adjacent to habitable accommodation; and all pools in the commercial sector. The latter relies on the internal rendering to retain the water. Indeed Water Regulations 1999 require all pool structures to be “watertight” or leak free.

A structural engineer should design concrete pool shells and according to SPATA Standards. The calculations should be made available to the client if required. This shell is described as a monolithic structure in that it is an entity in its own right and should in theory be able to hold the volume of water whether in or out of the ground. In commercial and some domestic installations a void or undercroft is designed around the pool to house air heating ductwork and water pipes and in this case the strength of the pool shell is of paramount importance.

The method of constructing shells can also vary. In commercial installations one method is a poured floor and shuttered walls with both thickness and reinforcing according to the design. This is also suitable for smaller pools but the cost of the shuttering can be high. Cavity block walls containing reinforced concrete tied to a poured floor is a method widely used in the domestic market and for smaller commercial pools. In this case the two block walls act as shuttering for the poured concrete in between; once again both thickness and reinforcing according to the design. The blockwork is quicker and cheaper to construct but due to the block size is limited to gentle curves and therefore shape.

Sprayed concrete, either Shotcrete or Gunite depending on the aggregate size, is applied by spraying it under pressure onto a pre-assembled steel reinforcement frame; the constituents of the concrete mixing at the nozzle of the spray gun. This method of application results in a much lighter shell but one with a greater degree of flexibility in shape.

STAINLESS STEEL POOLS

Stainless steel pools are structurally designed to retain the weight of the water in the same manner as the concrete pool. Some products have supporting frames and others have reinforcing built into them. They are considerably lighter than the concrete type of shell and are usually restricted to the deck level type of pool as the surround channel adds to the strength. In some cases stainless steel can be the finish and in others a

vinyl membrane is applied. Angular shapes are favoured rather than free form.

LINER POOLS

Liner pools have a shell that is radically different. Here, water tightness is achieved by a vinyl container (the liner). The structure is non-reinforced and the floor of the pool is porous. The porosity of the floor is to allow ground water to permeate through it should the groundwater pressure become greater than the weight of the water in the pool at which time the flexibility of the liner allows movement to prevent collapse. The liner is supported by a structure, which is not meant to have any great strength in relation to the ground and water, but is there to give shape to the pool and to keep the liner in place. For this reason the liner system is not generally used for large commercial installations. However, there are some products which are similar and due to their more robust design have structural strength.

The supporting structure can be constructed of a variety of materials. Years ago one would see liner pool walls made of wood or even steel. As technology progressed, galvanised metal and basic fibreglass were used but today there are many composite “plastic” wall panels of high quality available. These are held in the vertical plane by braces usually known as “A” frames. These frames are set in concrete for strength and support. Generally speaking this type of liner construction gives a constant panel depth of approximately 1 metre. The floor profile can then be graded from the bottom of the wall into either a hopper or wedge shape.

Blockwork can also be used for liner pool walls. Depending on the depth of the wall either hollow agricultural type or ordinary blocks can be used. This type of wall has to have sand and cement rendering to provide a smooth finish, which will not puncture the liner material. However the use of hollow blocks that can be reinforced can allow greater wall and, therefore, water depths, and this also allows for gentle constant slope floors. The sand used on the walls and floor should be sharp sand, as this gives a greater longevity. It is also good practice, with block walls without reinforcement, to have a beam of concrete at the top of the wall, which is reinforced and runs round the entire perimeter of the pool to give added strength. Again, because of the construction of the walls and the liner manufacturing process, liner pools have limitations in shape.

ONE-PIECE PREFABRICATED POOLS

One-piece pools are, as the term implies, complete pools which are manufactured completely off-site and delivered to the new owners' home on the back of a suitably sized delivery vehicle. There, the pool is craned off the vehicle and dropped into a prepared excavation, usually with a concrete base for it to sit on, according to the pool manufacturer's recommendations. Plumbing connections are then made back to the plant room and the excavation back-filled in preparation for the pool edging and surround.

This type of pool has a number of advantages over other methods of construction. Firstly, given that it is manufactured off-site, installation times are drastically reduced - typically days rather than weeks - and are therefore less likely to suffer through delays caused by adverse weather. Secondly, the pools are usually preplumbed and pressure tested in a clean and controlled environment at the factory, meaning that work does not need carrying out on site, and plumbing tasks are reduced to merely connecting the pool plumbing

to the plant room.

For consumers looking to install a 'DIY' pool, it offers the benefits of not requiring any specialist skills such as brick-laying, and significant savings can therefore be made in labour costs, though it is always recommend that the advice and supervision of an experience pool professional is retained to assist the DIY consumer to avoid any potential pitfalls on site, or to advise on any unforeseen issues.

Modern one-piece pools are also highly durable, especially compared with a vinyl liner installation which can be punctured or torn by a pet dog which falls in and then attempts to extricate itself from the water using its claws. The finish of a one-piece pool is usually also maintenance free over the lifetime of the pool, whereas a liner pool will require relining on average every 5 to 10 years and a concrete pool will require retiling, replastering or repainting every 10 to 15 years. These time periods can be drastically reduced if the maintenance regime, especially that of water chemistry, are poor or completely lacking, whereas the surface finish of a one-piece pool tends to be more resilient and forgiving. In the case of concrete pools, draining down, stripping off the old finish and applying a new one is both time-consuming and labour intensive and therefore potentially highly costly.

