mageba expansion joints – for lasting driving comfort

TENSA®CRETE Type RE and RE-LS
easy to install, noise-reducing, durable
Features & Benefits

Introduction
The TENSA®CRETE type RE and RE-LS single-gap joint systems are expansion joints for gap widths up to 3” (76 mm) for the RE type and 4” (101 mm) for the RE-LS type (these values can vary depending on the construction standard).

Type RE-LS is also equipped with a noise-reducing surface in the form of “sinusoidal plates”. This results in noise reduction of up to 80%.

The steel edge profiles of the TENSA®CRETE expansion joints are anchored in ROBO®FLEX waterproof polymer concrete. The joints are suitable for new constructions as well as for refurbishment projects. A major advantage is the fast and cost-effective installation of the system, because the joint is only installed in the cross-sectional area of the wearing surface and no further interference with the underlying carrying construction takes place.

Area of Application
The TENSA®CRETE expansion joint is mainly used for asphalt and concrete connections and can be installed on virtually all new and existing bridges. Due to its low installation depth, it is particularly suitable for retrofitting in cases where bituminous expansion joints are rolled out or are fissured as a result of intensive use. The same applies to the replacement of worn mat joints (e.g. those damaged by heavy snow clearing equipment). The fast installation time of TENSA®CRETE expansion joints and the additional possibility of phased assembly combine to reduce traffic congestion.

Product Characteristics
- Movements in all three axes and rotations of the bridge are possible without constraints
- Gap widths, depending on the standard, up to 3” (76 mm) for RE type and 4” (101 mm) for RE-LS type
- Short setting time of concrete, with traffic able to pass over again in just 4 or 6 hours after installation
- Lane-by-lane installation is possible – resulting in reduced traffic congestion
- Easy adaptation to various materials and thicknesses of adjoining structures
- Joints are 100% water-tight
- Resistant to wear and chemicals
- Up to 80% noise reduction with the noise-reducing sinusoidal plates for the RE-LS type

Anchoring
No additional reinforcement or anchoring is necessary with the TENSA®CRETE expansion joints. All loads are transmitted directly through the bond between the polymer concrete and the substructure. To allow the transmission of forces into the adjacent structural elements, the surface of the recess must have a minimum tensile bond strength of 220 psi (1.5 N/mm²) for concrete or 440 psi (3.0 N/mm²) for steel. ROBO®FLEX should not be applied to new concrete within 14 days of pouring.

Installation
The installation of the TENSA®CRETE expansion joints and the insertion of the ROBO®FLEX polymer concrete must be carried out by qualified and certified personnel. The on-site coordination of these activities is carried out by our experienced project managers.

Customer Benefits
- Ideal replacement for bituminous expansion joints and mat joints
- Minimal traffic impacts for refurbishment projects
- Quicker and easier installation than conventional joints
- No impact on the main structure
- Improved noise protection through noise-reducing surface
- Work can be carried out by own qualified personnel

Anchoring
No additional reinforcement or anchoring is necessary with the TENSA®CRETE expansion joints. All loads are transmitted directly through the bond between the polymer concrete and the substructure. To allow the transmission of forces into the adjacent structural elements, the surface of the recess must have a minimum tensile bond strength of 220 psi (1.5 N/mm²) for concrete or 440 psi (3.0 N/mm²) for steel. ROBO®FLEX should not be applied to new concrete within 14 days of pouring.

Installation
The installation of the TENSA®CRETE expansion joints and the insertion of the ROBO®FLEX polymer concrete must be carried out by qualified and certified personnel. The on-site coordination of these activities is carried out by our experienced project managers.

Customer Benefits
- Ideal replacement for bituminous expansion joints and mat joints
- Minimal traffic impacts for refurbishment projects
- Quicker and easier installation than conventional joints
- No impact on the main structure
- Improved noise protection through noise-reducing surface
- Work can be carried out by own qualified personnel
Material Properties & Installation

**Materials**
The following high-quality materials are used in the manufacture of TENSA®GRIP expansion joints:

- Edge profiles available in the following grades:
  - ASTM A36 Grade 36
  - ASTM A709 Grade 36
  - ASTM A709 Grade 50
  - ASTM A588 Grade 50
- Sealing profile in Neoprene tested according to ASTM D5973
- Hybrid profiles with stainless steel top flange can also be supplied on request

**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).

**Water-tightness**
The TENSA®CRETE expansion joint is 100% water-tight due to mageba’s proven sealing profile. This sealing profile has been in use for decades, and is continuously enhanced and optimized. The profile has special sealing points to prevent the ingress of water. Should the sealing profile become damaged by external mechanical impact, it can be replaced in a fast and cost-effective manner.

