Water, Trapped Within the Surface Layers!

Water, in the form of seepage penetrating the road surfacing or condensation, can collect on the top of the waterproof membrane on bridge decks. Humidity and temperature variations can cause vapour pressure to build up within concrete structures under the waterproof membrane. Over time, water penetrating the road surface will migrate to the lowest point on the deck, which is often adjacent to an expansion joint on a long fall or a kerb line on a cross fall deck, at which point it ponds.

Water, The Common Enemy of Structures?

If water is left unattended, this can lead to problems, and in some cases the damage may be so great that it is irreversible. Seepage water or vapour pressure must be released to prevent damage to the integrity of the deck waterproofing or the road surface.

Below are three common examples of what effect water has on structures:

- **High temperatures** (e.g. during the day) evaporate trapped water, thus generating pressure gradient within the surfacing matrix.
- **Low temperatures** (e.g. winter months) freeze trapped water, resulting in an increase in volume within the surfacing due to ice formation.
- **Passage of traffic**, especially heavy goods vehicles, can cause a pressure wave to run ahead of the wheel in the seepage water which, like ice and vapour can cause severe breakdown of the road surfacing.

Similar mechanisms apply to the condensation under the deck waterproof membrane resulting in ruptures rendering the membrane unserviceable. Once through the membrane, water exploits the hair line cracks in the concrete structure, resulting in further damage by the progressive effects of frost. The risks of not addressing these stress-generating problems are potentially detrimental to the life of the structure.

Why is Sub-Surface Drainage Required?

Excellent drainage systems are required for most structures, especially near expansions joints that are critical to structural endurance where maximum loads, rotations, movements, and contact pressures occur. Poor drainage often leads to water entering the deck causing incipient structural failure of reinforced concrete by a combination of load, flexing, bar corrosion, and concrete spalling.

For any enquiries or advice, please contact us at enquiry@ekspan.co.uk or call 0114 2611126
**The Solution**

Ekspan 300 Series Sub-Surface Drainage Systems are specifically designed to prevent problems caused by poor drainage, hence eliminating any costly repairs.

### 302 Series

![Diagram of 302 Series Drainage System](image)

**Available in DXF Format via Email**

### 325 Series

![Diagram of 325 Series Drainage System](image)

A 90 degree outlet at this point could drain into a 302/51 through deck pipe. Alternatively, an asphaltic plug joint can be bridged using a 325 Expansion unit.

**Use of the 325 system enables collection and direction of water flow at the membrane surface where it is required. This minimizes the need for through deck drain points and subsequent collection pipes. The 325 system is fitted as a retrofit drainage improvement in addition to use on new decks.**

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EKSPAN 300 SERIES

The Ekspan 302/51 and 302/2 through deck drain units provide spot sub surface drain points or wide area water collection when used with the 325 channel system. Corresponding 325 outlets will fit into either of the 302/51 or 302/2 funnel types. These are available in 50mm or 32mm. The 32mm system is ideal to drain a bridge deck between pre-stressed beams in retrofit applications.

<table>
<thead>
<tr>
<th>New Decks</th>
<th>Retrofit</th>
</tr>
</thead>
<tbody>
<tr>
<td>302/51 (C)</td>
<td>302/51 (R)</td>
</tr>
<tr>
<td>Funnel Cover</td>
<td>Funnel Cover</td>
</tr>
<tr>
<td>Temporary Plug</td>
<td>Temporary Plug</td>
</tr>
<tr>
<td>Funnel</td>
<td>Funnel</td>
</tr>
<tr>
<td>Through Deck</td>
<td>Through Deck</td>
</tr>
<tr>
<td>Tube</td>
<td>Tube Square</td>
</tr>
<tr>
<td>Coupler</td>
<td>Fixing Cone</td>
</tr>
<tr>
<td>Temporary Bung</td>
<td>or 45° tip</td>
</tr>
</tbody>
</table>

Most highways applications use the 50mm (302/51) systems to improve discharge capacity.

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Ekspan 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 the Highways Agency BA26/94 and fully compatible with the Ekspan 302 Through Deck System.

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

**Drain Section**
Can be fitted to any required length - standard unit is 2m long. End stoppers are used at all open ends to prevent ingress of Blacktop.

**Outlet Arrangements**
Below the bridge deck the drain units can be linked to water collection pipes or allowed to drain free below via the drip nose attachment. e.g. over non navigable rivers and streams.