The main drawback with one-piece pools is that the shape and finish choice is limited to that produced by any particular manufacturer. Consideration should also be given to site access in order that the pool and the vehicle which is delivering it can reach the site, and the same considerations too for the crane which transfers it from the delivery vehicle and lowers it into the excavation.

Why Compass Ceramic Swimming Pools?

This document has been prepared by Compass Ceramic Pools UK. We distribute and install the world's leading, highest quality and most respected brand of once-piece pools throughout the UK. Whilst the information contained herein is impartial, factual and of genuine value to anyone considering the installation of an indoor or outdoor pool, and its design, construction and operation considerations, there is no hiding the fact that we do have an obvious commercial interest, and rather than sweep it under the carpet address it head-on so that you in turn can make an informed and transparent choice in the advice you give your clients.

Does this mean we can provide a pool for every eventuality? No. If you have a client whose heart is set on the guitar shaped pool in turquoise and gold tiles that they've always dreamed of since they were a teenager, a one-piece pool is not going to provide a solution and one or more of the other construction methods outlined in this document will need to be recommended and employed. However, in the majority of cases we sincerely believe that we offer the majority of prospective clients a solution that meets their needs both functionally and aesthetically; and at a quality and value that offers unrivalled beauty, durability, wide choice of configurations, styles and finishes, ease of operation, ease of maintenance and low lifetime ownership costs when compared with other methods of construction. Why do we believe this so strongly? Here are a few reasons...

Advantages of Compass Ceramic Pools over concrete and liner pools.

- Much faster installation - days as opposed to weeks.
- Much less labour intensive installation - lower installation costs.
- Lends itself better to DIY installation for clients who are more hands-on or self-builders.
- Will not require relining, replastering, retiling or repainting - less downtime and lower cost of

ownership.

- Concrete is not forgiving of ground movement and can crack if stressed. So much so, concrete built pools to British Standards and SPATA Standards can lose 2000 litres of water per month on an average family pool and still be within permitted tolerances.
- Thermal conductivity of concrete is relatively high, so much more of the energy requirement in a concrete or block and liner pool is spent heating up the walls and floor.
- Tile grout in increases the surface area for bacteria to multiply. This therefore increases the amount of sanitiser and other chemicals required to deal with it, and the amount of cleaning and scrubbing of the pool's surface needed. Furthermore tiles can easily pop off with ground-movement.

Advantages of Compass Ceramic Pools over other one-piece pools on the market.

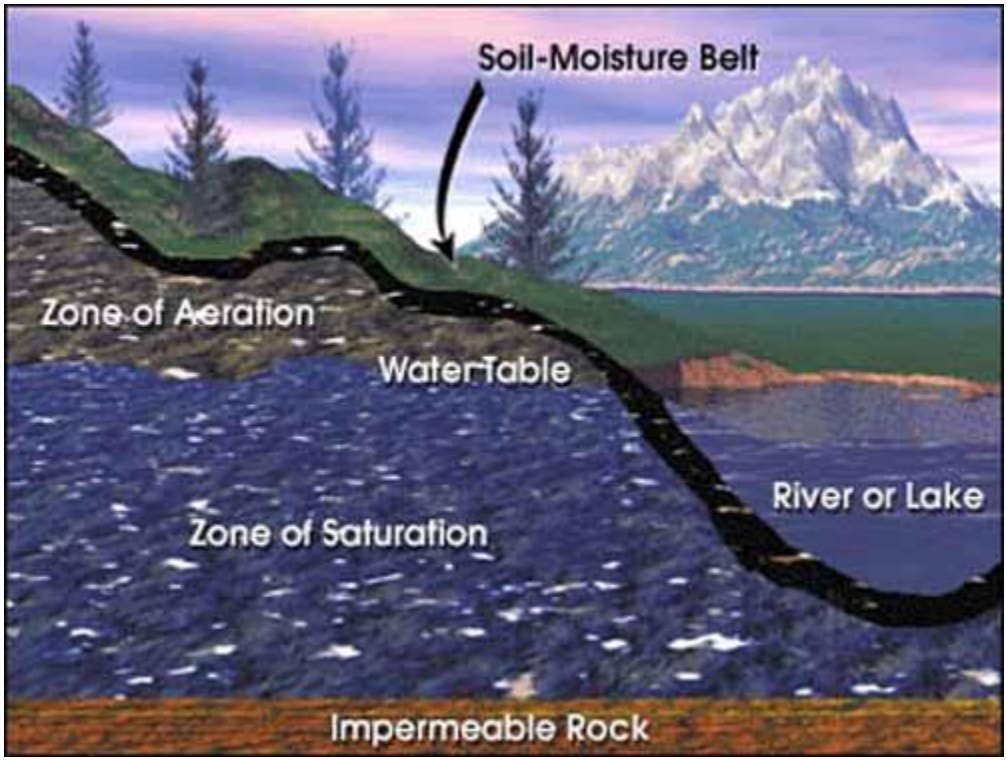
- Closed Beam Technology- to give the pool greater structural strength and rigidity round the perimeter and key potential stress-points.
- Ceramic Core technology – At the heart of our exclusive six layer composite, our ceramic core makes the structure impervious to osmosis so no ground water can permeate through and stain the finished surface from behind, and it has excellent insulation properties. Furthermore, this insulating ceramic layer is only 1.5mm from the water so you do not waste money heating up the rest of pool shell. We can also add as much insulation to the outside of the pool as you like, so we can far exceed the minimum statutory requirements, where applicable.
- Carbon-Infused Layer – carbon fibre is a cutting-edge technology renowned for its incredible strength, yet extreme light weight. These qualities have seen it used in Formula 1 cars, racing yachts and modern aircraft. These same properties also make it a perfect material for use in swimming pool shells, which is why we use it in Compass Pools to reinforce key points of stress.
- Bi-Luminite® Layer – Gives a beautiful and unique 3D finish which is resistant to fading caused by chemicals and UV light.
- Our surface finish is continuous, smooth and impermeable to bacteria, reducing the need for chemicals to a minimum.
- Water loss through the shell is zero due to the pool being manufactured and tested in an environment strictly controlled for temperature and humidity.
- The Compass Ceramic composite structure is layered to make it exceptionally strong, yet is flexible to allow for ground movement and is, uniquely, warranted against leaks though the shell for 50 years.

