Introduction

The Need For Effective Waterproofing Solutions.

Bridges are under constant stress as water, chlorides, acid rain, de-icing salts and freeze-thaw cycles act on them. Extreme weather cycles, the impact of traffic and vibration place bridges under further stress. As steel reinforcing bars corrode and expand, concrete can crack and deteriorate. The costly disruption caused by resulting repair work impacts on both traffic and safety.

Bridge repairs can often amount to 10-30% of the updated construction cost, and large repairs may even exceed this and still be the preferred option when compared to the cost of traffic interruption and demolition. As moisture is the most significant factor in concrete deterioration, incorporating sufficient waterproofing at the design stage is by far the most cost-effective option.

Prevention methods

• Bridge expansion joints
• Bridge deck waterproofing systems

KEY ENGINEERING CONSIDERATIONS

- Crack Bridging
  - Crack Bridging - New cracks require infinite elongation
  - Tensile strength
  - Bond to substrate
- Typical Design Life
  - 120 years
  - Non-degradable
  - Durable & robust
- Resistance To Chemicals & Chlorides

UK History of Bridge Deck Waterproofing Policy

1945 | Ministry of Transportation stipulate waterproofing as being beneficial to bridge stock
1945 | Waterproofing concrete bridges becomes mandatory
1975 | UK National standard BE27 Introduced for concrete bridge deck waterproofing requiring BBA testing and certification
1986 | UK DoT Appoints TRL to carry out study after premature failures causing issues with existing bridge stock
1976 | TRL study defective systems and recommend improvements in specifications
1986 - 1989 | Introduction of BD47 standard to replace BE27 improving performance criteria
1999 | Formal introduction of BD47 to UK market is made mandatory. DoT reduced systems approved from twenty five under BE27 to two approved in UK. Only liquid spray systems that meet BD47 and HAPAS used in the UK
2007 | UN 06/07 published surfacing and tack coat guidelines
2010 | HAPAS provides additional testing to enhance performance and products
2011 | Installer accreditation BDWA led scheme to ensure all applicators are fully trained
2016 | European Standard ETA for Liquid applied systems
The System

PMB forms a flexible, chemically resistant seamless membrane tough enough to outlast the design of many structures. PMB has exceptional bond strength to all commonly used substrates, has excellent crack bridging capability, a life expectancy in excess of 30 years and holds British Board of Agrément approval. Tested and approved throughout the world to the highest standards, the PMB system now adds Network Rail and London Underground (LUL) approvals to its ever growing list of accreditations.

WHAT IS PMB?

- Two component PUR spray system
- 100% solids reactive resin content
- Solvent free
- No fillers / extender loading
- Rapid setting – 5-8 seconds gel time
- Tack free after approximately 1 minute
- Can be walked on after approximately 10 minutes
- Elastic after approximately 45 minutes

System Benefits:

- Spray applied - rapid curing
- Excellent global track record
- Seamless membrane
- Excellent crack bridging properties
- Quality assured - including pin hole survey
- Durable, corrosion protection waterproofing
- BBA / HAPAS certified
- Longevity in service life

Applications:

- Bridges
- Footbridges
- Culverts
- Tunnels
- Walkways

Spray Applied, Seamless Bridge Deck Waterproofing

680,000m² of PMB Structural Waterproofing applied to Temburong Bridge, Brunei, South East Asia.
Pre Installation Checks

Surface Preparation

- No system will perform if preparation is not carried out satisfactorily
- Clean, dry and free of contamination

Primer

- Applied by airless spray or roller

Membrane

- Profil two part Polyurethane spray applied elastomer
- Installed using computerised two component spray machines

Spray Technology

- Versatile to suit access, application area and client’s programmes and productivity requirements

QA/QC Application

- Application
- Pre Installation Checks

Application Layer

- Tackcoat
  - Polymer modified
  - 95°C Softening point Bitumen emulsion
  - Applied by squeegee over sanded key layer

Primer

- 1. Primer PMCS/01
- 2. 1-3mm Silica sand

Application QA/QC – Inhole Check

QA/QC Quality Testing

QA/QC Quality Thickness

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Case Studies

NEW SPIRE BRIDGE, UK
9,000m² of PMB waterproofing was applied to the concrete bridge deck.

SECOND SEVERN RIVER, UK
Application of 176,000m² of PMB spray applied waterproofing.

TINSLEY VIADUCT, UK
8,400m² of PMB structural waterproofing, aggregated key coat and hot melt applied to bridge deck. 2,000m² combined waterproofing and high friction surfacing was applied to the steel walkway plates.

FORTH ROAD BRIDGE, UK
12,000m² of PMB waterproofing inclusive of the Hotmelt tack coat system was applied to accommodate the shallow asphalt which was to be laid on top.
Combined Waterproofing and Wearing System
A two component polyurethane body coat characterised but its inbuilt flexibility, even at low temperatures. Uradeck BC provides excellent adhesion to a variety of substrates. By broadcasting slip resistant aggregate into the surface of the wet resin a highly durable anti-slip system can be produced.

