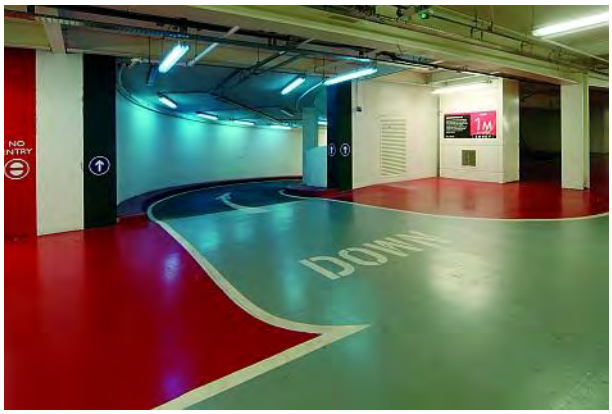
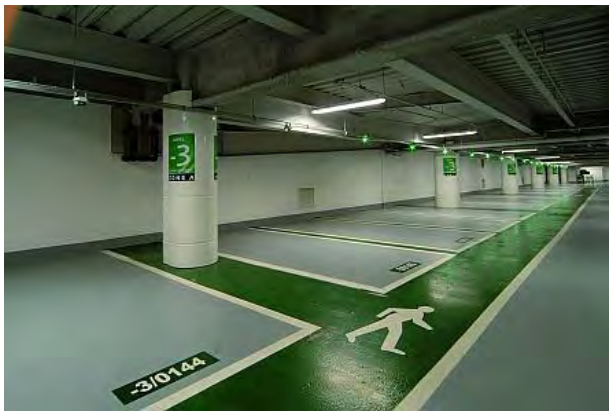
FeRFA GUIDE TO THE SELECTION OF DECK WATERPROOFING AND WEARING SURFACES FOR CAR PARKS





FeRFA Guidance Note No. 9

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1. INTRODUCTION

The aim of this Guide is to help car park owners and their professional construction consultants to make the right decisions in assessing car park condition and requirements, then in selecting the most appropriate and cost effective deck waterproofing and wearing surface systems. This applies equally to new car parking structures and the refurbishment of existing car parks, including the different areas within them both, where special considerations and potentially different treatments may also be required.

This guide does not generally relate to Asphalt car park decks or existing decks overlaid with any form of asphalt unless the asphalt is to be removed and replaced with a modern synthetic resin based system. Asphalt can have substantial variations in its composition, thickness and physical properties and therefore it is not usually recommended that such material is overlaid. Certain systems from FeRFA members can be installed over well prepared asphalt surfaces and project specific advice should be sought.

The advice given in this Guide is on the basis that the car park structure and its decks are of sufficient structural design and load bearing capacity. With existing structures a professional Condition Survey must always be undertaken by suitably qualified and experienced people, including a Structural Engineer's Assessment, to determine the precise nature and extent of any damage or defects. Any structural damage or defects must be repaired and rectified and/or made good prior to commencement of the deck coating works in accordance with EN1504, the current and relevant standard for concrete repair.

2. DESCRIPTION

Reinforced concrete and steel framed multi-storey car parks usually have reinforced concrete decks that are exposed to a wide range of aggressive influences. These decks need to have adequate protection to meet their service life requirements, safely maintain their function and increasingly to also contribute to providing a secure and attractive environment for visitors or residents.

Preventing water penetration in or through car park decks is of prime concern to owners, operators, and users. In addition to the potential damage and deterioration water ingress can cause in the structure (see 4.3d) below), water can create dangerous slippery conditions for pedestrians and drivers or leach soluble aggressive alkaline materials from the concrete and these can cause damage to car paintwork.

Resin based car park decking and wearing systems are most commonly available in epoxy (EP), polyurethane (PUR) and acrylic (PMMA) types or hybrid blends which have some common characteristics as well as specific properties depending on their formulation. They are generally installed as thin multiple layer (1-6 mm) aggregate dressed coatings to offer protection, improved aesthetics and safety to reinforced concrete parking structures.

