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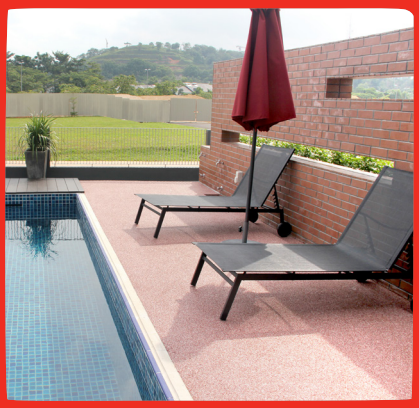
AQUATIC & LEISURE CENTRE DESIGN CONSIDERATIONS



An overview of the role flooring plays in aquatic & leisure facilities.

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Aquatic & Leisure Centre Design Considerations

Aquatic and leisure facilities need to be constructed as spaces where people can relax, exercise and be healthy – however if the building materials and design are not properly considered then the site can instead pose a long list of troubling health and safety risks.

From the potential for bacterial growth and the spread of microorganisms to the many slip and trip hazards that can arise from standing water and people walking around without shoes, a leisure centre needs to carefully analyse each aspect of its design in order to ensure that it will facilitate a clean, safe and fun environment.

This white paper will explore the crucial role that the floor plays in this regard, the regulations and standards that the floor finish will have to comply with and the types of solutions that are available to achieve this.

An Overview of Flooring Demands

Facility design is central to the prevention of drowning and other injuries, with surfaces in particular being a critical aspect of a building's safety and hygiene credentials.

The floor finish has many roles to play in order to be fit for purpose, with cleanability, durability, chemical resistance, drainage and slip resistance all being important criteria. Getting all of this right means carefully considering a long list of flooring aspects, including the texture of the finish, its colour and smoothness, the thickness of the coating and the junction between the wall and floor as well as access and egress points.

A common factor throughout any building that has a swimming pool is dealing with large quantities of water on the floor. This is obviously most likely on the concourse surrounding the pool, but also needs to be considered in the changing rooms, corridors, back of house areas and generally anywhere within splashing, dripping or spilling distance of the water.

Ponding water in any of these areas is a concern, as it could become a prime site for bacterial growth and contamination. This will be more likely if the floor is covered in depressions, gaps or cracks which will result in water stagnating in hard to clean places. If the floor does not properly drain, then a leisure

facility could run the risk of contaminated liquid finding its way into the main body of water – which would pose a very serious hygiene risk! The floor's colour and design plays both a safety and interior design role. Many site's will want a floor that complements the colours and visuals of the facility, making it a fun and engaging place for the patrons – especially in venues that welcome a lot of children. When choosing the colour of the floor it is important to ensure that the colours won't inadvertently hide contaminants or detract from important signage.

The facility may also choose to place safety or navigational signs on the floor. Where this is the case it needs to be done in a way that will survive all the water, foot traffic, chemicals and wear that it will face and the signage needs to be applied in a way that is clearly visible. Bright safety yellow against a pale background is a good way to guarantee that the messages, warnings, arrows or symbols will be seen.

Regulations and Resin Flooring

The Code of Practise for the Design, Construction, Operation, Management and Maintenance of Aquatic Facilities compiled by the WA Department of Health is very clear on the importance of building materials and design when it comes to swimming pools.

In fact, it specifically states that "aquatic facilities shall be constructed of materials that are non-toxic to humans under normal conditions of use, impervious, enduring, capable of withstanding design stresses, and provide a watertight structure".

