



# SOLUTIONS FOR HIGHWAY BRIDGES

EXPANSION JOINTS  
BRIDGE DECK WATERPROOFING  
STRUCTURAL BEARINGS  
BRIDGE DRAINAGE

# Introduction

## Market Leaders In Structural Protection & Movement Control.

USL Ekspan are a world class, multi-disciplined mechanical engineering solution provider, with core competencies in structural protection and movement control.

We offer an unrivalled range of specialist services including spray applied bridge deck membranes, bridge deck expansion joints, structural bearings, bridge deck drainage as well as bespoke structural fabrications.

Through early project engagement with stakeholders, we are able to provide high quality engineering solutions by way of consultancy support or the delivery of a complete project management service.

From design, manufacture and installation, to inspection, site maintenance and replacement work, our single point of responsibility offering, leaves USL Ekspan uniquely placed to solve complex challenges on a truly global scale.



2



NORTHERN SPIRE BRIDGE, SUNDERLAND, UK



3



**CONTRACTING CAPABILITY - SITE, FLEET & MACHINERY**

USL Ekspan manufacture high quality products, and has the capability to supply and install all products, offering the comfort of client single source responsibility, whether it be undertaking simple or complex expansion & waterproofing installations requiring multiple crews.

**Fleet & Machinery (Contracts)**

Custom Built Installation Rigs	32
Specialist Application Equipment	20
Commercial Vehicles	68



**MANUFACTURING**

**RESEARCH & DEVELOPMENT**

**APPROVALS**

USL Ekspan has a wealth of experience in manufacturing specialist construction products. Enjoying an excellent reputation within the industry for quality products, excellent value and exemplary customer service. The company's manufacturing facility processes bitumen, epoxy, polyurethane and acrylic resins together with aggregate and powder blending. The resin facility operates to zone 1 for highly flammable materials.

USL Ekspan is a quality assured manufacturer which is reflected in the quality of products the company supplies. Fully accredited to internationally recognised Quality Management System, we are able to provide full traceability of product and constantly monitor our processes to ensure that we offer all customers the highest levels of service. Free Certificates of Analysis and Certificates of Conformity are provided where requested and USL Ekspan works closely with all customers to ensure that they receive exactly what they require.

USL Ekspan takes innovation seriously and believes it is the only way a specialist construction company can stay ahead of the game. That is why USL Ekspan invest resources into their laboratories and material testing facilities, concentrating on the development of ground breaking products to improve effectiveness and efficiency on construction sites across the world.

USL Ekspan's Research and Development is stimulated by the relationships with their customers acting upon specific client requirements, providing timely solutions which provide the backbone of the company's ever expanding product portfolio.

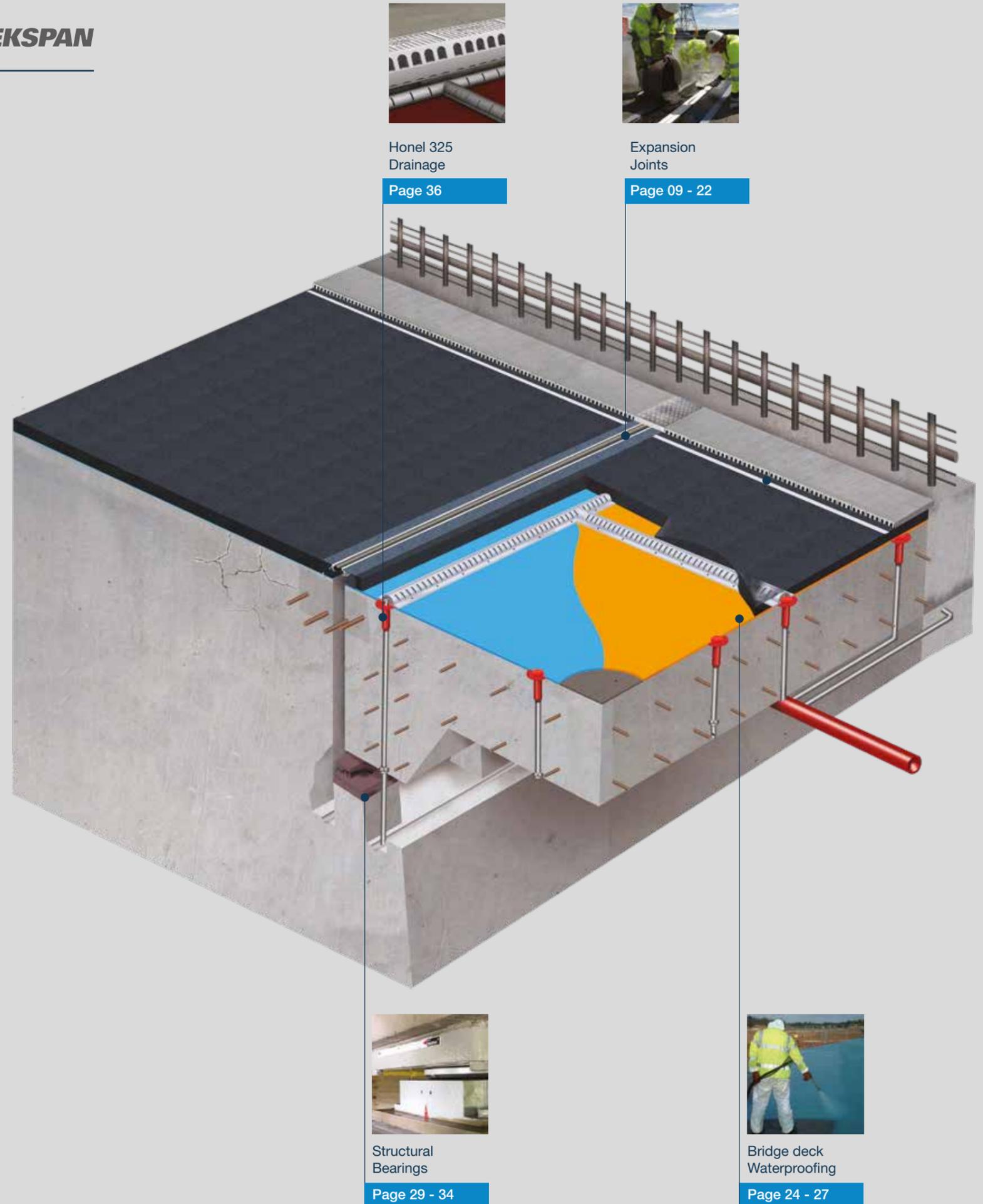




## WATER MANAGEMENT SOLUTIONS

Bridges are at constant attack and under 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 the updated construction cost 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.



Honel 325  
Drainage

Page 36



Expansion  
Joints

Page 09 - 22



Structural  
Bearings

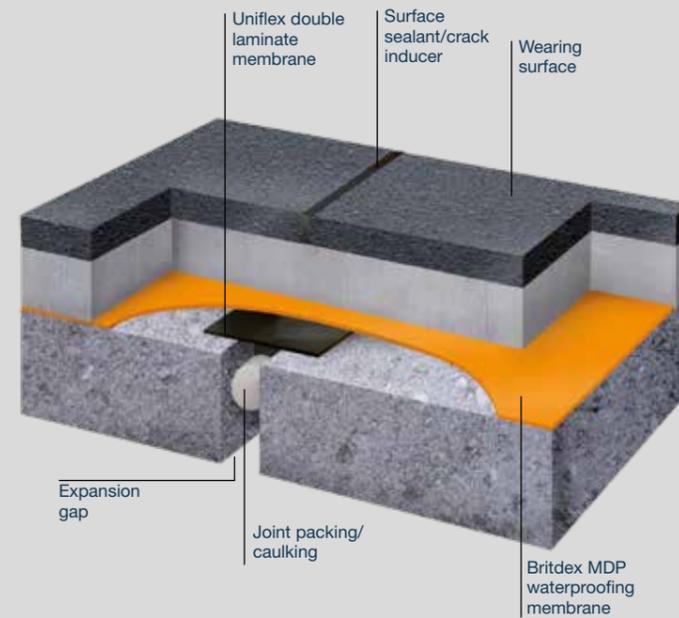
Page 29 - 34



Bridge deck  
Waterproofing

Page 24 - 27

# Expansion Joints

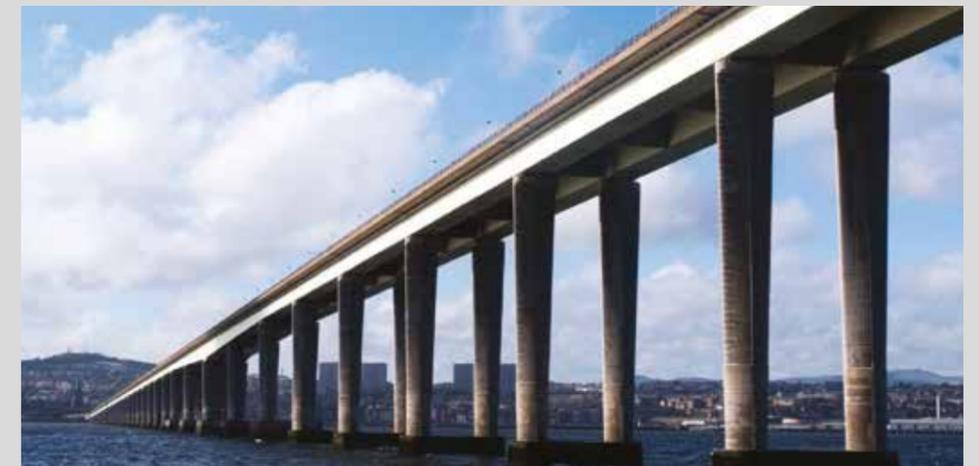


## UNIFLEX (BURIED)

This system uses a butyl rubber membrane, bonded to the substrate with **Uniflex** epoxy Adhesive to provide an efficient and permanent expansion joint that is easily installed. The system will accommodate a variety of conditions from those experienced on an asphalt-covered traffic-free roof, to bridge decks with sheet membrane, spray on coating or asphalt waterproofing, also it can be used with two layer mastic asphalt or brick paving systems.

The **Uniflex** system is chemically inert and completely impervious to water and water vapour. In buried joints the membrane is completely protected by the wearing surface. **Uniflex** membrane will not rock or crack in service and the combination of a simple design and proven components makes the system naturally long-lasting and well up to the requirements of modern building and civil engineering practice.