Therefore, whilst Compass Pools can't satisfy absolutely every application, hopefully we've shown that it does offer you and your clients a practical, attractive and beneficial solution in the vast majority of applications.

Ground Conditions & Ground Water Handling

One common factor in relation to the proper installation of all pool shells is dealing with groundwater. If the groundwater pressure builds up the shell of the pool will be at risk unless the pressure is relieved. Battleships were made of steel, weighed thousands of tons and floated. If the pressure is greater than the water and the weight of the concrete or fibreglass shell, it could lift or float the shell. In concrete pools not only should a hydrostatic relief valve be fitted in the lowest point but also the drainage under and around the structure should be such that the water can easily gravitate to the deepest point and if necessary operate the relief valve. Liner pools with their porous base do not have hydrostatic relief valves because that water would permeate through the liner floor. Again the surround drainage should be designed to take water away from the structure as the liner will lift off the base and float and a floating liner is not conducive to swimming. This,

in extreme cases, could mean the installation of a pumping chamber and float operated pump to take away the ground water. The Ceramic shell should be protected in the same way as the concrete pool. It is therefore important to assess the groundwater situation, and consider the winter months, before the installation is started so that all necessary precautions can be included in the specification.



Basically speaking if the pool type is designed and installed correctly there is very little difference between the options other than shape and feel and the cost. Concrete pools tend to be the most expensive.

But first it is important to note that every in ground pool must be designed to suit the ground in which it is to be installed; the type of soil, the water table and the general surrounds. It is obvious to say but clay, chalk and sandy loam exhibit very different properties and it is vital that the contractor be aware of the conditions prevailing on the site before the pool is designed. Therefore if the ground conditions are unknown it is wise to have a trial hole dug and if necessary a soil analysis which should be passed to the structural engineer. It is also important to establish the use the pool is to be put and what is required of it. The bathing load will determine in part the size and may also play a part.

As a general rule the ground should be natural and have a load bearing rating 0f 100 KiloNewtons/ square metre in uniform strata.

OUTDOOR POOLS

Outdoor Pool Design Considerations

Any of the pool construction methods described in the previous paragraphs can be utilised to build an outdoor pool. Outdoor pools do have their own particular design considerations which you need to be aware of, including but not limited to...

Proximity to the house.

How close is the pool to be to the house for changing and showering facilities? If the pool is to be used for extended periods of the year, a relatively close proximity to the house is desirable in order to minimise the walk from the pool back to the house in the cold. If the pool is to be located some distance away, think about the paths to the pool from the house. Areas of lawn between changing facilities and the pool area are to be avoided so that dirt, mud, animal dropping, grass-clippings and other associated debris are not carried on bather's feet into the pool where they will place an unnecessary demand on the pool sanitising chemicals and necessitate more pool cleaning.

Planting round the pool.

All planting near the pool area should be thought out to ensure that leaves and stems are not sharp or prickly, ideally non leaf-dropping (certainly during the main summer season) and not poisonous or irritating. Most garden plants and lawn grasses are resistant to pool chemicals at the tiny concentrations to be found in pool water and are therefore unaffected by pool water when exposed to it. However, some species may be particularly sensitive so, if you have particular concerns or especially valuable plants, please consult with your plant supplier, garden centre or horticulturist.

Paving/Surround types.

The paving or pool surround and pathway materials should be carefully chosen to ensure safety of people and prevent excessive ingress of contamination into the pool water, as well as aesthetics. Surfaces should be non-slip, not riven or unduly uneven, not sandy or loamy, and be laid over a suitably stable base. Special consideration must be given if very heavy items, i.e. garden buildings or hot tubs are to be positioned. As well as traditional stone and stone-like materials, many synthetic decorative pool surround surfaces are also available.

Lighting.

