mageba expansion joints – for lasting driving comfort

TENSA®FLEX Type RC
innovative, easily installed, flexible
Expansion Joints

Product Characteristics & Benefits

Principle
The mageba TENSÀ®FLEX Type RC sliding finger joint is suitable for use in bridges with heavy traffic loading and for movements between 3.9 in and 31.5 in (100 mm and 800 mm). It consists of a steel-elastomer bonded system, and is either fixed directly to the supporting structure with chemical anchors on a prepared surface, or is bolted to a steel substructure which is concreted in place. The finger plates are pre-tensioned downwards as a result of a slight inclination at installation, and the tips of their fingers thus maintain constant contact with the sliding surface at the opposite side of the bridge gap. A watertight drainage channel beneath the joint is designed to accommodate all deck movements.

Properties

Design
The parts of the sliding finger joint together form a simply supported system. Traffic loading is efficiently transferred via the finger plates and sliding surfaces to the supporting structure, with minimal moment effect compared to a cantilever finger joint. The sliding fingers of the TENSÀ®FLEX joint have a slight downwards inclination. This creates a downward pre-tensioning when the finger plates are anchored at one side of the bridge gap, and their fingers make contact with the counter pieces at the other side. This pre-tensioning prevents the sliding fingers from protruding above the driving surface due to bridge settlements or rotations, or due to longitudinal movements of a sloped bridge deck. By avoiding such protrusions, the joint design ensures a flat driving surface and maximizes driver comfort. The finger plates are bolted to the bridge at the joint’s fixed side. The sliding fingers move on a sliding surface which is securely bolted to the other side of the bridge gap. This side also features fixed fingers in the spaces between the sliding fingers. Important: Snow ploughs without protective strips can damage the elastomeric surface of TENSÀ®FLEX sliding finger joints.

Noise Reduction
The geometry of the sliding finger plates and their interlocking partner plates avoids a straight transverse gap in the roadway. The wheels of passing vehicles thus maintain constant contact with the expansion joint’s surface, reducing the noise caused by impacts with the gap edge. This results in low noise emissions and high driver comfort. TENSÀ®FLEX sliding finger expansion joints are thus ideal for use on bridges near residential areas or in other noise-sensitive zones.

Drainage Channel
Beneath the expansion joint, a watertight drainage channel of EPDM, soft PVC or stainless steel is attached. This features rounded end-pieces at both ends, and a flexible discharge outlet at its low point for connection to the bridge’s drainage system. The channel can be easily flushed clear of any accumulated sediment during periodic bridge cleaning activities. To facilitate this, an external hose connection point can optionally be provided in the non-trafficked part of the joint.

If desired, the channel can also be delivered with a dirt-repellent surface, reducing cleaning effort to an absolute minimum.

Benefits
- Lesser loading on the supporting structure compared to a cantilever finger joint
- Use of high-quality steel-elastomer composite system ensures increased durability
- Minimal installation depth; quicker and simpler installation as compared to conventional joint types
- Minimal disruption to traffic during replacement works
- Low noise under traffic due to the design with interlocking fingers on the surface
- High driver comfort due to the special connection and support of the sliding finger plates
- Reliable prevention of protrusion above the driving surface

1 Schematic section showing build-up of joint
2 Drainage channel
3 Hose connection point to simplify cleaning of the drainage channel
Installation of the Joint as a Replacement for Another Type

Thanks to its special connection system with chemical anchors, the TENSAA®FLEX RC joint requires less installation depth than common expansion joint types. This makes the system especially suitable for expansion joint replacement works which require the impact on the supporting structure to be minimized, because the joint lies completely within the depth of the structure's surfacing layer. Furthermore, the replacement works can be carried out in phases, one traffic lane at a time, to also minimize the impact on traffic. Indeed, should it be necessary to allow traffic to use all traffic lanes during peak times, the construction area can be temporarily bridged by specially designed and properly anchored steel plates. These plates, of the so-called “Mini-Fly-Over” traffic management system, are then removed at off-peak times to allow the work to progress.

Replacement of individual Sliding Plates

Due to the modular design of the system, with individual elements of 0.5m length bolted in place, single sliding plates can be easily replaced at any time. In roads with more than one lane, the service life of the TENSAA®FLEX joint can be increased by swapping the finger plates of the heavy vehicles lane with those of the passing / lighter vehicles lane after a number of years of service, to balance out the wear and tear.

Materials

The following high-quality materials are used in the manufacture of TENSAA®FLEX expansion joints:

- Finger plates: ASTM A709 Grade 50 steel
- Support structure: ASTM A709 Grade 36 steel
- Drainage channel of EPDM, soft PVC or stainless steel, according to customer preference

Corrosion Protection

The steel edge profiles are treated with corrosion protection systems based on hot dip galvanizing ASTM A-123 / AASTHO M111, or any applicable painting systems approved by the responsible Department of Transportation (D.O.T.).