The **Uniflex** membrane is prepared from specially developed butyl rubber compound that is tough, weatherproof, flexible and can withstand up to 300% elongation. The **Uniflex** epoxy adhesive has been designed specifically for bonding **Uniflex** to concrete, asphalt and other surfaces to make the system effective. The **Uniflex** membrane is normally supplied in 20 metre rolls of any required width up to 1300mm, adhesive, closed cell foam and steel plates if required are all part of the different systems we can provide.



### Expansion joint selection guide

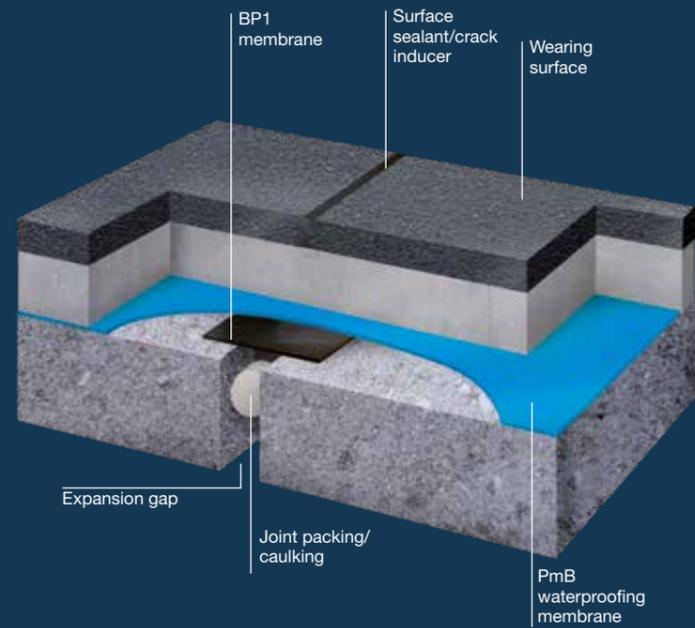
USL Ekspan are market leaders in the manufacture, supply and installation of expansion joints which have been carefully developed to provide safe, efficient and economical methods of sealing construction gaps.

The bridge expansion joint range of products caters for movements up to 2000mm.

- Rapid on site assembly
- Minimal disruption to traffic
- Perfectly suited for lane by lane installation
- Minimised future maintenance costs
- Easy to install and detail at design stage
- Adaptable to numerous applications
- Excellent global track record
- Unparalleled bond to concrete and steel decks.

Movement up to (mm) Page No.

	Movement up to (mm)	Page No.
Uniflex (Buried)	20mm	09
BP1 (Buried)	20mm	10
Feba (Flexible Plug)	40mm	11
Britflex NJ (Nosing)	40mm	12
Transflex (Mat)	330 mm	13
Transflex HM (Mat)	1600mm	14 & 15
T-Mat (Mat)	260mm	16
Britflex BEJ (Modular)	150mm	17
MEJS (Modular)	2000mm	18
Finger/Comb (Finger)	1000mm	19
LJ (Longitudinal Joint)	220mm	20
Roller Shutter	800mm	21
UCP (Footbridge)	70mm	22



### BP1 (BURIED)

**BP1** is a buried joint, incorporating polyethylene, which is placed into the air gap flush with the concrete surface. The deck is then primed using PMCS/01 and over the joint area. The whole area is then sprayed with PmB 2mm nominal thickness waterproofing layer.

Within 4 hours the 300mm overlay is sprayed on top of the existing 2mm waterproofing layer finally installing a saw cut to surface.

**System Benefits:**

- Movement Range  $\pm 10$ mm
- Highways England Approved Product

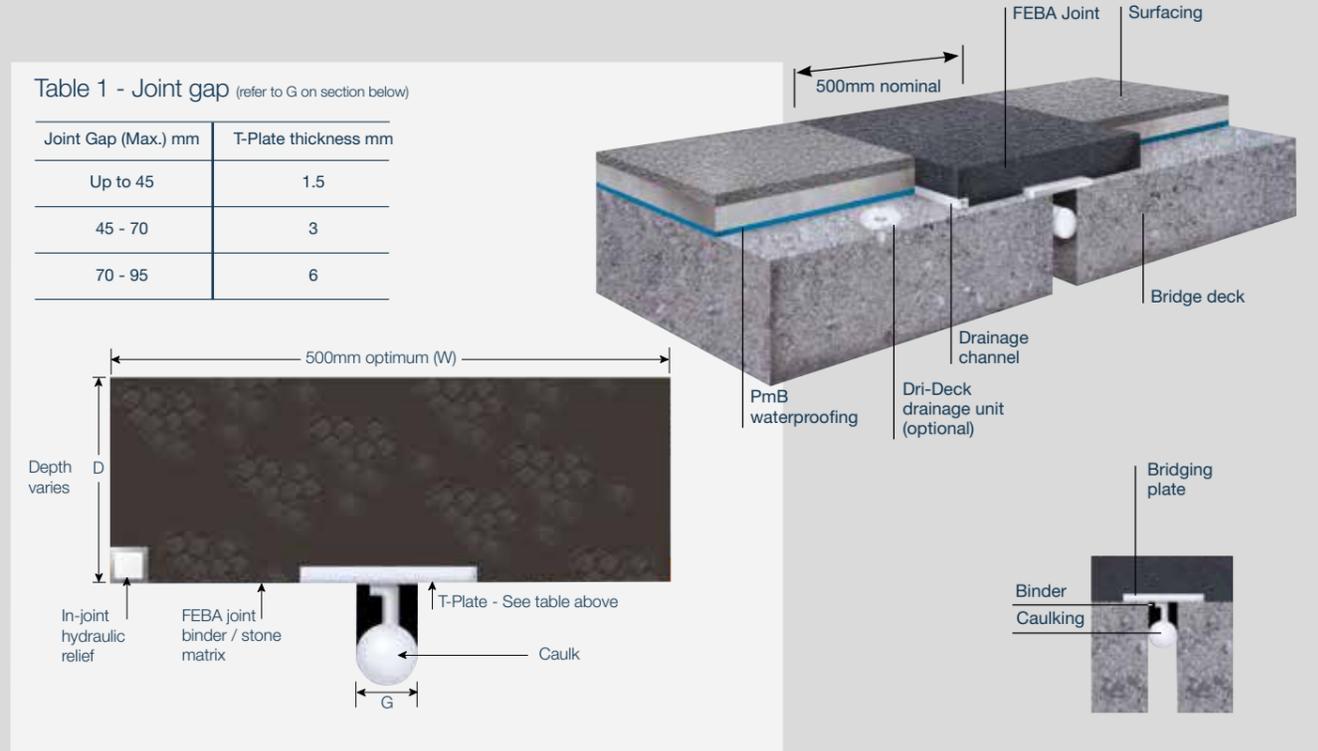
**Applications:**

- Bridges
- Roads



Table 1 - Joint gap (refer to G on section below)

Joint Gap (Max.) mm	T-Plate thickness mm
Up to 45	1.5
45 - 70	3
70 - 95	6



### FEBA (FLEXIBLE PLUG)

USL Ekspan offers three grades of asphaltic plug joint systems, all in accordance with BD33/94 standard for use on all classes of highway bridges.

The binder is selected depending largely upon climatic conditions, bridge movement factors, cross-falls and the nature of traffic also are considered.

**FEBA** - is a standard asphaltic plug joint which provides a flexible, waterproof joint with excellent ride quality for users and noiseless characteristics for minimal impact on the environment. Asphaltic plug joints are recognised as being suitable for a maximum design movement of  $\pm 20$ mm horizontally and  $\pm 1.5$ mm vertically and are ideal for use on bridges with low traffic volumes such as B roads.

**FEBA HM** - is a high modulus asphaltic plug joint suitable for low to medium movement of  $\pm 20$ mm on heavily trafficked highway bridges. **FEBA HM** is a special blend of bitumen, polymers, fillers and a surface active agent, formulated to combine good fluidity at process temperatures with low temperature flexibility and ambient temperature slump control. The use of basalt aggregates (BS EN 13043) ensures excellent load bearing capacity and high resistance to wheel tracking. This amalgamation of a highly interlocking aggregate allows the system to provide excellent anti rutting characteristics.

**FEBA HC** - A bituminous asphaltic plug joint which has been developed for use in hot climates.

**NOTE:** Design, construction and installation criteria remain the same for all joint types.



FEBA joint extends across the full length of the carriageway and into the verges.

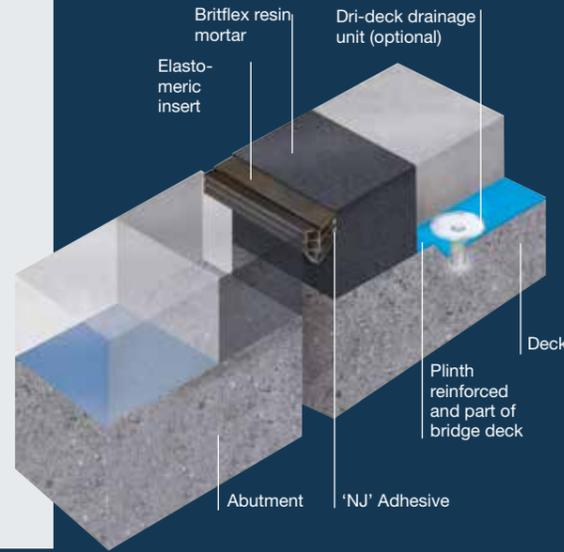
Table 1 - Design detail

	Total Movement Capacity		Minimum Nosing Size		Optimum' Nosing Gap 'B'	Nosing' Gap 'B'	
	Horizontal	Vertical	W	D		Min	Max
NJ 1	15	±3	100	60	30	20	35
NJ 2	20	±5	100	60	30	20	40
NJ 4	40	±10	100	60	50	30	70

All dimensions in mm

Notes

The 'W' and 'D' dimensions are the minimum for new works contracts. For refurbishment contracts, nosing width and depth can be varied, however the 'W' and 'D' dimensions should always be based upon a minimum aspect ratio of 1.25:1, width to depth.



## BRITFLEX NJ (NOSING)

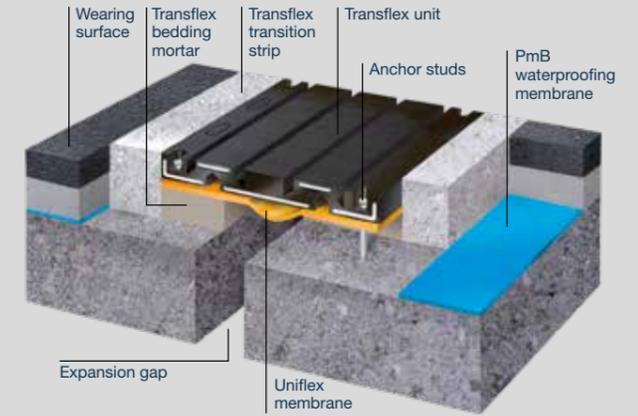
A surface mounted nosing joint with an elastomeric insert bonded to the rapid curing elastomeric compound known as Britflex® Resin Mortar.

