

WHITEPAPER




HOW TO ACHIEVE PERFECTION IN MULTI-STOREY AND UNDERGROUND CAR PARK PROTECTION



An overview of the correct specification of waterproofing and surfacing materials within the car park environment.



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How To Achieve Perfection in Multi-Storey and Underground Car Park Protection

Although often underestimated, the correct specification of waterproofing and surfacing materials is critical, within the car park environment, to delivering a long-term, structurally protected and safe facility for car park operators and vehicle owners.

The most suitable deck coating materials will largely depend on where within the multi-level or underground parking facility they are to be installed as well as the conditions to which the material will be subjected.

This can range from slip-resistance, durability and service life requirements through to temperature cycling, UV exposure and any problematic existing substrate conditions as well as any anticipated movement within the structure.

Parking has become a vital part of today's mobile world with more vehicles on the road than ever before. As a result, the demand for parking is at an all-time high with vehicle owners searching for secure and safe environments to house their vehicles when they are without them.

Car Park Deck Coating Materials

The car park is often the first point of call for a visitor to any public, private or commercial venue. It is the "front door" of the building, while at the same time serving its primary

functional role. There is no doubt that initial appearance, ease of use, signage, bright lighting and clear directional marking all help to make a car park a more positive and safer environment.

As new build multi-storey and underground car parking structures are more frequently adorning the urban landscape so too are older structures being refurbished to meet both modern design and safety requirements.

One critical design consideration is the deck coating material chosen to protect the reinforced concrete structure, in order to protect against the ingress of water as well as corrosive de-icing salts and other pollutants.

Epoxy and polyurethane resin based car park decking and wearing systems are most common although acrylic (MMA) systems, which offer fast cure installation in order to keep disruption to car park operations to a minimum during renovation, are increasingly being specified, particularly in refurbishment situations.

Resin systems are installed at various thicknesses dependent on the specification, not only to protect the substrate but also to As new build multi-storey and underground car parking structures are more frequently adorning the urban landscape so too are older structures being refurbished to meet both modern design and safety requirements.

Why Choose a Protective Resin Deck Coating System?

Car parks, like no other structures, are subject to unique conditions, which demand deck coating systems proven beyond doubt in the protection of buildings subject to multi-traffic movement.

Applied coatings, whether on the wall, deck or soffit, must perform to meet the most stringent of criteria if they are to succeed in their primary function of car park protection.

Non-protection of any car park, will inevitably lead to long term maintenance programmes, increased operations costs and in extreme cases, deck failure.

TIP:

Material with a light reflective finish can help to brighten internal decks.



The following addresses various selection criteria that must be considered before selecting, specifying and installing a protective car park deck coating solution:

Structural Movement

The nature of car parks demands that they are constructed with large clear spans with a minimum number of supporting columns, in order to achieve the maximum number of parked vehicles. This type of construction, when subject to cyclical traffic flow, inevitably leads to the structure being susceptible to flexing and movement.

A high volume of vehicles traversing a car parking structure over time can lead to dynamic loading, where vibrations impart through the decks into the structure, increasing the risk of movement across all construction, expansion and movement joints within the frame of the structure and decks themselves.

In order to counteract the risk of dynamic loading, flexible, crack-bridging polyurethane based deck coatings systems are often used to move alongside the structure, preventing any long-lasting damage to the surface or the building itself.

Thermal Variations

Often fully exposed to the environment, car parks are subject to high temperatures, extreme sunlight, UV exposure, low temperatures, freezing and thawing, high levels of rain and extreme temperature fluctuation.

All of these can impact negatively on the fabric of the structure, imposing dynamic stresses, which will inevitably lead to the early cracking of the host concrete and potential structural failure.

Again, specialist resin-based deck coating systems act as a protective coating by accommodating thermal movement in order to prevent thermal cycling over 24 hours or seasonal change from posing lasting damage.

Abrasion & Wear

Significant traffic exposure can lead to extensive mechanical wear and abrasion of the surface, which is naturally increased on car park ramps, turning circles as well as vehicle loading and unloading areas. This is also true to a lesser extent of pedestrian exits and entrances from the car park into a commercial venue as well as at elevator waiting areas.