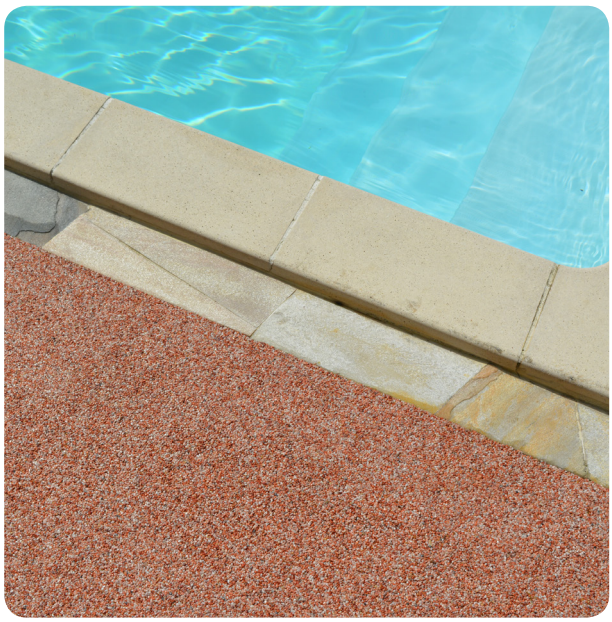
In addition to all of these points, the floor must also be "impervious, durable, easily cleanable and continuous, with no cracks, joints or protrusions other than structural joints". A long list of demands that rules out most types of flooring, even many hard-flooring materials! For example, unprotected concrete is not impervious and is prone to cracking, wood (even if treated) could pose a number of hygiene and safety issues, very smooth finishes such as marble or ceramic can be a slip hazard and tiles will incur joints for grouting.

For these reasons, seamless resin flooring solutions have become a popular choice among aquatic and leisure facilities due to the ability of these systems to satisfy the regulatory requirements and create fit for purpose surfaces that will provide many years of high performance functionality.

Slip Resistance

Slip resistance is a recurring point throughout the design regulations and best practise guides, therefore we've given this topic its own section to get to grips with the issue.

Appendix 6 in the WA Department of Health Code of Practise deals specifically with this issue and puts each area of a facility into



three different categories of slip resistance to ensure that the available friction is "sufficient to enable a person to traverse the surface without unreasonable risk of slipping" regardless of where they are in the building. The table also details the floor's angle of inclination to guarantee quick and effective drainage.

The categories are:
Category C covers the areas where slip resistance is most critical, including the stairs leading into the water, starting platform top surfaces and sloping pool edges. These areas need to have a minimum mean angle of inclination of 24°.

Category B includes the majority of floor surfaces in an aquatic facility, such as: pool surrounds, concourses and bulkheads; passages normally maintained in wet conditions that are used by barefoot staff or patrons; shower rooms; resting steps and benches and some types of pools. These areas need to have a minimum mean angle of inclination of 18°.

Category A surfaces don't require as much slip resistance, as there is less potential for a dangerous slip or trip. This includes: passages normally maintained in a dry condition that are used by barefoot staff or patrons; changing and locker rooms; and water body floors where the water depth is greater than 1.0 metres. These floor areas need to have a minimum mean angle of inclination of 12°.

To determine whether or not a surface meets the Code of Practise's required standard, the wet barefoot ramp test method is used. Alternatively, Standards Australia references a different testing method, the wet pendulum test, for determining if a surface is fit for purpose in a swimming pool or sporting facility.

The wet pendulum test is a common international benchmark which measures the dynamic coefficient of friction (CoF) in order to determine the potential for slipping on clean, dry or contaminated floors. The test does this by replicating a pedestrian heel strike, as this is what causes most slips to occur. When a heel hits a wet floor, a fluid film is created between the two points which can result in a slip.

This test has five different categories of slip resistance, with very smooth surfaces being at P1 and the most slip resistant finishes registering at P5. Standards Australia recommends that swimming pool ramps and stairs leading to water should be in the top P5 category, swimming pool surrounds and communal shower rooms need to meet at least P4 and both communal changing rooms and undercover concourse areas should come in at P3.

Around the Building

Flooring requirements in an aquatic facility are not just one size fits all, as there are many different types of rooms and spaces that need to be accounted for, all of which will require varying levels of hygiene, durability, aesthetic and longevity properties.

One of the highest priority floor areas is the concourse surrounding the pool, as this will inevitably be exposed to the most water and is where the risk of dangerous slips and falls is at its highest. Therefore, it is critical that an impervious, textured coating able to effectively drain is installed.

Along with all the other demands listed previously, the Code of Practise also states that "aquatic facility concourses shall be at least 1000 mm wide and of sufficient width to ensure the safety of patrons around the water body". Certain concourse areas can have even more specific criteria, such as walkways above ground level which must be fitted with a barrier to prevent falling.

Flooring Recommendation: A flexible polyurethane coating is ideal for the concourse areas around a swimming pool. Installed in one seamless application, this type of flooring material is completely impervious and it can be easily laid to a fall at the required angle, giving water no place to pond or hide away from the cleaning regime.