In the UK the Britflex® NJ system can only be used in the situation where the gap at carriageway level does not exceed 65mm for gaps above 65mm the 'BEJ' system would be used.

The Britflex® NJ joint is an ideal system for maintenance situations and has been developed to provide a whole life economic solution for applications where asphalt plug joints are unsuitable.

Advantages

- Versatile
- Substantially waterproof
- Rapid installation
- No drilling of deck
- No mechanical fixings
- Quiet comfortable riding characteristics



## Transflex bridge joint models

Models	Movement accommodation	Module length	Module width B	Module depth A	Stud diameter D	Module weight	Max joint width at mid-deck temp N	Max joint width O	Recess depth R	Transition strip width W
150	38mm	1750mm	240mm	35mm	12mm	30kg	35mm	54mm	41mm	100mm
200	50mm	1830mm	274mm	40mm	12mm	48kg	51mm	76mm	46mm	100mm
250	65mm	1830mm	356mm	46mm	16mm	68kg	67mm	98mm	52mm	100mm
300	76mm	1830mm	432mm	52mm	20mm	88kg	83mm	121mm	58mm	100mm
400	102mm	1830mm	590mm	54mm	20mm	150kg	102mm	152mm	60mm	100mm
650	165mm	1830mm	724mm	75mm	24mm	272kg	121mm	203mm	81mm	125mm
900	230mm	1830mm	890mm	93mm	24mm	375kg	158mm	273mm	99mm	150mm
1300	330mm	1220mm	1204mm	127mm	30mm	451kg	216mm	381mm	133mm	175mm

Note: Add 3mm to the recess depth 'R' when using the Uniflex secondary membrane.

## TRANSFLEX (MAT)

The Transflex expansion joint system is registered with Highways England, for use on highway bridge decks on all classes of roads and motorways. (BD 33/94: Joint Mat refers).

Britflex Resin Mortar is included in SA1 as an approved material for transition strips to all types of expansion joint. Transflex bridge joints comprise of steel angles and a steel bridging plate system encased in a flexible elastomer.

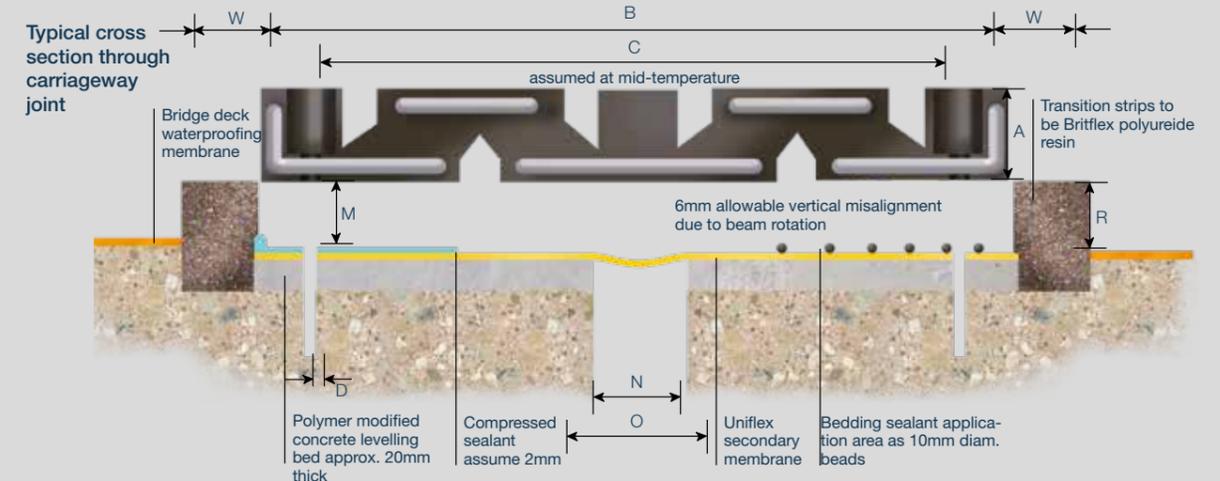
They are supplied in module lengths designed to be bolted to the structural concrete on either side of the expansion gap. A range of models are available to accommodate movement up to 330mm, providing a substantially waterproof joint and a smooth running surface.

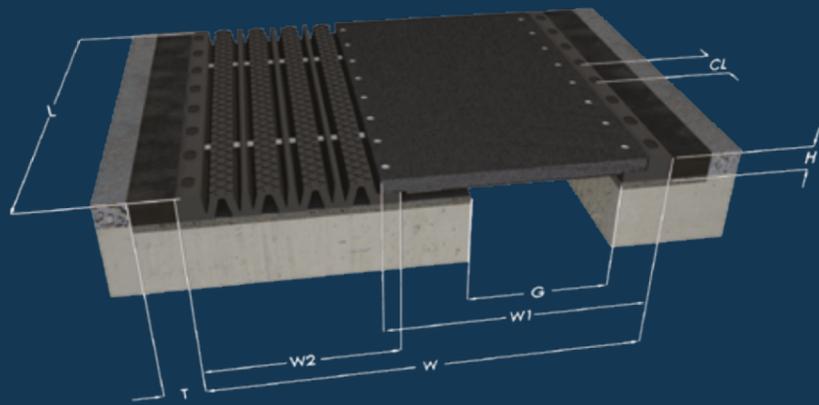
Advantages

- Movement accommodation up to 330mm
- Corrosive resistant elastomer casing
- Accommodates skew movement
- Factory vulcanised kerb and skew kerb units to special order
- Membrane system included for maximum waterproofing

Applications

- Highway bridge decks
- Service Ramps





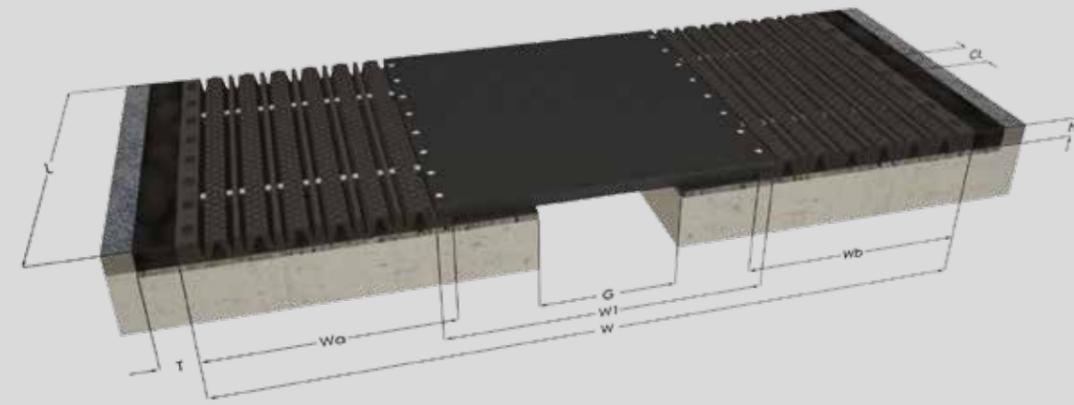
## TRANSFLEX (MAT)

The High Movement **Transflex** expansion joints have been designed to cover large movements. They consist of up to three modules, two movement modules and the bridging module. The movement modules are the "mobile" section of the joint, made of rubber and steel, to accommodate the expected movements. The bridging module is the "fixed" section of the joint, to bridge the structural opening.

The High Movement **Transflex** expansion joints absorb large movements while providing remarkable comfort to traffic, effective sealing, low maintenance and easy replacement.

High Movement **Transflex** models cover a movement range from 400mm to 1600mm.

Models	Movement (mm)	L (mm)	H (mm)	W (mm)	W1 (mm)	W2 (mm)	Wgt (kg)	CL (mm)	G (mm)	T (mm)
1600	400 (±200)	1600	85	1280	675	675	460	200	220	170
2000	500 (±250)	1600	85	1520	775	815	585	200	270	170
2400	600 (±300)	1600	85	1760	875	955	710	200	320	170
2800	700 (±350)	1600	85	2000	975	1095	765	200	370	170
3200	800 (±400)	1600	85	2240	1075	1235	930	200	420	170



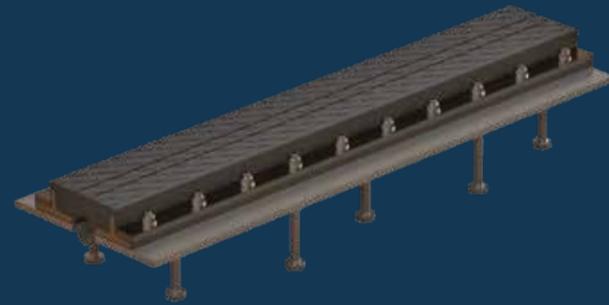
## TRANSFLEX (MAT)

### Advantages

- Corrosion resistant elastomer casing
- Movement accommodation up to 1600mm
- Seismic movement capability
- Accommodates skew movement
- Factory vulcanised kerb units to suit changes in levels
- Easy replacement



Models	Movement (mm)	L (mm)	H (mm)	W (mm)	W1 (mm)	W2		Wgt (kg)	CL (mm)	G (mm)	T (mm)
						W(a)	W(b)				
3600	900 (±450)	1600	85	2440	1090	675	815	1050	200	470	170
4000	1000 (±500)	1600	85	2680	1190	815	815	1250	200	520	170
4400	1100 (±550)	1600	85	2920	1290	815	955	1440	200	570	170
4800	1200 (±600)	1600	85	3160	1390	955	955	1630	200	620	170
5200	1300 (±650)	1600	85	3400	1490	995	1095	1850	200	670	170
5600	1400 (±700)	1600	85	3640	1590	1095	1095	1980	200	720	170
6000	1500 (±750)	1600	85	3880	1690	1095	1235	2165	200	770	170
6400	1600 (±800)	1600	85	4120	1790	1235	1235	2350	200	820	170



Type	Movement "X" Range		Movement "Z" Range	Hight (mm)	Width (mm)	Anchor Diameter (mm)
	Horizontal	Vertical				
30	30mm (±15mm)	80mm (±40mm)	60mm (±30mm)	55	290	12
80	80mm (±40mm)	120mm (±60mm)	80mm (±40mm)	55	318	12
130	130mm (±65mm)	200mm (±100mm)	140mm (±70mm)	65	414	12
160	160mm (±80mm)	240mm (±120mm)	80mm (±40mm)	55	760	12
260	260mm (±130mm)	400mm (±200mm)	140mm (±70mm)	65	960	12

## T-MAT (MAT)

The **T-Mat** expansion joint consists of a solid armoured expansion mat made of a high quality chloroprene with metal reinforcements (T-bars).