Outdoor lighting is vital for ensuring safe use of the pool area and any pathways to and from it at night. IP66 rated outdoor switching and sockets in useful locations may also be beneficial. Care must be taken to ensure that whilst lighting should be aesthetically pleasing, it should also be functional yet not be a nuisance to any neighbours which may be affected. All electrical work must be undertaken by a suitably qualified electrician and certified to Part P of Building Regulations. See Section*** re underwater lighting.

Outdoor sound systems.

When specifying outdoor sound systems, always ensure that speakers and other equipment, including any wiring, installed outside the house is specified for outdoor purposes. When installing speakers, avoid the temptation to mount a pair on a building facing the main socialising area and rely on volume control to project the sound to all parts of the garden. This would potentially result in the volume being overpoweringly loud for those close to the speakers, whilst the sound may not adequately reach farther reaches of the garden. It could also prove a nuisance to neighbours. A better solution would be to mount speakers at regular intervals around the perimeter of the garden attached to trees or on posts and pointing inwards. Speakers disguised as rocks are also available to install at ground level. That way, the volume can be maintained at a relatively low level, whilst at the same time ensuring that sound reaches all parts of the

garden desired. As with electrical installations, it is recommended to seek the advice and expertise of a suitably qualified professional.

Poolside Buildings

In many installations, particularly those where the pool is some distance from the main house, clients choose to erect an adjacent building. If your client is considering doing so, ensure they clearly specify their needs, which will guide the type and size of the building. Generally, buildings are of the wooden chalet or log building type. These usually do not require planning permission and come under permitted development. However, in some instances planning permission may apply (see section on planning), especially if the building is considered to be of a more permanent nature, or services (electricity, water, drainage) need connecting to it. If in doubt, always consult your local planning department. Also, will the building be required for changing, showering or entertaining? Will multiple rooms need to be incorporated within it? If the pool is removed from the main house and a poolside building is to be erected, it would make sense to also incorporate the pool plant-room within it to minimise installation costs and the length of pipe runs.

Safety / security.

Whilst there are not yet statutory obligations governing pool safety in the UK as there are in countries like France or Australia, consideration to pool safety and security must be given, especially where there are young children in the family, to prevent unauthorised access to the pool at times when there is no adult supervision, and therefore minimise the risks of accidental drowning. Measures to evaluate would include fencing the pool area off with a suitable fence and lockable gate, a purpose-made safety cover (a cover which complies with French standard NF P90-308 is considered a safety cover - check with the manufacturer as most pool covers are not considered safety covers unless stated), a certified alarm system (water sensors or infra-red beams which set off the alarm when triggered), or an enclosure which can be fixed in place and locked.

Covering.

Any outdoor pool requires some kind of cover which should be in place over the whole surface of the pool at all times when the pool is not in use, primarily to prevent evaporation and therefore the greatest heat losses from the pool surface. There are a range of covering materials available to consumers which vary greatly in terms of capital cost, and likewise with quality, efficacy and lifespan. The cheapest available are of the 'bubble' type, which are made from a synthetic material akin to thick, blue-coloured, bubble-wrap. Not only does this type of cover eliminate evaporation, the trapped air bubbles also offer solar-gain when the sun shines. This heats up the trapped air in each bubble, the energy from which is then transferred to the cooler water. Other types of cover include heavy duty foam, which is more resilient in quality than the bubble type, but does not impart any solar gain. At the upper end of the spectrum are the motorised slatted type cover. Here, the cover is made up of a series of many PVC slats with a trapped air chamber. This trapped air chamber gives the cover its buoyancy and also its insulation properties. Some automatic slatted covers are certified as safety covers, especially when coupled with a ledge or handrail, and some offer translucent slat options to benefit from solar gain. The covers roll and unroll automatically on and off the pool at the flick of a switch via an internal electric motor.

Telescopic Pool Enclosures & Domes

Telescopic pool enclosures have gained in popularity in recent years. They resemble a tapering conservatory which spans the pool and a proportion of its surround. They offer a great solution to those consumers who like the idea of an indoor pool at times when the weather is not being kind, and to extend the length of the swimming season in the Spring and Autumn, whilst at the same time allowing the benefits of an outdoor

pool at times when the weather is hot and sunny. It does this by folding up one of the ends and then telescoping each modular section up into the opposite end on rollers or special tracks. Some are even motorised for ultimate ease of use.



Pool domes are clear PVC structures which are secured on the deck surrounding the pool by way of steel anchors or integral bags filled with water to weigh it down. The structure is then inflated like a large balloon and is kept up by maintaining a higher pressure within the dome than that outside. Access to the inside is usually via a zipped entrance. As with other enclosures, a dome affords protection from inclement weather and extends the usable swimming season in Spring and Autumn.

INDOOR POOLS

Pool tied to building.

Often architects specifying indoor pools will place the pool hard up against one wall with the wall of the building running into the pool. While aesthetically pleasing this opens up a can of worms with regards to the integrity of the pool structure. Settling of the foundations or movement in the building can result in water loss from the pool shell due to the stress involved. It is also impossible to access any services located behind

this wall, for example pool lights, return inlets etc. The recommended method in this instance is to locate the pool 350mm from the building that is enough for a coping stone and allows access if required. The pool can then be constructed independently of the building and allow movement in both structures.