3. AREAS OF SPECIAL CONSIDERATION

There are some areas of reinforced concrete decked car parks that always require special consideration and additional or alternative treatment in both new construction and refurbishment works. These include:

3.1 Ramps

The ramps for access in, up, around and out of a car park are potentially subject to increased mechanical abrasion and vibration from traffic; they are at least partially externally exposed to weathering and rainwater; they will collect de-icing salts from vehicles entering the car park – in addition to any salt used by the car park operator; plus they can have complex / substantial movement in joints connecting ramps with the rest of the structure and parking decks. Therefore ramp areas demand special consideration and treatment with regard to these aspects. A higher system thickness and performance specification for the ramp areas is normally appropriate.

Additionally the application of resin materials on a slope can be problematic due to their flowing properties that are an advantage on 'flat' areas such as the decks. Therefore it is also important to select and specify a system with a sufficient thixotropic nature for slump-free application, when applied and broadcast with aggregates on ramps, whilst still maintaining its required abrasion resistance and crack bridging properties.

3.2 Turning Circles

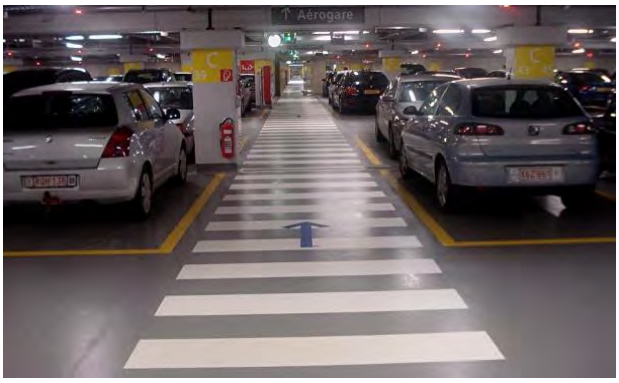
The reasons for special consideration of Turning Circles can be similar to those of the Ramps apart from the slope. Dependant on the design of the car park and the size (radius) of the turning circles, these areas may be subject to

increased stress and require additional protection – This will usually be somewhere between the performance of the systems appropriate for the decks and the ramps, so this requirement must be clearly determined and then detailed in the specifications.

3.3 Exposed Decks

It is clear that exposed decks will have the highest external weathering exposure to the elements and are therefore likely to be subject to the highest levels of thermal movement, thermal shock and UV light radiation. The anticipated effect this exposure on the structure and the decks must be fully considered and appropriate systems selected and specified for the exposed and partially exposed decks.

3.4 Intermediate Decks



The intermediate decks of a car park are likely to have the lowest level of thermal movement, thermal shock and UV radiation. Therefore these aspects must be considered but it may, for example, be possible to use a more rigid (non crack-bridging), lower thickness, lower cost resin system; dependent of course on the other selection criteria, particularly the position and condition of joints and any cracks in the decks.

The Structural Engineer should always confirm these details and requirements.

3.5 Below Ground Decks

Below ground decks and to a lesser degree, decks at ground level without lower levels, can be subject to water or vapour penetration from below if there is inadequate or limited provision for waterproofing in the structure.

As a result it is highly recommended that a below ground car park always has an emergency pumped drainage system installed and that either:

- a vapour permeable deck system should be selected
- a suitable moisture barrier must be applied to allow a vapour tight system to be installed without risk of osmotic blistering or delamination from the surface.

The owner together with their project team must make this decision and many FeRFA Members also have considerable expertise and experience in both below ground waterproofing, and the design and installation of deck coating systems on below ground car park decks in these situations. They will be happy to assist in this decision making process.

3.6 Decks over Residential / Commercial Premises

When car park decks are directly above residential or commercial premises there may be additional criteria such as thermal insulation to consider. In addition, there is normally no chance of access to the deck soffit for inspection and maintenance and any water ingress would cause unacceptable disruption and be extremely expensive to repair. Therefore in these situations it is prudent to ‘err on the side of caution’ and ensure that an extremely crack-bridging and durable deck coating system is used, possibly overdesigned, even if these are non-exposed or intermediate decks in the structure, as the costs of rectification of any leaks and damage can be punitive.