The internal design of the expansion joint is such that due to the discontinuous steel reinforcement combined with the elasticity of the material (chloroprene), the expansion joint will not only allow for horizontal movement on either side of the joint but will also allow for transverse and vertical relative movements of adjacent bridge decks.

Structural safety during train and vehicle operation is guaranteed by the fact that the design of the expansion joint allows to carry and absorb the combined forces of load and traffic.

The expansion joint is designed to be installed in such a way that ballast can be put directly on top of the joint without any additional protection or treatment required.

The internal design allows also for high vertical movement due to differential settlement (up to ± 70 mm vertical and ± 100 mm transversal) without losing any of its other functional properties.

### Key Features:

- For longitudinal movements from ± 15 (T30) up to ± 130 (T260)
- Impervious to deep standing water
- Low noise - ideal near residential properties

### Applications:

- Motorways
- Rail & road bridges
- Primary/secondary roads
- Pedestrian walkways

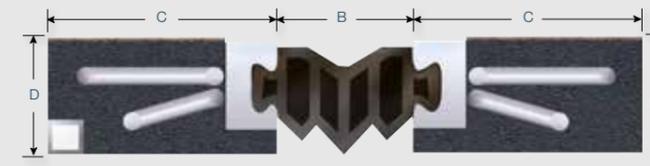


Table 1 - Design detail

BEJ	Movement <sup>4</sup> Capacity		Minimum Nosing Sizes		Nominal <sup>1</sup> Nosing Gap B	Minimum Nosing Gap B.Min	Maximum Nosing Gap B.Max	Cover to <sup>2</sup> Services E	Kerb Upstand <sup>3</sup> Clearance X	Optional Kerb <sup>3</sup> Detail W
	Horizontal	Vertical	C	D						
3	35	±12	100	60	45	25	60	70	125+125 tan a	225
5	50	±15	120	60	55	30	80	70	125+135 tan a	270
8	80	±15	140	70	70	30	110	85	125+145 tan a	310
10	100	±15	160	70	90	40	140	105	123+160 tan a	365
13	130	±15	180	70	115	45	175	165	125+170 tan a	405
15	150	±20	200	70	125	50	200	180	125+180 tan a	445

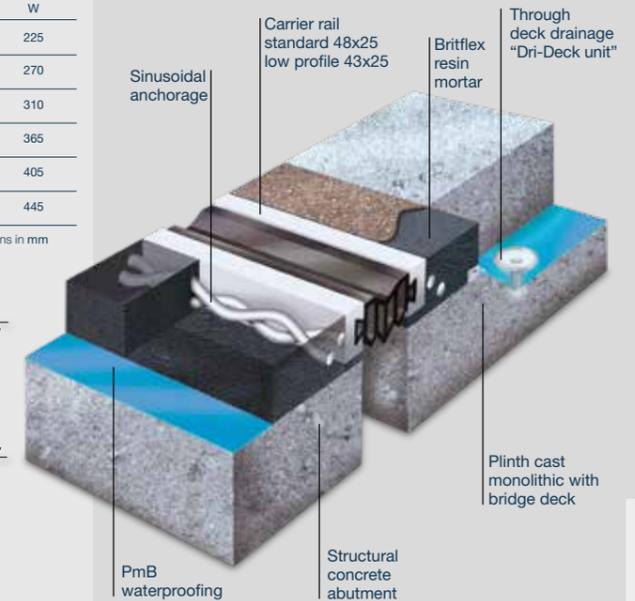
Note: Elastomeric insert changes according to joint size

All dimensions in mm



### Notes

1. Nominal nosing gap is that selected at average design effective bridge deck temperatures and does not take movement into account other than temperature movements.
2. This is the standard design. Please refer to USL Ekspan Technical and Advisory Service if a 'special' is required.
3. For optional kerb detail based on minimum nosing widths – refer to the technical brochure.
4. For skew movements, greater than ±15mm, please refer to USL Ekspan Technical and Advisory Service.
5. For clarification of kerb upstand clearance (x) refer to the technical brochure.



## BRITFLEX BEJ (MODULAR)

A surface mounted mechanical system, with an elastomeric insert between two metal runners /carrier rails. Set into a, rapid curing resin compound known as Britflex® Resin Mortar. The polyureide resin provides unrivalled anchorage to the deck due to its remarkable bonding qualities, meaning that no mechanical fixings are required.

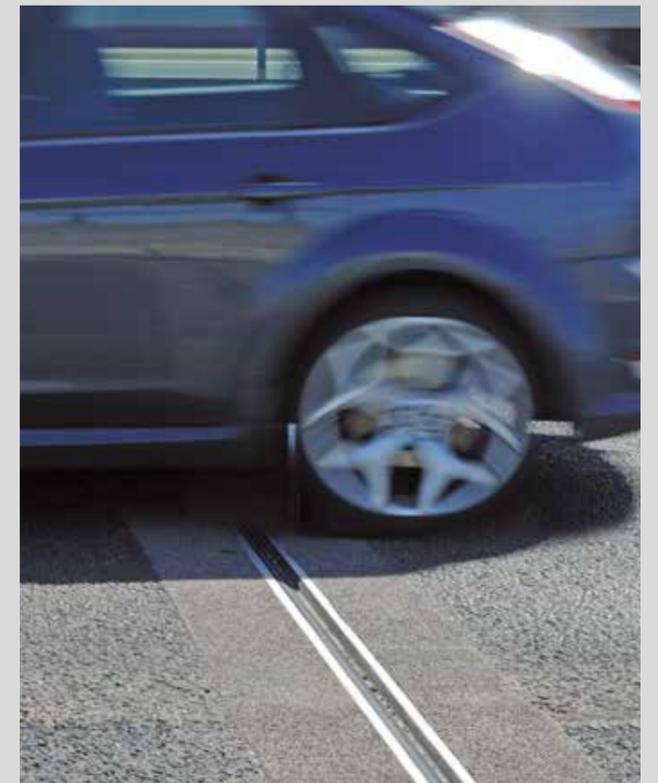
'BEJ' expansion joints incorporate cellular elastomeric inserts which are load bearing enabling a range of movement to be accommodated up to 150mm.

The **Britflex® BEJ** Expansion Joint system has worldwide approvals for use on bridge decks on all classes of roads and motorways. The Britflex® Resin Mortar, is also an approved material for transition strips to all types of expansion joints.

This system is ideal for maintenance projects where there is a need to replace ailing or failed systems. The major benefit this system will bring to any project is the speed in which it can be assembled on-site allowing phased work outside of peak traffic hours.

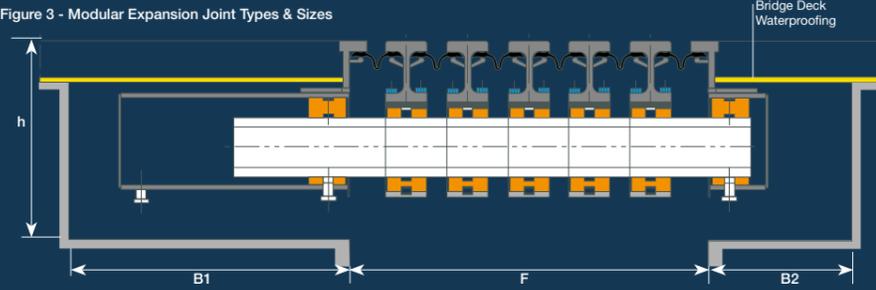
### Advantages

- Rapid on site assembly
- Minimal disruption to traffic
- Minimised future maintenance costs
- Adaptable to numerous applications
- Britflex® Mortar provides excellent bonding versatility, offering equally strong bonds to both concrete and steel bridge decks allowing phased work outside of peak traffic hours.

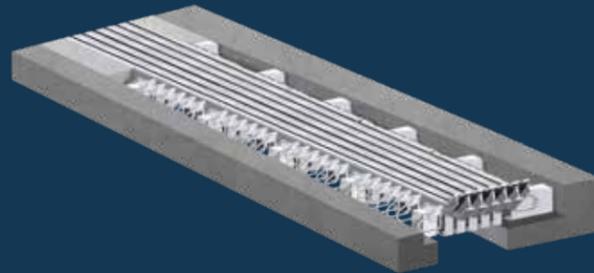


A close up of the BEJ expansion joint system not normally seen by the travelling public.

Figure 3 - Modular Expansion Joint Types & Sizes



Type	B1 (mm)	B2 (mm)	H (mm)	F(min) (mm)	F60 (mm)	F70 (mm)	F80 (mm)	G(WT) (kg/m)
LG2	400	400	400	140	260	280	300	150
LG3	480	300	400	220	400	430	460	210
LG4	560	300	400	300	540	580	620	250
LG5	640	300	400	380	680	730	780	290
LG6	720	300	400	460	820	880	940	410
LG7	800	300	420	540	960	1030	1100	500
LG8	880	300	440	620	1100	1180	1260	596
LG9	960	300	450	700	1240	1330	1420	745
LG10	1040	300	460	780	1380	1480	1580	1060
LG12	1200	300	500	940	1660	1780	1900	1340



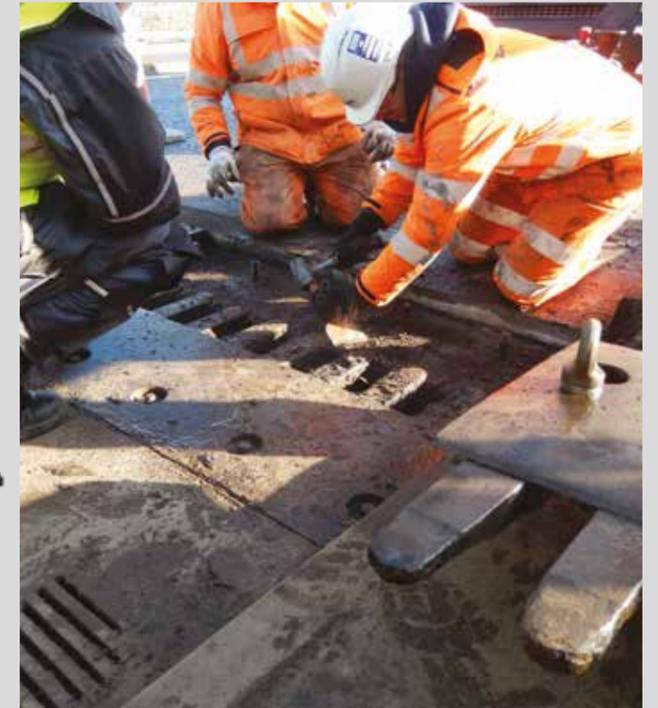
## MEJS (MODULAR)

**MEJS** is a mechanical device installed in bridge expansion joint openings. The primary function of the **MEJS** is to allow vehicle traffic to travel smoothly across large expansion joint openings. It does this by dividing the large expansion joint openings into a series of smaller openings called cells. These cells work together to accommodate the necessary thermal bridge movement (expansion and contraction) while providing a smooth riding surface for bridge vehicle traffic. The **MEJS** is normally used for expansion joints with a movement range up to 2000mm.