Insulation

The majority of heat loss from a swimming pool, up to 85 - 90% in fact, is through the surface. This can be dramatically reduced by covering the surface when not in use. This will reduce evaporation and therefore reduce cooling and running costs.

There are several types of cover available ranging from liquid to “plastic bubble”; from slatted to tarpaulin type sheet; from manual to electric to hydraulically operated (see section on ‘Covering’ in previous section under Outdoor Pools for more detail on cover systems).

Since the introduction of Part L of the Building Regulations pertaining specifically to indoor pools (see next section), it has been mandatory to insulate the pool walls and floors. There are proprietary products for swimming pools and other water retaining structures which typically manufactured of closed cell polystyrene with very high compressive strength to withstand the considerable load imposed by the weight of the pool shell and the water. The insulation boards are fitted between the wall or floor and the backfill.

Although insulating the shell is only mandatory (at the moment) in indoor pool installations, it would be good practice and beneficial in minimising heat losses in outdoor pools.

Building Regulations - Part L

Part L of the Building Regulations (Conservation of Fuel & Power, Approved Document L1B) came into force on 1st October 2010. Swimming pools are referred to twice in this document. Firstly the heat retention capability, or U value, of the pool shell structure should be equal to or less than 0.25 watts per m^2K. Generally a concrete structure would have to have incredibly thick walls and floor to achieve this. The principle usually adopted is to sheath the shell in sufficient insulation material, fit to be used underground and with an appropriate crushing strength, to achieve the required figure. Secondly when the heat retention capability of the building is calculated, the pool hall floor calculation should ignore the pool but include the pool footprint as the same material as the rest of that floor.

Currently only indoor pools have to have shell insulation according to this Regulation and outdoor pools remain unaffected.

Indoor pool environmental control

Wherever possible, an automatic pool cover should be used to minimise evaporation losses when the pool is not being used. Using a cover will also allow the air temperature to be reduced by reducing the air heating "set point". If a cover is in place then evaporation will be controlled and hence the air temperature need not be maintained at 1°C above water temperature.

With a system which does utilise a cover, two air temperature settings would normally be referred to as having two modes of operation.

- Occupied, when the pool cover is removed and the pool is in use and the air temperature is raised to the "occupied set point"

- Unoccupied, when the pool cover is in place over the water surface and the air temperature is dropped to the unoccupied setting, normally known as the "set back" temperature.

The "set back" temperature would normally be of the order of 21°C allowing the air heating to be shut off some 6°C earlier than the typical "occupied" condition of 30°C.

With modern highly insulated buildings it is very likely that the room air temperature may not drop as expected when the cover is put in place, and the air heating is turned down. The heat loss from the pool, through the pool cover, may well be sufficient to keep the room air warm, even when the air heating has been turned off using the "set back" system.

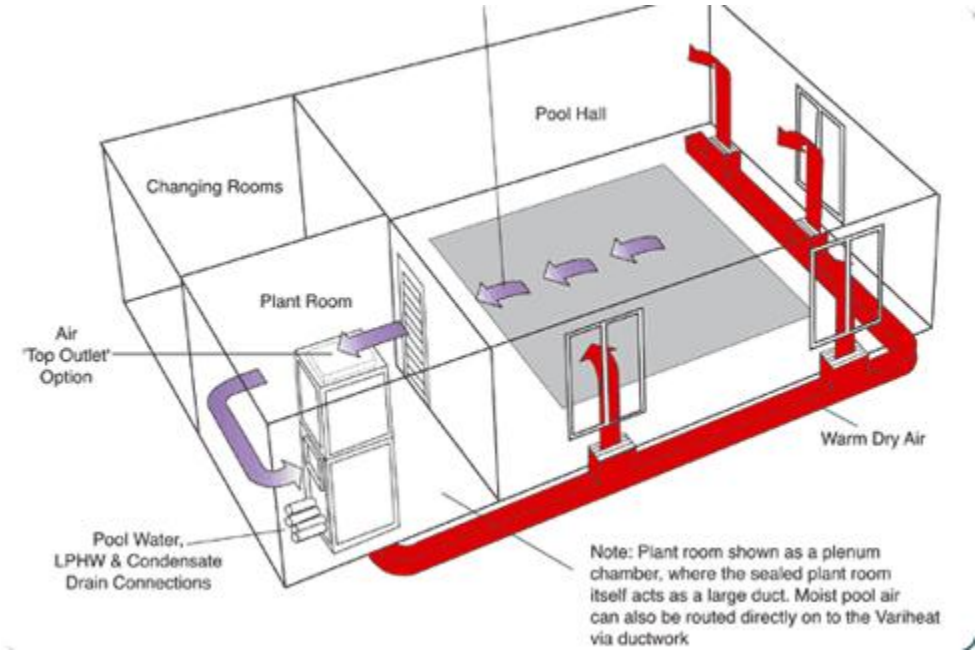
Air temperatures staying above the set back temperature are sometimes wrongly interpreted as the system malfunctioning. Generally it is the heat loss through the pool cover that is responsible, coupled with the high thermal performance of the building.

Air distribution

The only satisfactory way of keeping a pool hall at the correct air temperature and humidity is by forced air movement. Convection using domestic radiators will not work.