Frequently FeRFA members recommend fabric reinforced resin systems in these areas; the resin system is reinforced with a layer of suitable fabric, to ensure that its cohesive and tear strength is even higher than the bond strength to the primed substrate. This will ensure that in the event of any excessive movement, the system is able to spread the stress and accommodate this across the widest area, without allowing any liquid penetration to the deck or the sensitive areas below.

Please discuss specific system requirements with the manufacturers.

4. SELECTION CRITERIA

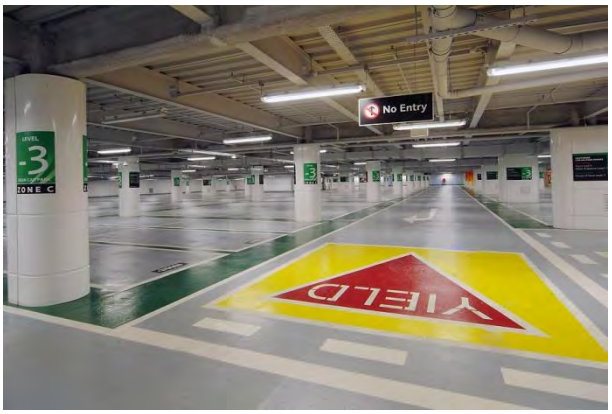
The selection of the most appropriate deck waterproofing and wearing surface system is dependent on

- the condition of the structure and the decks
- the existence of any previous surfacing treatments and their condition
- the anticipated future level of use and exposure
- the sustainability of the products and system components used.
- the economic constraints of the owner

There are several important differences between the requirements, system selection criteria and the application of the right deck waterproofing and wearing surfaces for new and refurbishment projects.

4.1 New Car Parking Structures

In a new car parking structure the concrete decks will tend to be flat and level, laid to the correct falls, without serious or extensive surface defects or damage and the movement joints are usually correctly located; therefore the concrete surfaces can easily be prepared to accept a protective surface treatment (vacuum blast cleaning is usually the preferred method). This results in a uniform, coarse sandpaper like texture that is ideal to accept the relatively thin deck waterproofing and wearing surfacing systems, which are normally 1- 6 mm thickness, according to the deck's exposure and the owner's requirements.



The potential additional costs of future refurbishment during the service life of the car park, together with the possibility of very serious damage if inadequately protected, make it essential to ensure the protective treatment of new car park decks is fit for purpose. This will minimise the structure's future maintenance requirements and its whole lifecycle costing, in order to obtain the maximum service life with minimum periods of closure for maintenance at the lowest overall cost.

4.2 Refurbishing Existing Car Parking Structures

In refurbishment situations the concrete deck is frequently already contaminated and damaged, sometimes severely, plus the concrete surfaces will have been attacked and their profile roughened, increased by spalling/scaling due to freeze-thaw damage. This is accelerated by de-icing salts brought into the structure on vehicles, or used to maintain safety on ramps, turning areas and stairways. This means the concrete surfaces will generally need more aggressive preparation to remove the damaged, contaminated or delaminated concrete. Therefore this mechanical preparation (still using vacuum blast cleaning technique where possible due to its effectiveness and efficiency) will necessarily have to be harsher than would be required on new concrete surfaces. This will result in a greater profile depth and roughness, which in turn will need to be made good and levelled appropriately as an additional operation prior to, or as part of, the new deck waterproofing and wearing surface system build-up.

As a minimum this additional profile will greatly increase the consumption of the priming and / or intermediate coats that are required to provide a uniform surface for application of the waterproofing / wearing layer(s) – particularly if the system has to be designed with crack-bridging properties. Levels and falls to drainage outlets may also need to be made good and any cracks in the surface sealed, or their movement accommodated with additional joints or a crack-bridging surfacing system. Broken or damaged joint arrises will frequently need reforming. All of these different and variable factors have an obvious and considerable effect in increasing the cost of a car park's refurbishment.