- **Flushing Unit Verge Box**
  Allowing access to system with water jetting equipment for cleaning, removing any silt and evaporative deposits.
  Special arrangements can be made to order if required, eg. joints to suit skew angled decks.

- **Transistion Piece**
  For connecting drain section to plastic tube to allow access from flushing unit.

- **Outlet**
  Designed to suit Ekspan 302 through deck tube. Available as straight or 90° 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.

**PRODUCT RANGE**

- **EKSPAN 325 ‘GALVANISED STEEL’**

  For any enquiries or advice, please contact us at enquiry@ekspan.co.uk or call 0114 2611126
ES SEAL SYSTEM (EKSPAN 371)

This product is designed to provide a flexible water seal collector between adjacent structures. The clamp profile is available in corrosion resistant Stainless Steel. Robust rubber seals with various functions, available to required lengths, are employed.

*Seal fitted longitudinally between bridge decks*

*Stainless Steel clamp strip 30 x 10mm drilled to take 12mm bolts*

*Seal suspended below expansion joint*

*Use of Para bolts significantly reduces drilling required*

ES Seal Selection Table

<table>
<thead>
<tr>
<th>Type</th>
<th>Nominal Gap (mm)</th>
<th>Movement Range (mm)</th>
<th>Overall Width (mm)</th>
<th>Bolts (standard capacity)</th>
<th>Weight (kg/m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES200-25</td>
<td>≤ 50</td>
<td>-50 to +40</td>
<td>200</td>
<td>M8 / M10</td>
<td>2.8</td>
</tr>
<tr>
<td>ES240-40</td>
<td>80</td>
<td>-40 to +60</td>
<td>240</td>
<td>M10</td>
<td>4.5</td>
</tr>
<tr>
<td>ES300-70</td>
<td>140</td>
<td>-70 to +65</td>
<td>300</td>
<td>M12</td>
<td>5.4</td>
</tr>
<tr>
<td>ES360-100</td>
<td>200</td>
<td>-100 to +90</td>
<td>360</td>
<td>M12</td>
<td>7.1</td>
</tr>
<tr>
<td>ES400-100</td>
<td>200</td>
<td>-100 to +90</td>
<td>400</td>
<td>M12</td>
<td>8.8</td>
</tr>
</tbody>
</table>

(For further seal applications and data please refer to our Expansion Joints & Seals product catalogue page 18)

ES Seal used as a gulley across expansion joint in bridge structure

Outlet unit can be fitted at required location on site. Corner shapes can be vulcanised to the seal prior to supply.

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EKSPAN PIPE BRACKETS

All component parts are made from stainless steel with welded construction. They are supplied with SS Pipe Clamp Fixings. Mounting bolts can be supplied separately. Please contact us for further information on the types of brackets required.

**UPVC Pipe Components**

- 45° Bend
- 90° Bend
- 88.5° Swept Bend
- Coupler
- Pipe

**Example of Ekspan’s Pipe Brackets**

![Example of Ekspan’s Pipe Brackets](image)

EKSPAN 304 GULLEYS

We offer a quality range of cast iron surface water gulleys ideal for shallow bridge deck construction. There are the options of 100 or 150 diameter outlets, set at either horizontal, vertical, or at 45° to suit your needs.

**UPVC Pipe Components**

- 45° Bend
- 90° Bend
- 88.5° Swept Bend
- Coupler
- Pipe

**Example of Ekspan’s Pipe Brackets**

![Example of Ekspan’s Pipe Brackets](image)

**EKSPAN 304 GULLEY**

Approximate Outline Dimensions (horizontal view)

![EKSPAN 304 GULLEY Approximate Outline Dimensions (horizontal view)](image)

**EKSPAN 304 GULLEY**

Approximate Outline Dimensions (vertical view)

![EKSPAN 304 GULLEY Approximate Outline Dimensions (vertical view)](image)

WHY USE EKSPAN SURFACE OR SUB-SURFACE DRAINAGE SYSTEM?

**Proven Track Record …**

- Market Leader
- Many years of successful use
- Recognised throughout the industry
- Technically superior

**… Yet Innovative**

- Constantly updating
- Responsive to changing needs
- No failures due to silting
- Horizontal elements can be cleaned

**… Ease of Use**

- Simple installation
- Cost effective
- User friendly
- Minimal wastage

**Integrated System …**

- Offers a total system
- Pollution control - water collection
- High flow capacities

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