**MEJS** also has the secondary function of protecting the surrounding bridge superstructure and substructure. All **MEJS** cells are equipped with watertight sealing elements that prevent debris, water and corrosives such as de-icing chemicals from passing through bridge expansion openings and damaging superstructure and substructure components.

### Advantages

- Durable
- Seal can be replaced without disturbing joint
- Low stiffness
- Allows vertical/skew movement
- Seismic movement capability



## FINGER/COMB (FINGER)

**Finger** type expansion joints are made up of fabricated or cast steel fingers and can be fitted mechanically as either continuous or modular sections in order to provide different options for clients needs.

They are very robust joints recommended for high performance requirements imposed by heavy traffic flows and movements on highways, accommodating both horizontal, vertical, and rotational movements.

### Key Features:

- For movements up to 1000mm
- Long durability and good grip surfaces
- High performance and smooth riding comfort
- Lifespan of 40+ years

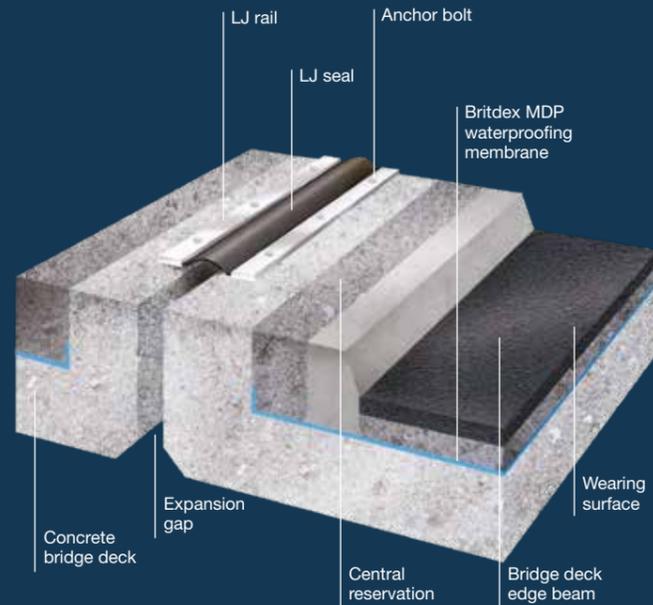
### Applications:

- Motorways
- Road bridges
- Designed to suit applications - examples available



Table 1 - Movement Capacity

LJ	Horizontal	Vertical
A	± 50mm	± 40mm
B	± 100mm	± 75mm



## LJ (LONGITUDINAL)

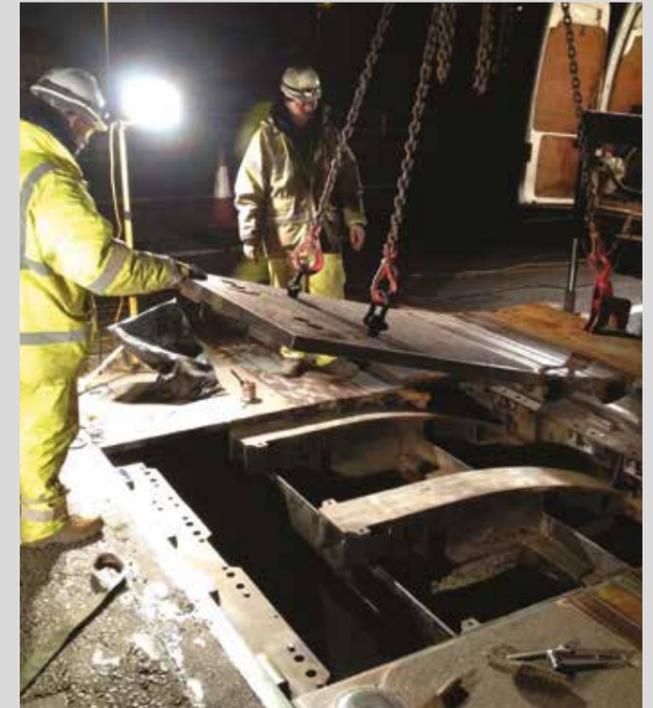
This system has been developed to provide an effective method of sealing longitudinal expansion gaps and soffits.

The joint can accommodate both longitudinal and vertical movement; the 'LJ' Joint also provides a substantially watertight seal to non-trafficked gaps between structures and is available in two sizes depending on the requirements of the individual project.

The 'LJ' Expansion Joint System has the flexibility to be used as a waterproof cover joint or alternatively as a drainage channel under joint with the facility to install drainage outlets into the system where required.

### Advantages

- Rapid Installation
- Low maintenance
- Cost effective
- Installed by USL Ekspan's experienced and fully trained workforce.



## ROLLER SHUTTER EXPANSION JOINTS

Roller shutter joints are manufactured for dynamic structures with large longitudinal movements. They are designed to take high vehicle volumes/ loads whilst providing a long operation service life.

### Bridges using this type of joint for example are:

Forth Road Bridge, Severn Bridge, Humber Bridge, Avonmouth Viaduct.

### Key Features:

- For movements greater than 800mm
- Durable and shown to resist seismic events
- High lifespan of the structure with low maintenance

### Applications:

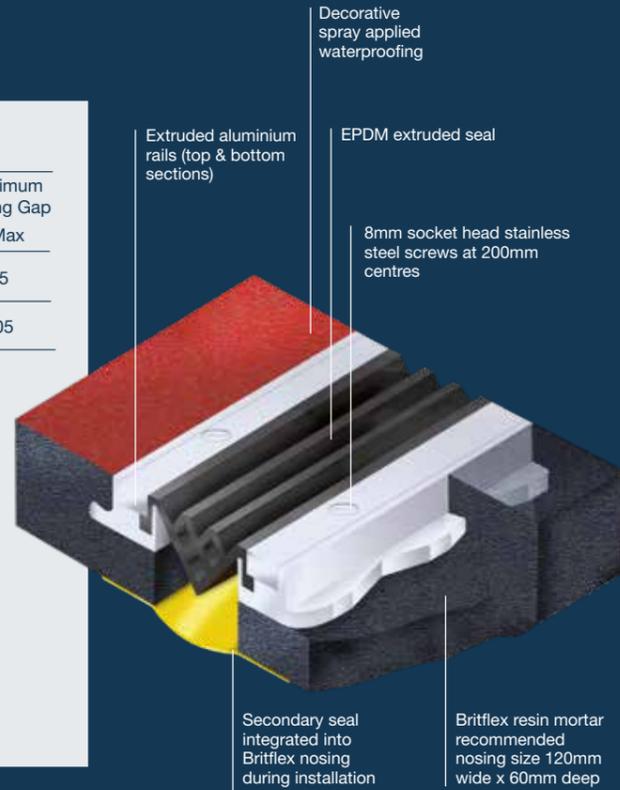
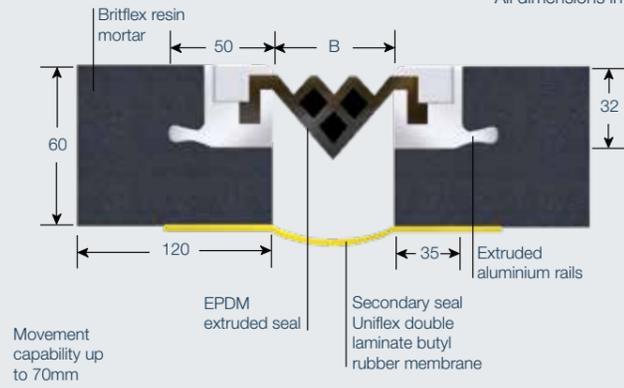
- Motorways
- Road bridges with large movements



UCP design detail

UCP	Movement Capacity		Minimum Nosing Sizes		Nominal Nosing Gap B	Minimum Nosing Gap B.Min	Maximum Nosing Gap B.Max
	Horizontal	Vertical	C	D			
50	50	±12	120	60	50	25	75
70	70	±15	120	60	70	30	105

All dimensions in mm



**BRITFLEX UCP PEDESTRIAN JOINT SYSTEM**

The system utilises the proven design of the 'BEJ' system, which have been extensively used throughout Britain's motorway network and the advantages of the 'BEJ system' have been adapted for use on footbridges and heavily pedestrianised structures.

There are two 'UCP' expansion joints; 'UCP' 50 and 70, capable of accommodating up to 50mm and 70mm of movement respectively. The system consists of heavy gauge aluminium rails, a resilient waterproof EPDM seal and an additional secondary waterproof membrane. This joint is totally sealed and will provide an impermeable seal to most liquids, salt and other abrasives, thus preventing premature damage to the structure.