As a result, the specified deck waterproofing and wearing surface system must have a skid resistance and abrasion resistance profile that is suitable for the exposure of the area in question (see Figure 1). Using positively textured aggregates, the anti-skid profile of the surface can be increased in areas of high stress.

Area within the Car Parking Structure	Traffic Exposure
Pedestrian Walkways	Low
Lift & Escalator Areas	Low
Main Aisles	Medium
Car Parking Bays	Medium
Ramps & Turning Circles	High
Loading / Unloading Areas	Very High

FIGURE 1: Traffic Type Breakdown in Car Park Environments: FeRFA Guide to the Selection of Deck Waterproofing for Car Parks.

Chemical Exposure

Airborne water, de-icing salts and automotive fluids; anti-freeze, battery acid, AC fluid, diesel and petrol as well as toxic gases from exhaust pipes are all examples of aggressive chemicals and pollutants to which the car parking structure is exposed.



TIP:
Heavy-weight, hardy PU systems work best on exposed roof-top decks.

Highly resistant polyurethane resin-based deck coatings can be used to prevent the early onset of corrosion, providing a protective barrier between the contaminants and the host substrate.

UV Radiation / Sunlight Exposure

The top deck of any car parking structure is its most vulnerable area. UV radiation on exposed top deck parking levels can be very aggressive and is one of the biggest causes of deterioration, discolouring and premature ageing of protective car park coating materials.

To withstand such deterioration a heavy-duty, UV-stable and elastomeric waterproofing system is required. Double the thickness of most material recommended for internal decks, this heavy weight polyurethane provides the durability and elastomeric capabilities required to take on the tough conditions at the top of the car park.



Existing Substrate Condition

The condition of the existing substrate will play a significant role in determining the correct protective deck coating system to install within the specified car parking facility. The moisture content and surface profile of the existing concrete must be thoroughly examined in order to determine if specialist treatments or membranes are required prior to the installation of the resin-based decking system.

Equally, in a refurbishment situation, the existing surface must be examined for any deck contamination brought about by chemical exposure or spillage as well as any pre-existing cracks. Where possible, any deep cracks will need to be filled with a flexible resin, over-banded with an additional elastic membrane or reinforced prior to the application of the final deck coating system.

Service Life & Durability

The service life and durability of any protective car deck coating material is a primary concern at specification stage as car park operators look towards the financial implications

and cost of any future closures of the car park for maintenance re-waterproofing or refurbishment works.

Correctly specified systems that properly address the service criteria of the area in question as well as any that may apply in the future can assist in extending the lifespan of the structure.

Drainage

Water ingress into the fabric of the car parking structure can have devastating consequences as can “ponding” particularly in sub-zero conditions. In order to prevent “ponding” or “pooling” of water, adequate provisions must be made for rainwater collection, drainage and removal from the facility.

Falls and specialist drainage systems must be incorporated into both internal and external deck floor details in order to deal reliably with high volumes of precipitation; easily coping with rainwater or snow that collects on cars and wheel arches as well as the inevitable dirt that accumulates along the way.

Aesthetics

Pigmented resin coating systems will transform a parking structure; protecting it over time whilst simultaneously brightening up the environment.

With the addition of colour and improved lighting levels as a result of the materials' reflective properties the overall ambience of the car park can be enhanced, making it a safer and brighter place for people to park.

Coloured line marking products can also be installed in conjunction with resin based solutions to define both pedestrian and vehicle areas, ensuring the safety of both people and cars by regulating traffic flow and pedestrian movement.

Likewise, specialist signs or signals can be placed on the surface of the car park to guide vehicle owners to designated bays or areas.

The design of multi-storey and underground car parking facilities must take into account a range of aggressively corrosive conditions at new-build or refurbishment specification stage in order to get the most out of their design lifecycle and ensure a service life free from major repair or early renovation.

This guide has been produced to give an overview of the factors to consider when specifying resin based car park deck coating materials within a multi-storey or underground car park setting.

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

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