The air can be directed around the pool hall either by extract fans operating on humidistats and discharging humid air out of the pool hall and drawing in fresh air from the outside, or by recirculating the air via an air handling unit which also heats and de-humidifies the air. This unit can either blow the air into the pool hall in a haphazard way and pull it back into itself, or it can distribute it via a ducting system and return it back via another.

The use of a ducting system allows the warm air to be directed to areas where condensation is likely to occur which are usually glazed areas.



Ducting

Two main options for ducting exist for pools, either on budget systems a simple blow suck design can be implemented pulled air in and expelling from one location. This system can however leave condensation on glass areas. A full ducted system is recommended for most situations blowing air to areas of glass and sky lights.

Ducting will either be positioned in the floor or in a dropped bulk head around the ceiling.

Pool Lighting

The water in the pool can only be illuminated by underwater lights. The surrounding illumination either indoors or outdoors will not do the job.

Equally fibre optics generally only provide pinpoint light and not the floodlight required. The can be used to great effect to highlight steps etc.

There are many effective underwater light types on the market. The sealed beam and halogen types are still available, but are now being superseded my more versatile, energy efficient and longer lamp-life LED lighting systems. These systems offer greater output and are typical multicoloured, with the home owner being able to pick a colour to convey a particular mood or ambience; or can set the lights to a cycle which phases through a range of colours, or is even synchronised with music.

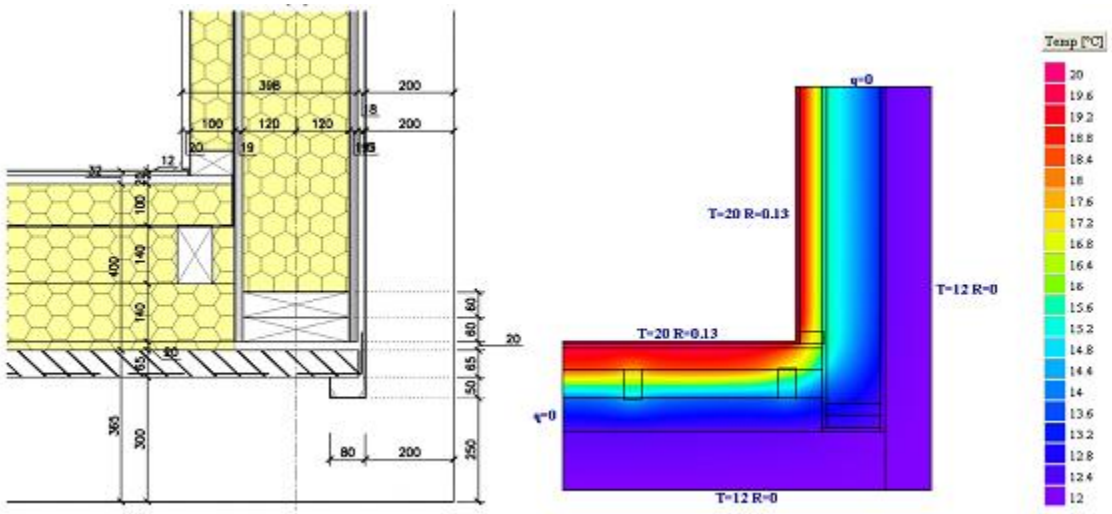
Indoor Pool Installation Process On a Compass Pool

1. Foundation installation
2. Pool Excavation
3. Shell installation
4. Plumbing installation
5. Pool water fill and leakage test
6. Pool boarded over
7. Building installed to first fix
8. Air Handling and Ducting Install
9. Pool equipment install.
10. 2nd fix and Building Finishes
11. Pool Commissioning

POOL HALL CONSTRUCTION

If a swimming pool is to be used throughout the year the structure placed over a it must conform to Building Regulations Part L (Conservation of Fuel & Power, Approved Document L1B). If the structure does not conform, then heating systems will not be permitted to heat that structure. Heating the water will be permitted. However as the ambient external temperature drops and with it the internal temperature, condensation will be formed by the difference in temperature between the water and air. Fogging will occur to the extent that visibility will be almost nil and the bathers will be cold when the are out of the water. In effect bathing will stop but the swimming season will be extended.

Consequently most indoor pools are of a traditional build. The following paragraphs give some guidance notes. However, it should be noted that even with the best environmental control, power failures with the cover off the pool can result in condensation forming. Condensation will form when air in the pool hall at 28°C comes into contact with anything at approximately 21°C; this is "cold bridging". Steelwork in the structure of the building should be insulated to prevent this happening in voids.



Pool Hall Air temperature

Having established the required water temperature, the air temperature will normally be set at 1°C higher for the design of the environmental control system. Thus for an indoor pool whose water is to be heated to 29°C, the air would normally be heated to 30°C. This practice allows a degree of natural control of water evaporation and will reduce both the equipment required and the running costs of the system. It should be understood that this practice is not essential, and it is possible to design a system where the air is cooler than the water. Unless specifically stated otherwise all designers would assume that the scheme is to be designed with the air warmer than the pool water.



Vapour Control

The air within the pool hall needs to be contained within the hall. In other words the hall needs to be sealed with vapour barriers either in the horizontal plane, vertical plane or both. Those barriers must not be compromised either when being set in place or when other fixtures or fittings are installed. Doors and windows should be air sealed; it is good practise to have an air lock of two doors if the pool hall opens directly into the dwelling or others areas at lower temperature.