**There is a vast range of applications for this type of expansion joint, including:**

- Pedestrian Footbridges
- Podiums

**Advantages**

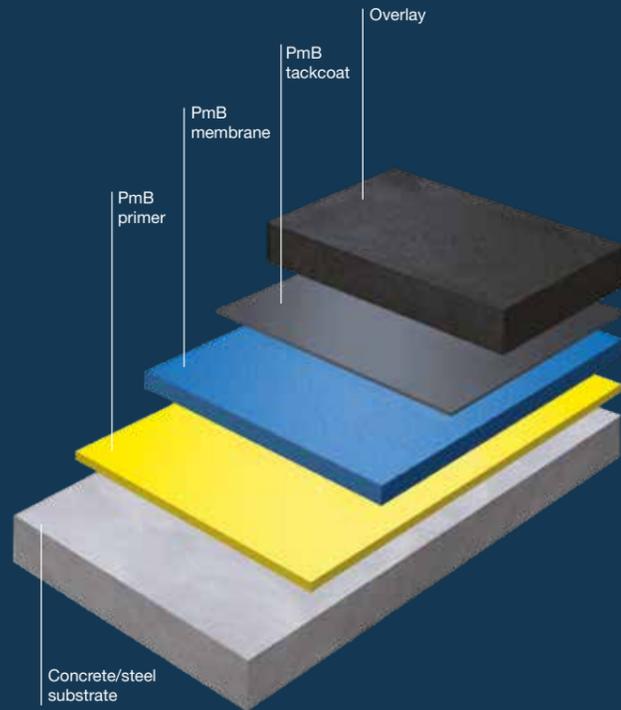
- Versatile
- Substantially waterproof
- Rapid installation
- No drilling of deck required
- No mechanical fixings
- EPDM Seal easily removed if required
- Provides quiet comfortable riding characteristics



# Bridge Deck Waterproofing

	Page
PmB	24
Britdex MDP	25
CPM Tredseal	26
Uradeck	27





## PMB - POLYURETHANE BRIDGE DECK WATERPROOFING

**PmB** is a two part, spray applied, durable corrosion protection and waterproofing material. The high performance system is 100% polyurethane containing no fillers or additives and is VOC free. Once applied, **Pitchmastic PmB** has exceptional bond strength to all commonly used substrates, has excellent crack bridging capability and a life expectancy in excess of 30 years and holds British Board of Agrément approval.

The system has gained BBA approval for use as a damp proof and waterproofing membrane for internal and external tanking. The system holds approvals in many continents including Europe, North America, the Middle and Far East.

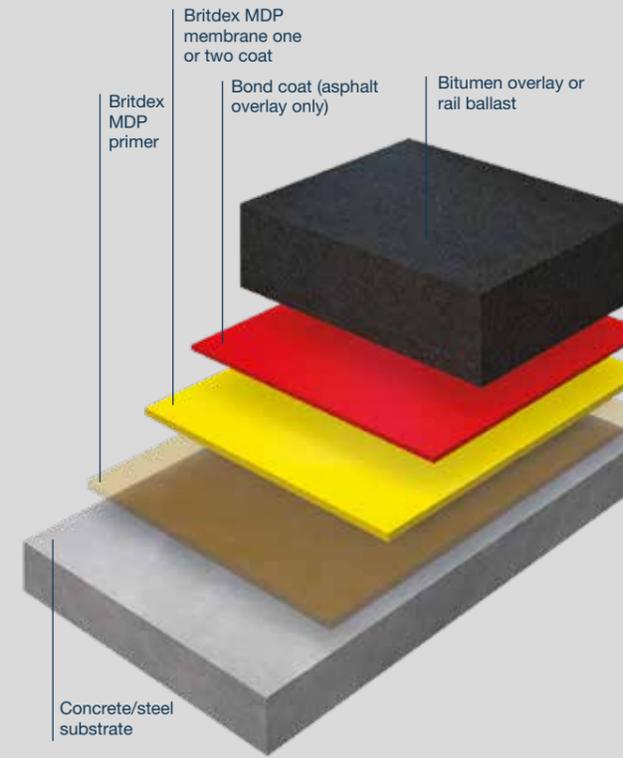
### Fast and Easy Installation

**Pitchmastic PmB** membrane is fast and easy to install and is applied as a single coat or in multiple layers. The two component materials of the membrane system are mixed at the spray gun and applied to the substrate using compressed air.

The spray equipment allows complete mobility, spraying vertical surfaces, overhead, behind pipe bays or over corners and edges quickly and effectively. This is achieved due to the membranes ability to gel in seconds preventing curtaining and providing instant protection.

### Advantages

- Two component PUR spray system
- 100% solids reactive resin content
- Solvent free
- No fillers
- 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



## BRITDEX MDP - METHYL METHACRYLATE BRIDGE DECK WATERPROOFING

A Methyl Methacrylate (MMA) waterproofing system comprises of up to three separate environmentally friendly layers each offering different properties to the system. The system offers a 100% effective seamless bridge deck waterproofing membrane and the design of the system means that it is extremely durable and flexible, resulting in its suitability for application to a variety of surfaces and structures.

The rapid curing properties of each element of the **Britdex MDP** system means that substantial areas can be covered in short periods of time making the system extremely cost effective.

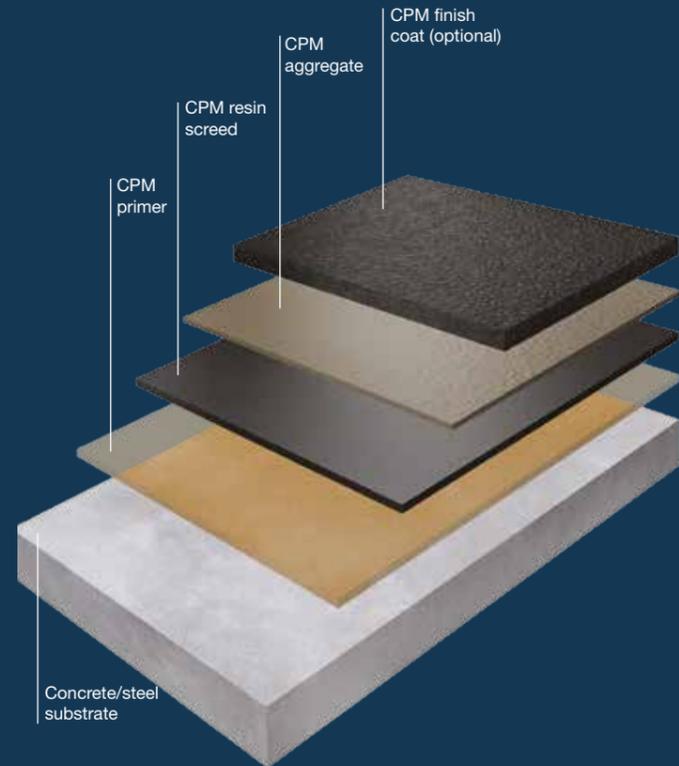
Due to the high durability of the system, it is unaffected by surfacing operations whilst offering excellent bond strengths to both the surfacing and the bridge deck.

### Applications:

- Bridges
- Tunnels (Cut and Cover, Immersed Tube)

### Advantages

- Seamless coating leaving no vulnerable joints
- Quick and easy application with rapid curing properties
- Excellent crack-bridging properties
- Environmentally friendly
- Durable effective protection against corrosion
- Versatile system - accommodates all surface contours, horizontal and vertical
- Application of the waterproof membrane can be one or two coats
- Highways England approved - BD47/99



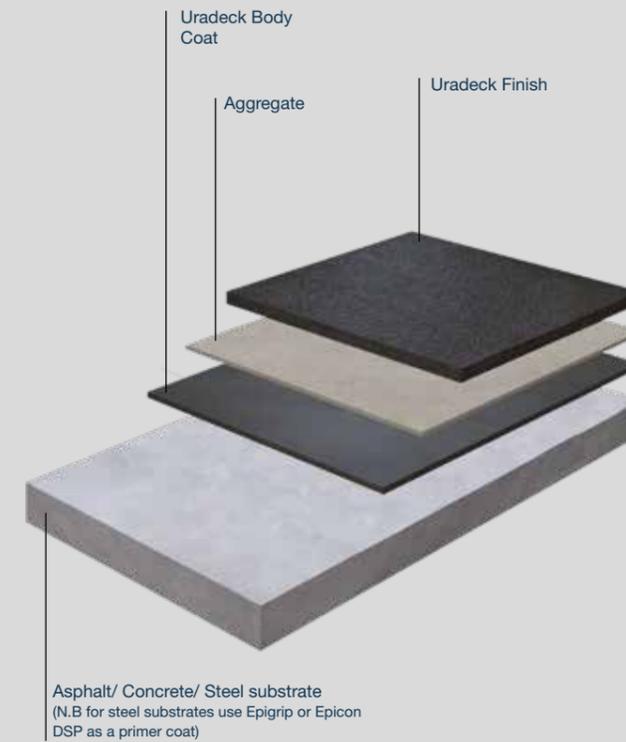
## BRITDEX CPM TREDSEAL - METHYL METHACRYLATE BRIDGE DECK WATERPROOFING

Britdex CPM TredSeal is a combined waterproof wearing system, offering 100% effective waterproofing, wearing course and skid-resistance in a single surfacing layer, many times lighter than mastic asphalt.

Ease and speed of application to concrete, asphalt, steel or aluminium substrates results in minimal possession times and a faster return to service. **CPM TredSeal** can be used on a wide range of structures subject to differing traffic conditions, allowing them to be lighter by design.

### Advantages

- Cost Effective
- Based on BBA approved technology
- Rapid set can be trafficked within two hours
- Easy and quick application
- Aesthetically pleasing finish
- Tough, flexible and hard wearing waterproof membrane
- Versatile surfacing, suitable for application on a number of different surfaces
- This system can be applied even at low temperatures
- Waterproof



## URADECK - POLYURETHANE FOOTBRIDGE & WALKWAY WATERPROOFING

A two component polyurethane body coat characterised by 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
- Car parks
- Rail, air & marine ports
- Ramps & pedestrian footways
- Stadiums & warehouses
- Industrial storage yards

# Structural Bearings

	Page
EKE - Elastomeric (EN1337-3:2005)	29
KE - Fixed & Sliding (EN1337-5)	30
DE - Line Rocker (EN1337-6)	31
GE - Spherical (EN1337-7)	32
FE - Restraint & Guide (EN1337-8)	33
EKR - Rubber Pad & Strip (EN1337-3:2005)	34

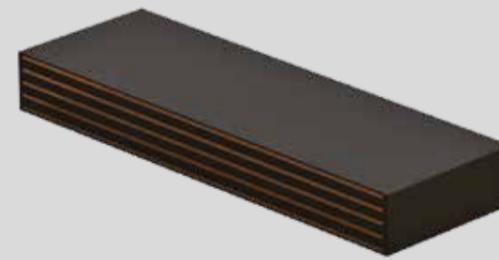
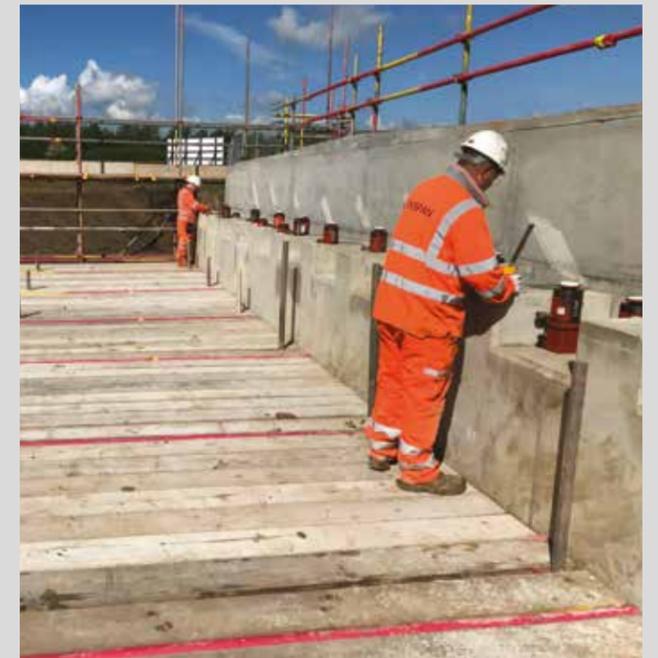


Fig. 1



## EKE - ELASTOMERIC (EN1337-3:2005)

Ekspan laminated elastomeric bearings are produced to the latest Eurocode EN1337-3:2005. Although standard sizes are shown within the literature bespoke bearings can be produced upon request.

