



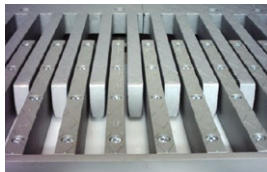
Expansion joints

Infrastructure | Buildings | Industrial structures

# mageba expansion joints – for lasting driving comfort



**TENSA® FINGER Type GF**  
advanced, reliable, durable



**mageba**



## Expansion joints

# Product Characteristics & Benefits

### Principle

The mageba TENSA®FINGER GF sliding finger joint is suitable for use on bridges with heavy traffic loading and movements of between 4.7 inches (120 mm) and 39.3 inches (1,000 mm) or more. It contains steel edge profiles, featuring connection surfaces for deck waterproofing membranes, which are connected to the bridge deck by anchor loops. The steel finger plates which are supported by these edge profiles are pre-stressed downwards by springs to prevent uplift. A drainage channel, hanging beneath the joint and connected to the edge profiles, is designed to accommodate all bridge movements.

### Properties

#### Design

The sliding finger plates, resting on the edge profiles, behave statically as simply supported beams. Traffic loading is transferred from the sliding plates to the edge profiles and into the supporting structures, with minimal moment effect compared to a cantilever finger joint.

The finger plates rest on plastic bearings at the fixed side of the joint, and are held in place by high-strength friction-grip bolts. A sliding bearing pad is attached to the underside of each finger, at its outer end. These sliding pads move on stainless steel or GRP sliding sheets on the edge structure at the sliding side of the joint. At the same location, fixed fingers are securely bolted to the edge structure in the gaps between the fingers of the sliding plates.

Special stainless steel springs, which connect the sliding plates to the edge structure at the fixed side of the joint, create a constant downward prestressing and thus prevent the sliding fingers from protruding above the driving surface, even in the case of settlement or rotation of the structure. This prevents damage to the joint, e.g. from snow-clearing vehicles. The constant prestressing also prevents protrusion of the fingers above the driving surface as the joint opens and closes, where the joint is installed on a bridge deck with a high gradient and horizontal bearings.

### Noise Reduction

The geometry of the interlocking fingers 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. TENSA®FINGER sliding finger expansion joints are thus ideal for use on bridges near residential areas or in other noise-sensitive zones.

### Surface Profiling

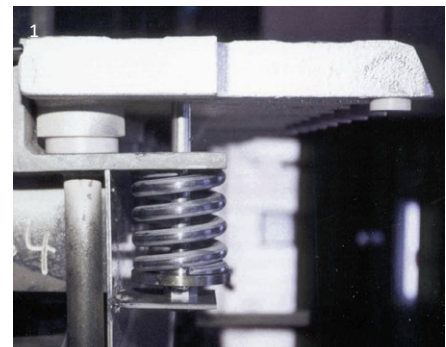
To improve the ability of vehicle wheels to grip the surface of the joint's finger plates, they can optionally be delivered with a  $\frac{1}{16}$ " (2 mm) deep surface pattern. This improves traffic safety, especially on joints with large movements and thus large surface areas.

### Benefits

- Causes less loading on the supporting structure as compared to a cantilever finger joint
- Use of steel and stainless steel ensures a long service life
- Robust, durable construction with well-proven design
- Optimized life-cycle costs due to high product quality
- Improved noise protection due to interlocking of fingers
- High driving comfort due to special fixing and bearing of sliding finger plates

### 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 gathered 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.



- 1 Spring system
- 2 Surface pattern of sliding fingers and opposing fixed fingers



# Material Properties & Dimensions

## Materials

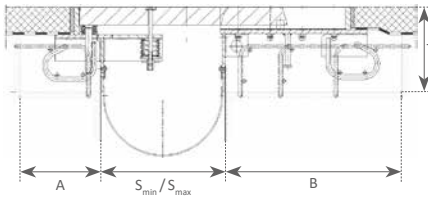
The following high-quality materials in particular are used for the manufacturing of TENSA®FINGER sliding finger joints:

- Finger plates: ASTM A709 Grade 50 steel
- Support structure: ASTM A709 Grade 36 steel
- Fixed and sliding bearings of polyamide
- Sliding sheet of stainless steel
- Springs of stainless 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.).

## Main Dimensions



Type	Movement capacity		S <sub>min</sub>		S <sub>max</sub>		A		B		T		Weight	
	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	lb/ft	kg/m
GF 120	4.7	120	6.2	157	10.9	277	13.8	350	13.8	350	13	330	215	320
GF 240	9.5	240	8.1	207	17.6	447	13.8	350	18.5	470	13.8	350	329	490
GF 360	14.2	360	10.3	262	24.5	622	13.8	350	26	660	14.2	360	440	655
GF 480	18.9	480	12.3	312	31.2	792	13.8	350	30.3	770	14.6	370	558	830
GF 600	23.6	600	13.8	352	37.5	952	13.8	350	35	890	15	380	692	1,030
GF 800	31.5	800	17.4	442	48.9	1,242	13.8	350	42.9	1,090	15.4	390	893	1,330
GF 1000	39.4	1,000	20.7	525	60.3	1,532	13.8	350	50.8	1,290	15.7	400	1,129	1,680

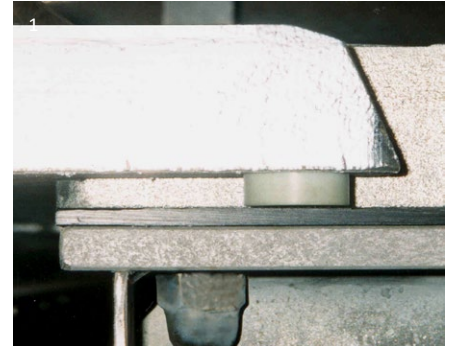
(Dimensions for larger movements on request)

## Shuttering Plates

Steel shuttering plates not only provide support to the fresh concrete during pouring, considerably reducing construction effort, but also serve as a connection surface for the drainage channel. They can alternatively be made from stainless steel to enhance their durability.

## Replacement of Individual Sliding Plates

Due to the modular design of the system, with individual elements of 19.7 inches (0.5 m) length bolted in place, single sliding plates can be easily replaced at any time.



- 1 Sliding bearing
- 2 Drainage channel
- 3 Installation of a joint
- 4 Installed joint



## Expansion joints

# 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-orientated 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®FINGER sliding finger joints have been subjected to extensive testing and analysis to confirm their properties and performance. For example, the joint was tested with  $2 \times 10^6$  load cycles at a frequency of 3.2 Hz and loads of up to 35.9 kips (160 kN). Under this loading, the system 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

The expansion joint is pre-assembled in the factory and fixed at the desired pre-setting value (gap width) by cross-beams. mageba installation technicians precisely position the joint on the main structure, and fix its anchorages to the structure's reinforcement. The concrete is then poured, fully securing the joint to the bridge. The stainless steel springs are not prestressed until the concrete has achieved sufficient strength.

### Related Products

The following mageba products can be used in combination with TENSA®FINGER 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

**ROBO®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

### 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](https://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)



Route 9G Bridge, NY (US)



Port Mann Bridge (CA)



Golden Ears Bridge (CA)



Deh Cho Bridge (CA)



Pont de Beauharnois (CA)

### mageba Expansion Joint Types



Single Gap Joints



Cantilever Finger Joint



Sliding Finger Joints



Modular Expansion Joints

**mageba**  
mageba-group.com

engineering connections®