4.3 Typical Stresses and Exposure on a Car Park Deck

4.3.1 Traffic Vibration of the Structure

The movement of vehicular traffic over, across and around a car parking structure creates dynamic loading which impart vibrations through the decks into the structure. These vibrations can increase the frequency and extent of movement in and across all types of construction and movement joints in the car park structure and decks, plus they can also increase the flexural movement of the decks – possibly increasing the requirement for crack bridging systems to be used in their surface treatments. The extent and effect of this dynamic loading and vibration is dependent on the design of the car park and its supporting structure.

4.3.2 Thermal Movement and Shock (in both hot and cold conditions)

According to their location and level of exposure to sunlight and weathering, car park decks can be subject to considerable thermal movement during a 24 hour period, between sun radiated daytime highs and clear night time lows. Thermal shock can occur even faster in sudden rainfall, with consequent rapid temperature drops on the deck surface – up to 30°C in a short time is possible (even in the UK climate) – For example this means a 10m length of 150mm thick car park deck can 'shrink' horizontally across its surface by up to 30mm and within an hour.

Contrary to popular misconception, movement joints in the decks are at their widest at the lowest temperatures and this also is when construction or daywork joints are most likely to open and cracks can occur. This capability for thermal movement must also be accommodated by the deck surfacing system selected.

Note: Bitumen / asphalt based materials are generally not able to meet this requirement and this is the cause of failure in many traditional waterproofed decks.

4.3.3 Mechanical Abrasion and Wear

Vehicular traffic causes mechanical wear and abrasion of the surface, which is naturally increased on the car park ramps and in turning areas. The potential damage from this wear and any associated impact is also increased on the joint arrises, drainage connection, or where the profile of the surfacing is already roughened and increased due to previous damage (e.g. from freeze thaw scaling), or where the profile has been deliberately increased to provide improved skid or slip resistance. This is not generally recommended by FeRFA due to the reduction of cover (to reinforcing steel) and increased risk of water penetration. The deck joints and drainage connections must be level and repaired where necessary prior to the deck coating works. The deck waterproofing and wearing surface system selected must have a skid resistance and abrasion resistance that is suitable for the exposure.

4.3.4 Water & Water Carried De-icing Salts

Water and water carried de-icing salts can create considerable damage in a reinforced concrete deck and structure, in addition to creating dangerous, slippery conditions for pedestrians, or damage to car paintwork due to leached calcium salts. This includes 'physical damage' to the concrete surface which on most untreated or inadequately treated decks is primarily due to scaling from freeze-thaw attack, but also loss of strength by cement leaching, often evidenced and seen as heavy localised efflorescence and calcium salt staining on the soffits – even as stalactites in some badly deteriorated car park structures, plus damage to the electrical equipment can also occur. 'Damage due to reinforcement corrosion' can be particularly serious, even leading eventually to structural failure and collapse in several well documented cases. All of these causes of damage and detailed recommendations to prevent or protect against it, are clearly explained in the latest series of European Standards EN1504, particularly EN 1504 Part 2: Surface Protection Systems for Concrete Surfaces.

The prevention of water and water borne de-icing salt ingress into a reinforced concrete car park deck and structure is therefore a primary requirement for long term durability and financial viability. This is the main reason for the selection and use of a specialist car park deck waterproofing and wearing system. It is also the reason that a crack-bridging system, with sufficient dynamic movement capability, should be selected where traffic vibration, or thermal movement are possible, as water and salt penetration will occur and penetrate more deeply where there are cracks and partially dynamic moving cracks, through the surface. The correct detailing of the waterproofing system around any surface penetrations such as joints and holding down bolts for barriers or equipment is also critical for durability.