Surface Finishes

Generally speaking the internal finishes of the pool hall should be “external” type materials; that which you would use on the outside of the building.

Plaster / Plasterboard are not recommended for use in pool halls, Please see knauf aquapannels or lafarge gtec aqua board

Stretch Ceilings

A Stretch Ceiling is a suspended ceiling system consisting of two basic components – a perimeter track and lightweight fabric membrane which stretches and clips into the track. In addition to ceilings the system can be used for wall coverings, light diffusers and creative shapes. Stretch Ceilings allow the incorporation of all types of light fixtures, grilles and fixing points by the use of a proprietary background support. The stretch fabric material is suitable to install in all types of swimming pool environments. Stretch ceilings offer increased light reflection, improved acoustics, attractive decorative finishes and a maintenance free, water impermeable ceiling that will not require any ongoing decoration.



Rendering - waterproof plaster

Flooring / Surround

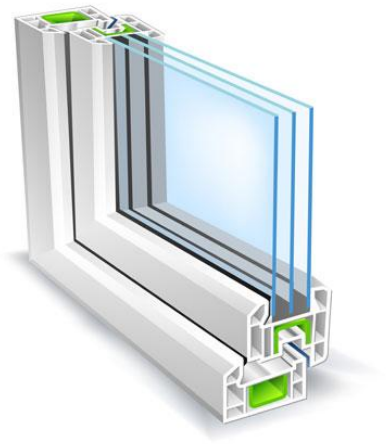
The type and style of the surround, and therefore choice of materials, will be largely dictated by the aesthetic desires of your client. However, bear in mind that the area will be wet for a lot of the time, but subject to areas of high traffic, so selecting non-slip materials designed for such areas is important. In addition to traditional finishes such as tile and stone, there are also synthetic flooring finishes specifically designed for such wet areas which are attractive, practical and kind on bathers' feet.

Water based underfloor heating is an attractive option with bare feet.

Glazing

Double or triple glazing should always be used. Solar gain may have a tendency to increase the pool hall temperature above that which is acceptable The only way to counter that is to ensure the air handling system incorporates an air cooling or air changing facility.

Where recessed windows, glazing bars or bell lights are used it is important to address the air distribution from the ducting accordingly



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Where aluminium glazing is specified the inside out the outside face should be split so as not to create a cold bridge and condensation. The same applies to handles on doors both internal and external.

Pool Hall Lighting

The lighting in the pool hall must be installed according to Electrical Regulations and a general comment, including power outlet, is that all with 2.5 metres of the water, in any plane should be SELV. With a minimum rating of IP55.

It is also good practise to put lighting in positions which are easily accessible and not over the pool.

Pool hall lighting will not illuminate the water, and suitable underwater lighting must be specified and fitted.

Changing & Toilets

These rooms, and indeed any occupied by bathers within the pool hall, will have to be ventilated in the same way and with the same system as the pool hall. Changing in a cold room is not pleasant and the room will, eventually, be covered in mould. As previously stated the use of radiators in these room will not provide the air movement required.

The ducting system should incorporate sprigs into these areas to blow air into or draw air out of them.

Consequently the door should not be of the sealed type.



Splash out Handling

It is inevitable that water will either be splashed out of the pool or taken out in soaking bathing costumes. The fall on the surround should be to a gully drain around the perimeter of the pool hall in the case of a freeboard pool; or back to the overflow channel in the case of a deck level pool.

Vertical splash tiles at the bottom of the walls at the joint of the floor are useful. Floor tiles should either be non-slip, or treated with an anti-slip application.

Service Considerations

All electrical work must be carried out by a registered, competent Electrician working to BS7671 "Requirements for Electrical Installations" including the Document "Special Locations 7". The Swimming Pool and Allied Trades Association also consider that all electrical equipment installed in the pool plant room should be to IP55 as there is a risk of spray contamination.

Particular attention should be made to the material electrical fittings are made from where exposed. Plastics are prefered but, where required, stainless steel switches should be of 316 grade treated stainless.

All gas installations should be carried out to "Gas Safety (Installation and Use) Regulations 1998 by an Operative with the appropriate HWB 1 qualification.

All water supplies must be carried out to "Water Supply (Water Fittings) Regulations 1999 in particular any

topping-up device connection must have an air gap. All Compass Pools comply to this as standard.

Pool Heating

There are essentially two different types of system for heating pool water, primary and secondary.

A primary system is a system where the home owner sets thermostatic controls at their desired temperature (typically between 22°C and 30°C), and the heating system will, as long as it was correctly sized, specified and installed, operate up to and until the water reaches that desired set temperature, irrespective of external factors like the ambient temperature, the weather, amount of sunshine etc, and then maintains it at that temperature, again, irrespective of any outside influences.

A secondary system will raise the water temperature, but is dependent on outside factors which will impact its performance, such as the weather, ambient temperature, sunshine etc. They generally cannot guarantee that the pool water will actually reach the required temperature. A secondary system is generally installed as a back-up to a primary system, as they normally offer considerable running cost savings when conditions are in their favour, with the primary system able to take over and make up any shortfall when they are not. For example, an air-source heat pump (secondary system) works very efficiently and cost-effectively when the weather is good and the ambient temperature relatively high. However, to heat the pool up from cold, or during periods when the ambient temperature is low and a heat pump does not work as effectively, a gas heater (primary system) can be switched on to make sure the desired set temperature is reached.