Laminated elastomeric bearings consist of natural rubber layers separated by steel plates. Around this makeup a rubber cover encapsulates the bearing (Fig. 1). These items are then vulcanised to create a compact maintenance free bearing. Elastomeric bearings can absorb horizontal movements in every direction and rotational movements around every axis through elastic layers deformation. They are used for short to medium span structures. Once correctly installed these bearings require very little maintenance.

Natural rubber is not too sensitive to changes in temperature and shows only slight growth in deformation, over the period of deformation at a constant load (low creep). Natural rubber is highly resistant against ozone, ageing, UV and chemical effects. The vulcanized steel reinforcement plates meet the requirements of BS1449.

### Advantages:

- Easy to install
- Maintenance free
- Continuous functionality for providing long service life
- Operate well at very high or very low temperatures





### KE - FIXED & SLIDING POT (EN1337-5)

Ekspan KE range of pot bearings are designed to allow the correct transfer of load whilst allowing rotation about all axis. The bearings are also designed to either allow or restrain translations depending on your requirements. The rotation is accommodated by a moulded 60IRHD rubber pad contained within the pot, restrained by a pair or trio of brass piston rings.

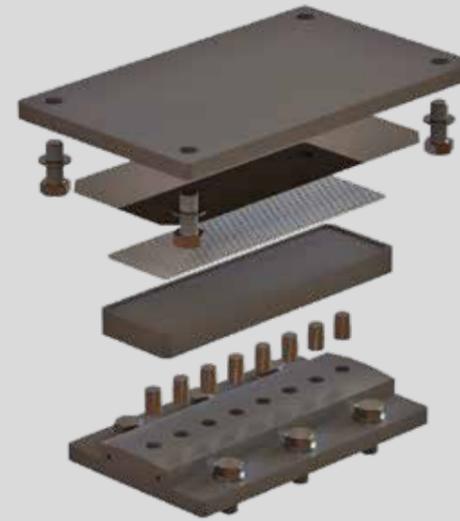
Designed in accordance with EN1337-5

**Load Capacities:**

- Vertical load capacity up to 46,287kN ULS
- Horizontal load capacity up to 3,900kN ULS
- Rotational capacity up to 0.015 radians

**Advantages:**

- Fully welded sliding surfaces
- Fully certified EN compliant materials
- Integrated guides to allow for accurate positioning



### DE - LINE ROCKER (EN1337-6)

Ekspan DE range of rocker bearings are designed to allow the correct transfer of load whilst allowing rotation about a single axis. The bearings are also designed to either allow or restrain translations depending on your requirements. The standard load capacities are shown, however larger bearings can be manufactured upon request.

Designed in accordance with EN1337-6

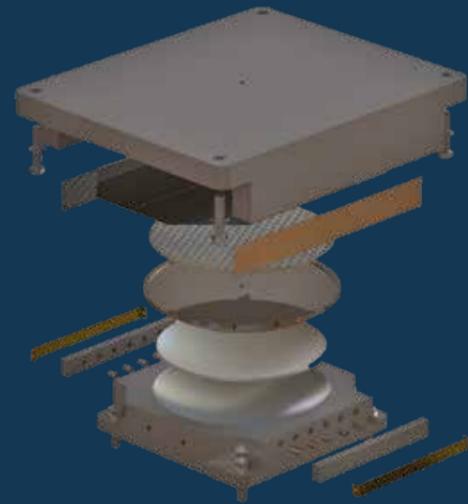
**Load Capacities:**

- Vertical load capacity up to 6,000kN
- Horizontal load capacity up to 593kN
- Rotational capacity up to 0.02 Radians

**Advantages:**

- Fully welded sliding surfaces
- Fully certified EN compliant materials
- 0mm vertical deflection
- Ideal for long span rail structures





## GE - SPHERICAL (EN1337-7)

Ekspan GE range of spherical bearings are designed to allow the correct transfer of load whilst allowing rotation about all axis. The bearings are also designed to either allow or restrain translations depending on your requirements. The rotation is accommodated by a convex stainless steel piston mating against a PTFE sheet, which sits within the concave bearing base.

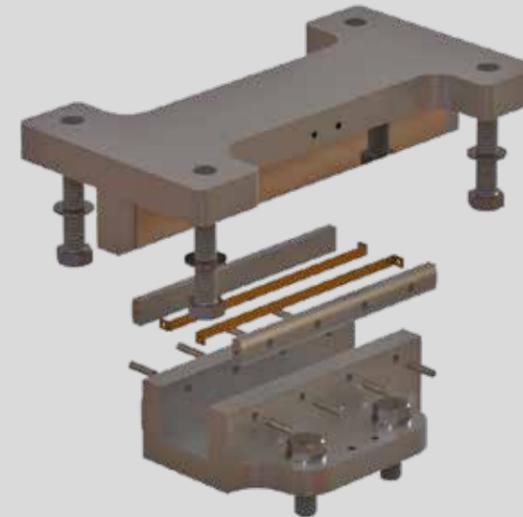
Designed in accordance with of EN1337-7

### Load Capacities:

- Vertical load capacity up to 39,000kN ULS
- Horizontal load capacity up to 6,825kN ULS
- Rotational capacity up to 0.049 Radians

### Advantages:

- Fully welded sliding surfaces
- Fully certified EN compliant materials
- Integrated guides to allow for accurate positioning
- Ideal for highly skewed structures
- Stainless steel spherical piston for added corrosion protection (dependant on size and material availability)



## FE - RESTRAINT & GUIDE (EN1337-8)

Ekspan FE range of restraint and guide bearings are designed to resist only horizontal forces induced into the structure. These bearings are commonly used in conjunction with laminated elastomeric bearings to resist the horizontal forces. The bearings can be designed to allow for rotation about all axis whilst having a capacity of +15mm – 10mm vertical translation, which is very useful for future bearing replacement. This allows the structure to remain restrained during jacking and replacement of the laminated elastomeric bearings, reducing the need for significant temporary works.

Designed in accordance with EN1337-8

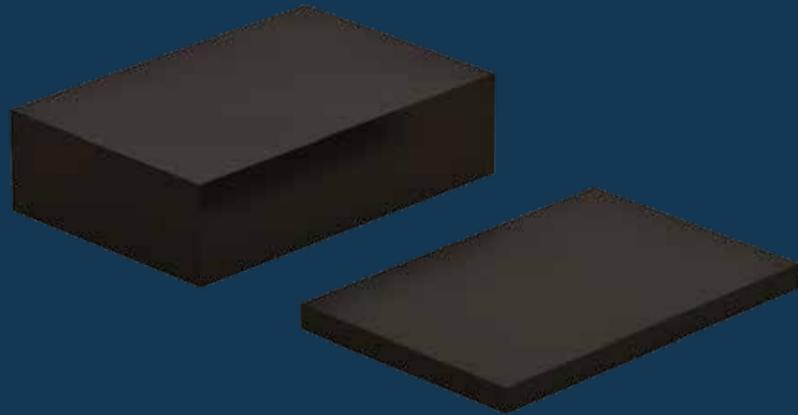
### Load Capacities:

- Vertical load capacity 0kN
- Horizontal load capacity up to 2,300kN
- Rotational capacity up to 0.01 Radians (21FE and 10FE)
- Rotational capacity up to 0.01 radians longitudinally and 0.04radians transversely (31FE)
- Vertical translation of +15mm – 10mm

### Advantages:

- Fully welded sliding surfaces
- Fully certified EN compliant materials
- Vertical translation allows bearing replacement without the need for significant temporary works





### EKR - RUBBER PAD & STRIP (EN1337-3:2005)

**Natural Rubber** strip can be utilised to support a concrete diaphragm and natural rubber pads are used to support individual beams. These products are commonly used where the vertical loads/translations are relatively low.

Where increased vertical load capacity/translations and rotations are required then the preferred option would be to utilise a laminated elastomeric bearing.



# Sub-Surface Bridge Drainage

Honel 325/302 System Page  
36



## HONEL 325/302 SYSTEM - SUB-SURFACE BRIDGE DRAINAGE

**Honel 325** is a long lasting galvanised steel fabricated section designed to remove surface water seepage from the waterproof membrane level of bridge decks, most especially at low points adjacent to expansion joints and kerb lines. This system is unique in that it utilises the flushing box which allows cleaning and maintenance vital to system integrity and life time operation.

It is designed in accordance with Highways England BA26/94 and fully compatible with the **Honel 302** Through Deck System.

The system is Blacktop Heat Proof and polyester resin mortar is used to prevent voids under the channel during installation.

### Drain Section

Each section of drainage channel is 2m long. End stoppers can be used at all open ends to prevent ingress of blacktop.

### Outlets

Designed to suit **Honel 302** through deck tube. Available as straight or 90 degree cranked, 4-way junctions and T- Pieces.

### Joints

Inter-connect drain section on the deck surface. Available as T, cranked joints left hand and right hand Y pieces.

### Transition Piece

Enables convenient access to the **Honel 325 system** for periodic cleaning.

### Flushing Unit Verge Box

Allowing access to system with water jetting equipment for cleaning, removing any silt and evaporative deposits. The flushing verge box is not designed to take any wheel loading therefore must not be installed on the carriageway.

Special arrangements can be made to order if required, for example joints to suit skew angled decks.