4.3.5 UV Radiation / Sunlight

UV radiation from sun light on exposed car park decks is very aggressive and it is the main mode of deterioration and premature ageing of many car park deck sealing and waterproofing systems, including all bitumen and resin based surfacing materials. The result of this deterioration can vary according to the specific material and type of system / products used and this can include discolouration and yellowing, embrittling, bleeding and surface cracking or even gradual 'powdering' disintegration and erosion. All of these could have serious durability implications for exposed decks, therefore the UV resistance and performance requirements must also be clearly defined for surfacing in any exposed deck areas, including the partially exposed areas with open facade sections, in order to select the most appropriate deck surfacing system.

4.3.6 Automotive Chemical Spillage

Whenever cars and other motor vehicles are parked for long periods there is the possibility of leaks and spillage of different automotive fluids including fuel – petrol and diesel, engine oils, coolant and screen wash, etc., plus what is probably the most aggressive to synthetic resins and coatings – hydraulic oils such as brake fluid. The resistance of the proposed deck coating system and its component products, to these different chemical media which can also be damaging to concrete, must therefore be confirmed.

4.4 Criteria for Selection

The following may not be exhaustive or necessary for every structure, but is intended as a guide that should be considered before selecting, specifying and proceeding with the Deck Waterproofing and Surfacing of reinforced concrete decks in car parking structures.

4.4.1 Cracks

Checks should be made to see if there are any cracks in the deck, in the top surface of the deck and if possible to view, in the bottom of the deck slabs / soffits i.e. do the cracks go right through the deck? If cracks exist, are they of structural significance and what originally caused them? Are the cracks still moving and if so by how much? A Structural Engineer should always confirm these details and any structural significance they might have, in order to determine the correct treatment and detailing required. This can include pre-filling with flexible resin, over-banding with an additional layer of the elastic membrane, or the addition of fabric reinforcement over the area. This additional work is usually best completed before or within the new deck waterproofing system application procedure.

4.4.2 Joints

Is there adequate provision for any required movement joints in the deck to accommodate thermal movement, dynamic loading and any other anticipated structural movement? How have the daywork / construction / isolation joints in the concrete decks been formed and previously treated? Are these all securely and safely sealed for the future or additional joint pre-treatment and sealing required?

4.4.3 Drainage

Is there adequate provision for rainwater collection, drainage and removal from the structure? How have the drainage details been incorporated into the deck and sealed at their junction with any existing or proposed deck waterproofing membrane? Is there evidence of past or current 'ponding' or 'puddling' of standing water on the deck surface? i.e. are there inadequate falls for the required drainage requirements or must work be carried out to reinstate these with a cement or resin based screed for example? Ponding of water due to inadequate falls would lead to future dangers for users, particularly in freezing conditions, and it would increase the potential for ingress into the structure.

4.4.4 Surfacing Permeability Requirements

Is the deck below ground level or at ground level? Is there a secure and intact damp-proof membrane (DPM) installed between the concrete structure and the ground? Does water vapour need to be able to escape through the new surfacing? If this is the case, then any proposed deck waterproofing and wearing surface must be waterproof, but water vapour permeable, in order to allow this vapour to diffuse and escape.

4.4.5 Concrete Surface Profile

What is the surface profile of the existing or specified concrete surface and how is it to be achieved? Is the surface profile suitable to accept a resin waterproofing and wearing surface, or does it need additional surface preparation or remedial falls creating by laying a screed, or if localised damage exists, surface patch repair and levelling as a preliminary operation?

4.4.6 Deck Contamination

Has there been any exposure or spillage on the decks which could affect the adhesion or performance of the new surfacing system? (i.e. automotive fluids including fuel – petrol and diesel, engine oil, grease, brake fluid, or chlorides from de-icing salts). As a result, additional surface pre-cleaning prior to the mechanical surface preparation of the concrete is required prior to accepting a new deck surfacing system.