With such a range of options available, sizing and specifying a heating system (or a combination of systems) is always done in close consultation with the client, and should take into account their budget, available fuels and the relative costs of using them, relative on-going maintenance costs, and the views and desires of the client (for example, in a situation where it may be found that it's less expensive to specify a gas powered system, but the client has strong views on reducing their environmental impact, which would lean more towards a renewable heating system). There are also practical considerations like the physical size of the equipment and its fuel storage requirement versus the plant room specified to house it which may also play a part in dictating what is specified and installed.

Primary heating systems:

High performance fuel oil heater

In dedicated swimming pool oil heaters, domestic fuel oil is burned, heating up a fluid in a closed loop to a high temperature. This fluid is circulated through a series of stainless or titanium tubes which are in contact with the pool water, which heats up as a result.

High performance gas boiler

The same working principle as with a fuel oil boiler (above), but using natural gas, LPG or butane as the fuel source.

NB: Propane (LPG) and butane solutions offer the same advantages as natural gas if mains gas is not available to your client. However, the running costs are approximately 280% as high, so this solution is extremely expensive to run in comparison.

Electric heating.
A dedicated swimming pool electric heater is much like a domestic electric heating system where pool water is circulate through a chamber where it comes into contact with an array of stainless steel or titanium electric heating elements; but much larger to account for the much greater water volume. With ever increasing electricity prices it is seen as the least viable of the direct heating systems and tends only to be installed in situations where there really is no other alternative.

Air/water heat pump.
Heat pumps are gaining much coverage in the media for their green credentials and efficient performance, and are therefore also strongly gaining in popularity for heating pools, especially as the costs of fossil fuels continue to rise.

An air to water heat pump works by absorbing heat from the ambient air and transferring it to the pool water. The ambient air doesn't itself have to be warm - even cool or cold air has heat energy within it which a heat pump can extract though, clearly, the warmer the air, the more heat is available to extract, and the more efficiently the heat pump will operate. When used as a primary heating source, the heat pump must be sized to perform at maximum efficiency during the coldest days of the year that the consumer intends to swim in, to ensure it can keep up with demands.

Pool water heat exchanger.
With new-builds, or in installations where the household domestic heating system is being overhauled/replaced, it's possible to fit a pool water heat exchanger with thermostatic controls to tappings off the domestic heating system. In such instances, it is vital the heating demands at the peak period of the year for the pool water and its desired set temperature are used to calculate the heating capacity needed. The household heating system must then have enough spare capacity to cover the peak demand of the pool, as well as the rest of the house. With indoor pools, the demands of the air heating in the pool hall must also be taken into account and included in the sizing calculations.

Renewables - Biomass, pellet, and log burners.
Many consumers are looking to reduce their carbon footprint and their heating bills in the face of ever increasing fossil-fuel costs, and renewable heating systems are gaining in popularity in that respect. The specified fuel has a known calorific value so, subject to it always being available, and the heater being sized correctly to cope with the calculated demands. It is rare for a renewable heating system of this type to be specified dedicated to pool heating, and usually at least some or all of the household demand is met, and the pool fed via tappings to a pool water heat exchanger (as above).

Secondary heating systems:

Solar - EPDM rubber or PE plastic sun mats.
Solar 'sun mats' can be installed on either flat or sloping roofs as long as there is enough space. Manufacturers advise at least 67% of the pool area as mat area, but from experience we suggest 100% as more realistic and 150% as an optimal area. Pool water flows directly through the black mats directly and heat it through the direct action of the sun. Sophisticated systems have motorised valves linked to sensors which cut the supply of the pool water when the sun goes in and the ambient temperature drops where the system would actually act as a radiator of heat as opposed to an absorber.

Solar - Evacuated tube.
Evacuated tube solar systems are rapidly overtaking EPDM and PE matting as they are more efficient

collectors of heat, converting the sun's energy into heat. Whilst they will collect much greater quantities of heat on long, bright, sunny cloudless days than they do on short cloudy dull days, as one would expect, the point to note is that as long as sunlight reaches them, they still work to a degree, and are not reliant on ambient temperature either. However, as the sun is such an unreliable energy source here in the UK, it should only be considered as a secondary system. Electrical running costs can also be mitigated as well as heating by partnering with solar photovoltaic (PV) panels.

Air/water heat pumps.

As above, but specified and used as a secondary system to capitalise on its most efficient performance when ambient temperatures are high and much usable heat can be extracted from the surroundings, but with a primary heat source taking over when conditions are not in its favour and the primary source becomes the more efficient heating mechanism.

Ground/water heat pumps.

A heat pump as above, but with heat taken abstracted from a deep borehole drilled at the site of the heat pump as opposed to the ambient air. Whilst the capital costs are much higher (the cost of drilling the borehole - typically between 80m and 200m deep - needs to be factored in), the source of heat at this depth is constant and therefore more reliable all year round, as opposed to ambient air.