<table>
<thead>
<tr>
<th>Type</th>
<th>Movement Capacity</th>
<th>S&lt;sub&gt;min&lt;/sub&gt;</th>
<th>A</th>
<th>B</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>in</td>
<td>mm</td>
<td>in</td>
<td>mm</td>
<td>in</td>
</tr>
<tr>
<td>RC 100</td>
<td>3.9</td>
<td>100</td>
<td>13.4</td>
<td>340</td>
<td>15.0</td>
</tr>
<tr>
<td>RC 200</td>
<td>7.9</td>
<td>200</td>
<td>13.4</td>
<td>340</td>
<td>22.8</td>
</tr>
<tr>
<td>RC 300</td>
<td>11.8</td>
<td>300</td>
<td>13.4</td>
<td>340</td>
<td>18.9</td>
</tr>
<tr>
<td>RC 400</td>
<td>15.7</td>
<td>400</td>
<td>13.4</td>
<td>340</td>
<td>22.8</td>
</tr>
<tr>
<td>RC 500</td>
<td>19.7</td>
<td>500</td>
<td>13.4</td>
<td>340</td>
<td>26.8</td>
</tr>
<tr>
<td>RC 600</td>
<td>23.6</td>
<td>600</td>
<td>16.4</td>
<td>370</td>
<td>31.5</td>
</tr>
<tr>
<td>RC 700</td>
<td>27.6</td>
<td>700</td>
<td>16.4</td>
<td>370</td>
<td>35.4</td>
</tr>
<tr>
<td>RC 800</td>
<td>31.5</td>
<td>800</td>
<td>16.4</td>
<td>370</td>
<td>39.4</td>
</tr>
</tbody>
</table>
Quality & Support

Quality
For five decades, mageba expansion joints have proven their worth in thousands of structures under the most demanding conditions. In addition to the product properties, the extensive experience of our well-qualified manufacturing and installation staff also contributes to the high quality and durability of the products.

mageba has a process-oriented quality system. In addition, its quality is regularly inspected by independent testing institutes. mageba factories are AISC certified for Major Bridges (CPT, STD, SPE) and also maintain AWS certifications for D1.1 and D1.5.

Tests and National Approvals
TENSA®FLEX RC sliding finger joints have been subjected to extensive testing and analysis to verify their properties and performance. The anchorage, for example, has been thoroughly tested in dynamic fatigue tests, with $2 \times 10^6$ load cycles at a frequency of 2.75 Hz and loads of up to 31.5 kips (140 kN). Under this loading, the anchorage fulfilled the demanding requirements of the AASHTO CRFD standard. The system has also been awarded with national approvals in numerous countries around the world.

Installation
After the preparation of a suitable, flat surface, the holes for the chemical anchors are drilled with the help of a template. The drainage channel and connecting structure waterproofing are then installed. Finally, the elements of the TENSA®FLEX joint are lifted into position by hand and bolted down, and the road surfacing adjacent to the joint is completed.

Customer Support
Our product specialists will be pleased to advise you in the selection of the optimal solution for your project, and to provide you with a quotation.

On our website, mageba-group.com, you will find further product information, including reference lists and tender documentation.

Related Products
The following mageba products can be used in combination with TENSA®FLEX sliding finger joints:

- **ROBO®DUR**: Strengthening ribs of special mortar, which reinforce the asphalt adjacent to the joint. These reduce rutting while increasing driver comfort and the durability of the joint
- **STATIFLEX®**: Strengthening strip of quick-hardening polymer concrete along the side of an expansion joint, which reduces rutting while increasing driver comfort and joint durability
- **ROBO®MUTE**: Noise-protection system, consisting of mats placed beneath the joint to reduce noise emissions

Reference Projects with mageba Expansion Joints

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audubon Bridge, LA (US)</td>
<td></td>
</tr>
<tr>
<td>Route 9G Bridge, NY (US)</td>
<td></td>
</tr>
<tr>
<td>Port Mann Bridge (CA)</td>
<td></td>
</tr>
<tr>
<td>Golden Ears Bridge (CA)</td>
<td></td>
</tr>
<tr>
<td>Deh Cho Bridge (CA)</td>
<td></td>
</tr>
<tr>
<td>Pont de Beauharnois (CA)</td>
<td></td>
</tr>
</tbody>
</table>

mageba Expansion Joint Types

- Single Gap Joints
- Cantilever Finger Joint
- Sliding Finger Joints
- Modular Expansion Joints

mageba LLC - 1384 Broadway, 4th Floor - New York, NY 10018 - USA - T +1 212-644-3335 - info.us@mageba-group.com
mageba LLC - 900 E Hamilton Avenue, Suite 100 - Campbell, CA 95008 - USA - T +1 917-747-9022 - info.us@mageba-group.com
mageba LLC - 5455 De Gaspe Ave. Suite 710 - Montreal, Quebec, H2T 3R3 - Canada - T +1 438-834-1450 - info.ca@mageba-group.com