4.4.7 Concrete Moisture Content

In both new and existing concrete decks the moisture content must be at an acceptable level, which is generally defined as not more than 4% parts by weight (pbw), before a new resin surfacing system can be applied. This could be from residual water after hydration in the concrete, water ingress from the ground or water penetration after rainfall. Whatever the source, the water must be allowed to evaporate and the concrete must dry out before the deck coating system is applied. Alternatively an effective moisture barrier, or a surfacing system that is vapour permeable, should be used to allow the moisture to evaporate over time as water vapour.

Water vapour permeable deck waterproofing and wearing surface systems have been specially developed and are available from FeRFA Members.

4.4.8 Future Use – Traffic Type and Level

What is the intended future level of traffic in each area and also within each deck of the car park? This can effectively be evaluated and summarised for the different areas as follows in order to develop the necessary performance requirements, bearing in mind that durability is directly proportional to system thickness which is adequately categorised by FeRFA type and BS8204.

Pedestrian only	Low
Main Aisles and Car Parking Bays	Medium
Ramps and Turning Circles	High
Delivery Vehicle Parking / Turning and Unloading Areas	Very High

4.4.9 Future Thermal Exposure – i.e. Externally or Internally Exposed?

Exposed decks are subject to much greater thermal movement possibilities due to their wider temperature exposure range (-15 to +40°C is not uncommon over the year throughout much of the UK – see Section 4.3b above). This degree of movement means that many exposed deck surfacing systems must be designed to be not just flexible, but sufficiently elastic to accommodate the Structural Engineers anticipated levels of movement in the deck surface. The use of light coloured surfacing externally can also help to considerably reduce the 'heat island effect' and reduce the higher limits of temperatures attained in the summer months, always provided they can be kept clean and do not discolour with UV light. The significance of thermal shock from sudden rain or hailstones is that the movement can take place in a short time and therefore this capability must be ensured (see Section 4.3.2)

4.4.10 Future Chemical Exposure (Auto fluids etc)

Will the deck be subject to direct water and de-icing salt exposure and therefore potential freeze thaw damage and if so, to what degree? What level of resistance to automotive fluids or other possible spillages is required? (ie. petrol and diesel, engine oils and brake fluids) (See Section 4.3.4 and Section 4.3.6 above).

4.4.11 Colour and Design

Is there a modern environmental deck colour design scheme in place to upgrade and establish a specific ambience or increased level of light and security in the car park? This is usually undertaken in conjunction with lighting upgrades and other user improvements in the facilities i.e. wall coatings, soffit coatings, signage and security. Many FeRFA Members are very experienced in this field and can frequently provide very useful additional advice to owners and their designers to support increasing visitor numbers and visitor satisfaction.

4.4.12 Service Life / Durability / Maintenance

What is the desired service life and durability of the structure and the deck surfacing to first maintenance? How easy is it to close or restrict access to each area for maintenance purposes and possible re-waterproofing in the future? The durability required and the possibilities and costs of future closure and maintenance are probably the biggest decisions for the car park owner.

4.4.13 Fire Performance

Fire resistance in accordance with BS476:Part 3: Designated EXT.F.AA

4.4.14 Health & Safety

All resin flooring/deck waterproofing products should be laid in accordance with the manufacturer's recommendations with regard to handling, storage, mixing and laying. A risk assessment should be undertaken to indicate requirements for Personal Protective Equipment (PPE) specific to the application and working environment.

4.4.15 Penetrations

Any other penetrations through the decks, such as holding down bolts or brackets for barriers and equipment, handrails, plus connections around drainage details must also be assessed, correctly detailed and securely sealed to prevent water ingress.

4.4.16 System Sustainability

There is an increasing environmental awareness and a drive for ecology and sustainability from the Government's Low Carbon Transition Plan for construction, new international limitations/agreements, and programmes such as BREEAM (The UK's Building Research Establishment Environmental Assessment Method), LEED Certification (Leadership in Energy and Environmental Design), and from the international members of USGBC (United States Green Building Council including members from Europe, the UK and elsewhere).