Aberdeen Western Peripheral Route



M74 Completion



Mersey Gateway Bridge



A1 Blydton Haugh Viaduct



## PROJECT SNAPSHOTS

**Project:** Aberdeen Western Peripheral Route - Balmedie to Tippetty

**Product(s):** Britdex MDP, Uniflex, Surface Impregnation Britflex BEJ, Britflex NJ, FEBA, Transflex & MEJS

**Client:** Transport Scotland

**Main Contractor:** AWPR Construction JV (Balfour Beatty, Morrison Construction and Carillion)

**Summary:** The Aberdeen Western Peripheral Route / Balmedie to Tippetty (AWPR/ B-T) lies at the intersection of several major roads around the city of Aberdeen in Scotland. The project included the construction of 128km of new roads and access tracks, 2 river crossings at the River Dee and the River Don, 3 wildlife bridges and over 100 other structures.

**Project:** M74 Completion

**Product(s):** Britdex MDP & Britflex BEJ

**Client:** Glasgow City Council

**Main Contractor:** Interlink JV (Sir Robert McAlpine, Morgan Sindall, Balfour Beatty and Morrison Construction)

**Summary:** The M74 completes the 8km link between the M74 at the Fullarton Road junction near Carmyle to the M8 near Glasgow City Centre. The project included the construction of 14 bridges, the largest of these was the 30,000m<sup>2</sup> Port Eglinton Viaduct, which has 12 spans and stretches across several local roads and 12 sets of railway tracks, including the West Coast Main Line.

**Project:** Mersey Gateway Bridge

**Product(s):** Transflex HM

**Client:** Halton Borough Council

**Main Contractor:** Mersey Link CCJV (FCC Construccion, Kier Infrastructure and Samsung C&T Corporation)

**Summary:** The structure is cable-stayed with three pylons and 2.3km long with a river span of 1km. The main bridge deck is made from reinforced concrete and the spans are supported by steel cable stays attached to pylons rising up to between 80 and 125m above the river bed. The sheer scale of the project required the two expansion joints to accommodate 1200mm and 1500mm of movement at each abutment respectively.

**Project:** A1 Blydton Haugh Viaduct

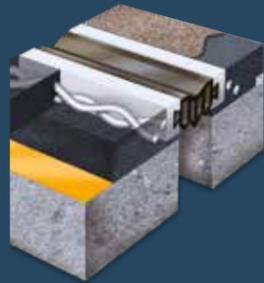
**Product:** Modular Expansion Joint System (MEJS)

**Client:** Highways England

**Main Contractor:** A-one+

**Summary:** The A1 Blydton Haugh Viaduct is located over the River Tyne, Newcastle. The crossing consists of 17 spans constructed of plate girders with a composite concrete deck. The viaduct is approximately 540m long. Works included removal of existing Modular Expansion Joint System during night time road closures and the installation of LG 6 MEJS expansion joint system.

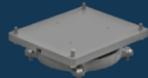
# USL EKSPAN PRODUCT RANGE



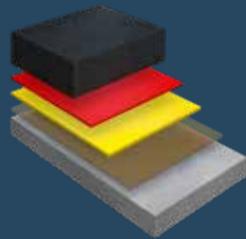
## EXPANSION JOINTS - CD 357

- |   |                                |                                  |
|---|--------------------------------|----------------------------------|
| <b>Uniflex</b> - Buried                   | <b>T-MAT</b> - Mat             | <b>Britflex UCP</b> - Footbridge |
| <b>BP1</b> - Buried                       | <b>Britflex BEJ</b> - Modular  | <b>Finger Joint</b>              |
| <b>FEBA</b> - Flexible Plug               | <b>Britflex MEJS</b> - Modular | <b>Roller Shutter Joint</b>      |
| <b>Britflex NJ</b> - Nosing               | <b>LJ</b> - Longitudinal Joint |                                  |
| <b>EC &amp; EW</b> - Joint Seal           | <b>ES</b> - Joint Seal         |                                  |
| <b>Transflex &amp; Transflex HM</b> - Mat | Aqueduct/Immersed Joint        |                                  |

## STRUCTURAL BEARINGS



- |  |   |                                 |
|--|---|---------------------------------|
| <b>EKE</b> - Elastomeric (EN1337-3)      | <b>D</b> - Line Rocker (BS5400-9)       | <b>Link Bearing</b> (BS5400-9)  |
| <b>KE</b> - Pot (EN1337-5)               | <b>F</b> - Restraint & Guide (BS5400-9) | <b>EA</b> - Sliding Bearing     |
| <b>DE</b> - Line Rocker (EN1337-6)       | <b>G</b> - Spherical (BS5400-9)         | <b>EKR</b> - Rubber Pad & Strip |
| <b>GE</b> - Spherical (EN1337-7)         | <b>J</b> - Roller (BS5400-9)            | <b>EQF</b> - Sliding Bearing    |
| <b>FE</b> - Restraint & Guide (EN1337-8) | <b>K</b> - Pot (BS5400-9)               | <b>Bespoke Bearings</b>         |



## STRUCTURAL WATERPROOFING - CD 358

- |  |   |
|--|---|
| <b>Pitchmastic PmB</b><br>Polyurethane (Pu) Waterproofing System     | <b>Britdex CPM Tredseal</b><br>Combined Waterproofing and Anti Skid Surfacing (MMA) |
| <b>Britdex MDP</b><br>Methyl Methacrylate (MMA) Waterproofing System | <b>Uradeck BC</b><br>Combined Waterproofing and Anti Skid Surfacing (Pu)            |

## SUB-SURFACE BRIDGE DRAINAGE



- Ekspan 325 Channel**
- Ekspan 302 System**
- ES Seal System**

**Project:** Second Severn River Crossing, UK

**Product:** PmB

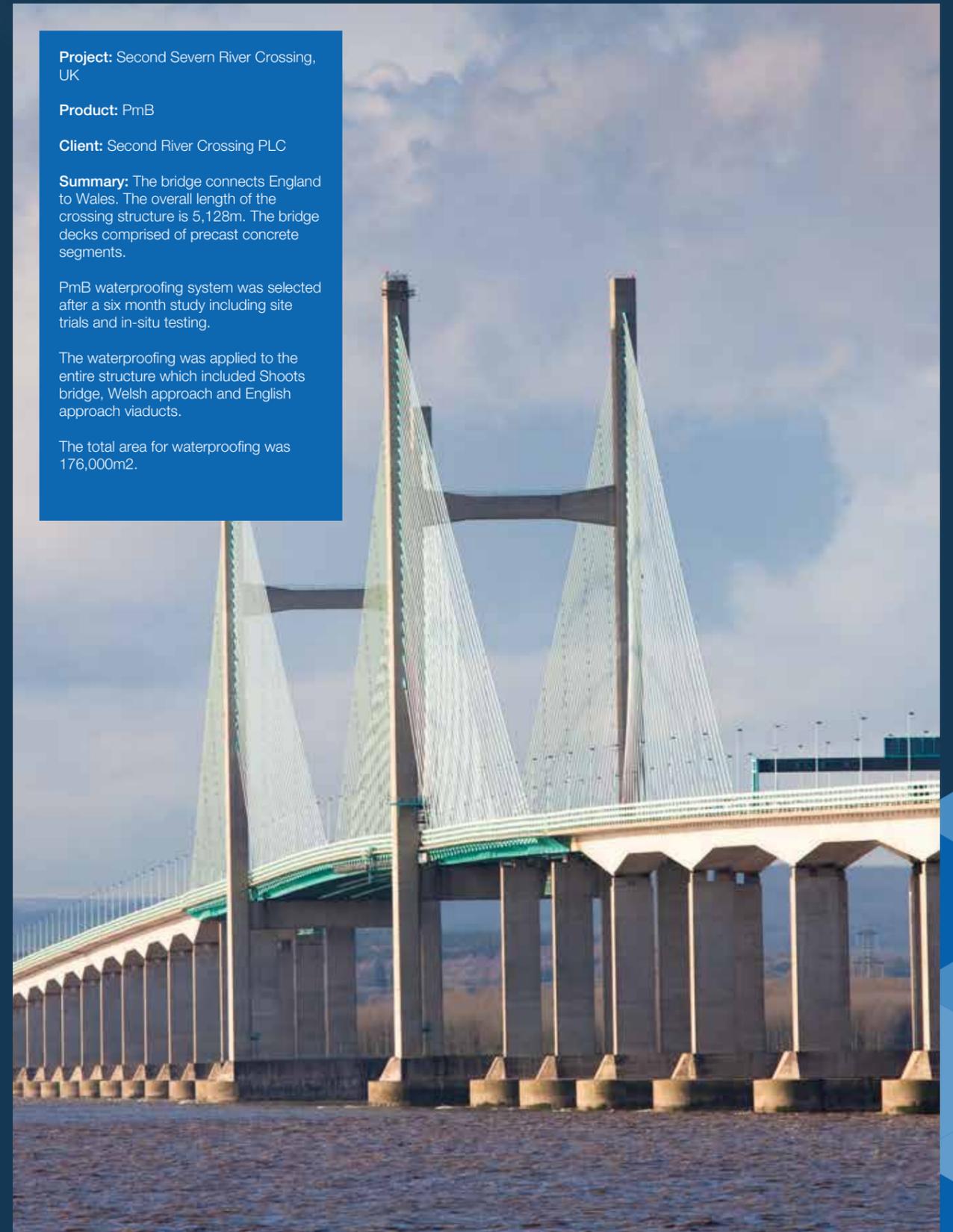
**Client:** Second River Crossing PLC

**Summary:** The bridge connects England to Wales. The overall length of the crossing structure is 5,128m. The bridge decks comprised of precast concrete segments.

PmB waterproofing system was selected after a six month study including site trials and in-situ testing.

The waterproofing was applied to the entire structure which included Shoots bridge, Welsh approach and English approach viaducts.

The total area for waterproofing was 176,000m<sup>2</sup>.





## CONTACT US

### Head Office

Kingston House, 3 Walton Road, Pattinson North,  
Washington, Tyne & Wear, NE38 8QA, UK

**t:** +44 (0) 191 416 1530 **e:** [info@uslekspan.com](mailto:info@uslekspan.com)

### Sales & Manufacturing

Cavendish House, Unit 1, Enterprise 36,  
Tankersley, Barnsley, S75 3DZ, UK

**t:** +44 (0) 114 261 1126 **e:** [info@uslekspan.com](mailto:info@uslekspan.com)

[www.uslekspan.com](http://www.uslekspan.com)