**ROBO®FLEX Polymer Concrete**
The measured material properties of the ROBO®FLEX polymer concrete are as follows:

<table>
<thead>
<tr>
<th>Property</th>
<th>Metric</th>
<th>Imperial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressive strength (Prism 40×40×160 mm, 28 d)</td>
<td>at least 22.3 N/mm²</td>
<td>3,240 psi</td>
</tr>
<tr>
<td>Tensile strength (Prism 40×40×160 mm, 28 d)</td>
<td>at least 7.4 N/mm²</td>
<td>1,080 psi</td>
</tr>
<tr>
<td>E modulus (Prism 40×40×160 mm, 28 d)</td>
<td>at least 55 N/mm²</td>
<td>7,980 psi</td>
</tr>
<tr>
<td>Bond to sand-blasted steel</td>
<td>at least 3.0 N/mm²</td>
<td>440 psi</td>
</tr>
<tr>
<td>Bond to sand-blasted concrete</td>
<td>at least 1.5 N/mm²</td>
<td>220 psi</td>
</tr>
<tr>
<td>Pot life</td>
<td>at least 10 minutes</td>
<td></td>
</tr>
</tbody>
</table>

The application surface temperature and air temperature for the installation of the ROBO®FLEX polymer concrete must be between 46.4 °F and 86 °F (8 °C and 30 °C). Depending on the temperature, the polymer concrete will be ready to withstand traffic loads within 4 to 6 hours curing time.

**Installation Process**

After uncovering the recess – by removing the previously laid asphalt layer or the old joint – the next steps for the installation of TENSA®CRETE expansion joint are as follows:

1. **Surface preparation**
   Pre-treatment (e.g. sand blasting) of concrete or steel surface in the recess so that it reaches the tensile bond strength of 220 psi (1.5 N/mm²) for concrete or 440 psi (3.0 N/mm²) for steel.

2. **Setting up the profiles**
   Lining and leveling of the edge profiles.

3. **Laying the polymer concrete**
   The ROBO®FLEX polymer concrete is mixed, poured and cured to form a smooth carriageway surface. Due to its excellent distribution properties, no cavities are left and no additional compaction is necessary. The polymer concrete reaches the compressive strength required to withstand the traffic loads within 4 to 6 hours (depending on temperature).

4. **Sealing profile**
   Insertion of the mageba sealing profile over the entire length of the joint if the latter has been installed in stages (e.g. lane-by-lane). Otherwise, the sealing profile is previously installed in the factory.
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.

Testing
The ROBO®FLEX polymer concrete has been specially developed for the TENSACRETE expansion joints. The ROBO®FLEX polymer concrete has undergone extensive testing conducted in collaboration with the University of Innsbruck (Austria) with regard to wear and tear, loading and durability. The tests showed that ROBO®FLEX is capable of withstanding 2 million load cycles at loads of up to 35.9 kips (160 kN) without failure. The failure occurred in each case in the underlying support structure, rather than at the interface between ROBO®FLEX and concrete, or steel surface respectively.

Tenders
The following text elements can be used for the preparation of tender documents with RE type TENSACRETE expansion joints:
- Delivery and installation of a water-tight expansion joint structure made of steel with polymer concrete anchoring in accordance with the static and constructive requirements
- Installation over the entire superstructure width
- Overall dilatation: 3” (76 mm)
- All steel surfaces should be prepared at the factory with SA 3 sandblasting quality grade
- Fatigue strength verification by an independent testing authority (at least 2×10^6 cycles under traffic-related loads)
- Type designation: mageba TENSACRETE RE type or equivalent
- Polymer concrete: mageba ROBO®FLEX or equivalent
- Bill of quantities based on the construction length in the horizontal axis profile

Additional / alternative for the RE-LS type:
- Design of the joint using a noise-reducing surface
- Overall dilatation: 4” [101 mm]
- Type designation: mageba TENSACRETE RE-LS type or equivalent

Quotations
In order to be able to provide a quotation we require the following data:
- A detailed drawing of the adjoining areas (cross and longitudinal sections of the bridge)
- Expansion joint movement range, including the direction of movements
- Noise reduction requirements

Execution Planning
In addition to the previously provided information, we need the following documentation when an order is confirmed:
- Layout plan of the construction
- Pre-setting values
- Drawings showing services
- Other particulars

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.

Reference Projects with mageba Expansion Joints

Audubon Bridge, LA (US)  New NY Bridge, NY (US)  Bayonne Bridge, NY (US)  Golden Ears Bridge (CA)  Port Mann Bridge (CA)  Pont de Beauharnois (CA)

mageba Expansion Joint Types

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