Sustainability is therefore becoming an important consideration when selecting surfacing materials for car park decking. In essence this involves the assessment and reduction of the environmental impact of the systems including their source, processing, installation, service life expectancy and their eventual recycling possibility. Sustainability relates to material waste reduction and packaging recycling versus disposal. Resin car park decking systems are laid insitu, resulting in minimal material wastage. FeRFA is a signatory to Halving Waste to Landfill, with agreed targets for reduction of waste to landfill, and operates a recycling scheme. For more information please refer to the FeRFA Environmental Guide, the FeRFA Recycling Scheme, and information from your selected FeRFA member.

5. SYSTEM PERFORMANCE AND SPECIFICATION REQUIREMENTS

From the Typical Stresses and Exposures (Section 4.3 above) and the Criteria for System Selection (Section 4.4 above), the characteristics and performance properties of a car park deck waterproofing and wearing surface can be specified and detailed for each different area and deck. This can be done generically or by defining the specific requirements and a specific product or system that meets these performance criteria as confirmed on their respective product data sheets or by the respective manufacturer in writing.

Additionally the materials should also be assessed physically, specified and measured on site as follows:

5.1 System Thickness and Build-up

The total system build-up and its individual components should always have a minimum thickness specified and measured, in order to perform in accordance with the relevant manufacturer's technical data sheet(s) and their independent test results, to meet the specified performance requirements in each area. This has cost implications and if not fully detailed in the project specifications and then physically monitored and recorded on site, it is unlikely to be achieved. Therefore fully detailed project specifications and Quality Control procedures are essential for success.

It is unlikely that a material thickness of less than 1mm will provide an effective seal and surfacing system, even on a car park deck that is not subject to movement and has no cracks. This is due to the concrete surface profile that will be obtained during the necessary mechanical surface preparation, plus the need to use sufficient material to hold or encapsulate any aggregates added for increased slip or skid resistance.

A crack-bridging system to accommodate deck movement will normally comprise multiple layers, after any necessary surface repair and levelling. Any layer intended to bridge cracks as a membrane must have a consistent thickness to allow it to achieve its intended elastic or crack bridging behaviour and for this reason preparation combined with initial priming layers should achieve a plane surface free from high spots which would otherwise cause thinning of the membrane layer.

A typical build up is described below although different systems from FeRFA members can vary.

First Layer - Penetrating / Sealing / Levelling Priming Coat

Second *Layer* - Elastic, crack-bridging, waterproof layer (usually a minimum thickness of 1mm of this layer is required to bridge static cracks of ≤0.5mm and live active cracks with dynamic movement up to ≤0.3mm)

Third Layer - First wearing surface layer (with or without incorporated or broadcast slip resistant aggregates)

Fourth Layer - Second wearing surface layer (with or without incorporated or broadcast slip resistant aggregates)

This usually means that the total minimum thickness for such a crack-bridging system will be a minimum thickness of 4-5mm, dependent on the depth of the concrete surface profile and the size, shape and granulometry of the non-skid aggregates incorporated or broadcast into the wearing surface layers (the elastic, crack-bridging, waterproofing layer should never be broadcast or have aggregates incorporated, as this will reduce its movement capability).

5.2 Crack-bridging capability

A crack-bridging system must be capable of fully accommodating rapid cyclical movement, particularly at low temperatures without splitting. The relevant standard which describes interpretation of this data is EN1504 which references EN1062-7 'Coating materials and coating systems for exterior masonry and concrete Part 7: Determination of crack bridging properties' as the standard for determining the crack-bridging performance.

Requirements for individual structures in defined locations and conditions of exposure may vary according to the Structural Engineers recommendations.

5.3 Skid resistance

Skid resistance performance of wearing surface systems for externally exposed car park decks is also assessed in accordance with BS EN1504-2 and the decks should generally be Class III for normal UK conditions. The FeRFA guide "Assessing the Slip Resistance of Resin Floors" should be referenced in this respect.