The textured finish of polyurethane systems enhances traction underfoot to give patrons and staff a slip resistant surface, no matter how much water is splashed out of the pool. Available in a wide range of colours, facilities can specify a polyurethane system that complements the site's interior design scheme. Changing rooms, shower rooms and toilets need to have floors that will help to stop the spread of unwanted contaminants, as there are many nasty bugs and bacteria that can easily spread in these wet conditions.

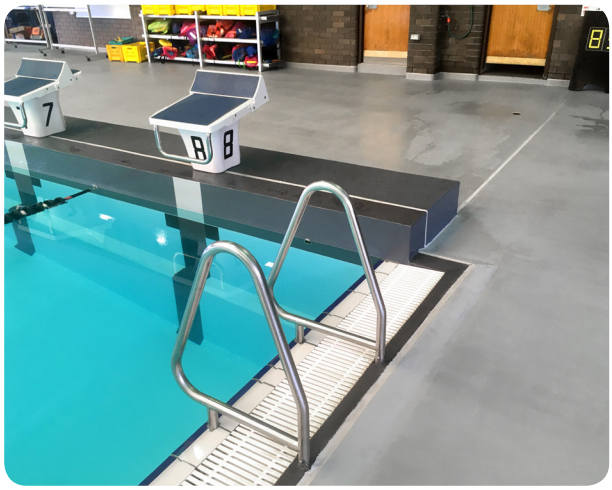
The severity of the problem was exemplified in an investigation into the outbreak of warts caused by papillomavirus in 221 students. This study concluded that the primary source of transmission was the changing room floor. Alongside papillomavirus, Pseudomonas aeruginosa has been found to colonise in the moist areas surrounding swimming pools and fungal species such as Trichophyton spp, Epidermophyton floccosum and Tinea pedia (otherwise known as athletes foot) are also known to pose an infection risk within shower rooms and changing rooms.

The NSW Government's Public Swimming Pool and Spa Pool Advisory Document advocates that floors in these areas should be as easy to clean as possible with a seamless finish that is coved at corners, graded and drained. The Ministry of Health's Code of Practise echoes these stipulations and states that the floor in these areas should be sloped to floor drains with a minimum grade of 1 in 50.

Flooring Recommendation: A high-build epoxy coating is suitable for these areas, as this type of flooring material can incorporate drainage into a seamless finish and be laid to a fall in order to facilitate the movement of water towards the drains.

Additionally, these areas require cleaning and disinfection on a daily basis and epoxy floors are able to withstand sustained levels of washing and scrubbing. Epoxy systems won't deteriorate in the face of corrosive cleaning chemicals, which means that the facility's operators can rest assured that the floor will remain hygienic and functional in the face of these chemicals.

Special aggregates can be added into a resin floor to increase slip resistance. The amount and size of these aggregates can be tailored to increase or decrease the level of slip resistance. As a heavily textured surface is more difficult to clean than a smoother one, this can be a useful advantage in areas that might have



different cleaning and slip resistance priorities. By using epoxy systems, the specified coating doesn't need to change in different areas, just the amount of aggregate broadcast into the floor's resin matrix.

Matting materials made from easy to sanitise materials, such as PVC, are good to place on the floor finish for changing rooms and shower rooms to prevent the transmission of fungal infections. The wearing of sandals or thongs should also be encouraged to help stop patron's coming into contact with wet, potentially contaminated changing room floors. Further out from the swimming pool surrounds, some aquatic facilities will have stands, seating and spectator areas. The floors in these areas will face different challenges than those around the swimming pool, as instead of large quantities of water this part of the building will need to present a clean, attractive and safe finish for an extended period of time despite heavy foot traffic, scuffs, scrapes and scratches. Flooring Recommendation: A polyurethane flooring system, including those with additional moisture tolerant properties, will protect the underlying concrete from any water and abuse and will provide an easy to clean, colourful surface that won't dust, crack or degrade when faced with large numbers of spectators sitting, standing or cheering.

As we can see in this white paper, there are both commonalities but also key differences when it comes to flooring in each area of an aquatic facility. While water exposure and bacterial growth are top priorities, they will vary in importance across the site and so different coatings will be required for the different areas that take into account the specific demands of the location in question.

This guide has been produced to provide an overview of the role flooring plays in aquatic and leisure facilities.

Detailed recommendations and advice are available from our network of regional technical and sales representatives.

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