The application of a decorative sealer coat is achieved with Uradeck Finish.

System Benefits
- Excellent adhesion
- Inbuilt flexibility
- Good chemical and abrasion resistance
- Excellent weathering characteristics
- Fast setting for early trafficking
- Decorative finish
- Formulated to comply with the requirements of EN 1504 Part 2
- Manufactured in accordance with ISO 9001

APPLICATIONS
- Waterproof coating for silos, tanks & bunds
- Footbridges & Stair Treads
- Rail, Air & Marine Ports
- Ramps & Pedestrian Footways
- Stadiums & Warehouses
- Industrial Storage Yards

URODECK BC
Waterproof coating for silos, tanks & bunds
Footbridges & Stair Treads
Rail, Air & Marine Ports
Ramps & Pedestrian Footways
Stadiums & Warehouses
Industrial Storage Yards

QUALITY AND TESTING SERVICES

Technical Information
BS 7976-2:2002 Pendulum Testers, method of operation using Slider 96
UK Slip Resistance Group Guidelines for Horizontal Surfaces

Uradeck BC

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>AVERAGE SLIP MEASUREMENT (PTV)</th>
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<tbody>
<tr>
<td>URADECK SYSTEM</td>
<td>DRY &amp; WET (WATER)</td>
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<table>
<thead>
<tr>
<th>Pot Life:</th>
<th>20 minutes @ 20°C</th>
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<tbody>
<tr>
<td>Overcoating Time:</td>
<td>2 hours @ 20°C</td>
</tr>
<tr>
<td>Adhesion (Concrete/asphalt):</td>
<td>Greater than substrate strength</td>
</tr>
<tr>
<td>Adhesion (Steel):</td>
<td>&gt;5 N/mm²</td>
</tr>
<tr>
<td>Coverage:</td>
<td>5kg: 4.2m² per pack @ 1mm</td>
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<tr>
<td></td>
<td>25kg: 21m² per pack @ 1mm</td>
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Uradeck Finish

<table>
<thead>
<tr>
<th>S.G:</th>
<th>1.4</th>
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<tbody>
<tr>
<td>Pot Life:</td>
<td>20 minutes @20°C</td>
</tr>
<tr>
<td>Hardness:</td>
<td>70 (Shore D)</td>
</tr>
<tr>
<td>Tensile Strength:</td>
<td>&gt;10 N/mm²</td>
</tr>
<tr>
<td>Coverage:</td>
<td>0.5kg/m² (approx. 3m²/kg)</td>
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All above pot life & hardening times vary at different temperatures
With a comprehensive portfolio of products and a highly developed global network, USL Ekspan is focused on providing specialist construction solutions on a truly global basis.

USL EKSPAN PRODUCT RANGE

EXPANSION JOINTS - CD 357
- Uniflex - Buried
- BP1 - Buried
- FEBA - Flexible Plug
- Britflex NJ - Raising
- ES & EW - Joint Seal
- Transflex & Transflex HM - Mat
- T-MAT - Mat

Britflex BEJ - Modular
Britflex MEJS - Modular
LJ - Longitudinal Joint
ES - Joint Seal
Aqueduct/Air-sealed Joint
Open Type Joint - Rail Joint
Britflex UCP - Footbridge Joint
Finger Joint
Roller Shutter Joint

STRUCTURAL BEARINGS
- EKE - Elastomeric (EN1337-3)
- KE - Pot (EN1337-5)
- DE - Line Rocker (EN1337-6)
- GE - Spherical (EN1337-7)
- FE - Restraint & Guide (EN1337-8)

- D - Line Rocker (BS5400-9)
- F - Restraint & Guide (BS5400-9)
- G - Spherical (BS5400-9)
- J - Roller (BS5400-9)
- K - Pot (BS5400-9)

- Link Bearing (BS5400-9)
- EA - Sliding Bearing
- EKR - Rubber Pad & Strip
- EQF - Sliding Bearing
- Bespoke Bearings

STRUCTURAL WATERPROOFING - CD 358
- Pitchmastic PmB
- Polyurethane (Pu) Waterproofing System
- Britdex MDP
- Methyl Methacrylate (MMA) Waterproofing System

- Britdex CPM Treadseal
- Combined Waterproofing and Anti-Skid Surfacing (MMA)
- Uradeck BC
- Combined Waterproofing and Anti-Skid Surfacing (Pu)

SURFACE BRIDGE DRAINAGE
- Envirodeck

SUB-SURFACE BRIDGE DRAINAGE
- Ekspan 325 Channel
- Ekspan 302 System
- ES Seal System
- DriDeck
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