6. CAR PARK DECK SYSTEM SELECTION – PROJECT CHECKLIST

To assist in the evaluation and selection of the most appropriate system a separate evaluation should be made for each deck of the car park as follows:

SELECTION CRITERIA	CHECK LIST
Condition survey report	Contamination, Repair / Strengthening Requirements, Concrete Surface Profile, Moisture Content, Surface Preparation
Future Use – Level of Traffic	Low, Medium, High or Very High
Durability – Life to first maintenance	Service life required, access and closure possibilities, closure costs
Joints	Movement / Expansion, Construction – Daywork / Connection / Isolation
Cracks – Existing and Potential	Width, depth, length, measured movement, existing contamination, arris condition, structural significance
Drainage Details	Falls, connections to outlet gullies / channels / scuppers / drainpipes
Penetrations	Holding down bolts, electricity supply cables, fixings for equipment, handrails, barriers
Crack-Bridging Capability	Thermal movement, thermal shock, structural movement and settlement, dynamic loading and traffic vibration
Abrasion and Wear Resistance	Impact, traffic type and volume
Slip Resistance / Skid Resistance	Pedestrian safety, vehicle safety (especially in wet and freezing conditions)
UV Radiation	Exposure to sunlight
Behaviour in Fire	Closed environments, surface spread of flame, emergency exit strategy & routes
Colour and Design	Environmental improvement, security and safety, ambience, user attitude improvement
Sustainability & Environmental Requirements	Surface preparation residues (dust), materials and packaging waste dispersal and volume, VOC / solvent contents. Site management waste plan to include collection, recovery and recycling of all waste packing and materials.
Areas for Special Consideration	Ramps, Turning Circles, Exposed Decks, Intermediate Decks, Below Ground Decks, Decks over Commercial or Residential Premises.
Health & Safety	Manufacturer recommendation regarding PPE requirements, check ventilation on intermediate decks and basement car parks prior to application.

7. GLOSSARY OF TERMS

Terms commonly used in relation to car park decking:

Crack bridging: ability of resin coatings/mortars to span dynamic or static cracks
Wearing surface: the upper layer of a surface
Dynamic loading: physics relating to forces that produce motion
Joint: formed discontinuity in either the whole or part of the thickness of a screed or slab
Relative Humidity: the ratio of the amount of water vapour in the air at a specific temperature to the maximum amount that the air could hold at that temperature, expressed as a percentage. Testing for relative humidity measures the concentration of water in the substrate.
Substrate: the underlying material to which a finish is applied
Moisture: water or another liquid that causes dampness

8. FeRFA PUBLICATIONS

All the FeRFA publications listed below are freely downloadable from FeRFA's web site at www.ferfa.org.uk.

- Guide to the Specification and Application of Synthetic Resin Flooring (RIBA CPD Approved)
- Guide to the Selection of Synthetic Resin Flooring
- Osmosis in Resin Flooring (TGN 01)
- Chemical Resistance of Resin flooring (TGN 02)
- Static Controlled Flooring (TGN 03)
- Guide to Installing Resin Flooring Systems onto Substrates with a high moisture content (TGN 04)
- Guide to Cleaning Resin Floors (TGN 05)
- Assessing the Slip Resistance of Resin Floors (TGN 06)
- Guide to Seamless Resin Terrazzo (TGN 07)
- Guide to flowable polymer screeds as underlayments for resin floor finishes (TGN 08)
- Guide to the selection of deck waterproofing and wearing surfaces for car parks (TGN09)
- FeRFA Environmental Guide (TGN10)
- FeRFA Guide to Preparing Substrates to receive resin flooring and finishing of resin terrazzo systems (TGN11)
- Guide to Personal Protective Equipment for use with In Situ Resin Floors and Surface Preparation

FeRFA

FeRFA, the Resin Flooring Association, represents the major product manufacturers, specialist contractors and surface preparation companies, raw material suppliers and specialist service providers within the UK Resin Flooring Industry.

The Association has established Codes of Practice for full members. It takes an active role in promoting resin flooring and in developing both national and international standards.

All FeRFA publications are freely downloadable from the website at www.ferfa.org.uk where the most up-to-date copies are available

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