



Expansion joints

mageba expansion joints – for lasting driving comfort



TENSA[®] FINGER Type GF

advanced, reliable, durable



mageba
Switzerland www.mageba.ch



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 120 mm and 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 prestressed 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 carriageway. The wheels of over-rolling 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

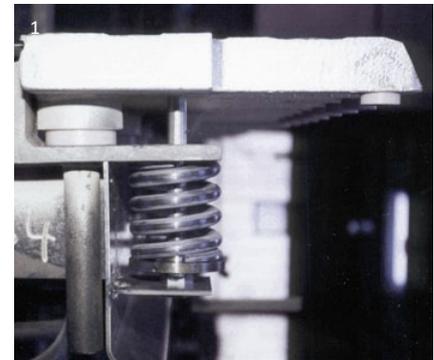
To improve the ability of vehicle wheels to grip the surface of the joint's finger plates, they can optionally be delivered with a 2mm-deep surface pattern. This improves traffic safety, especially on joints with large movements and thus large surface areas.

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
- Optimised life-cycle costs due to high product quality
- Improved noise protection thanks to interlocking of fingers
- High driving comfort thanks 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

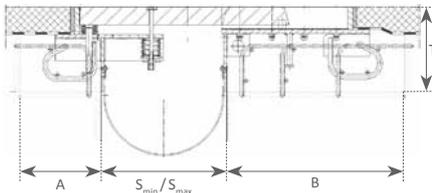
The following high-quality materials in particular are used for the manufacturing of TENSA®FINGER sliding finger joints:

- Edge profiles and sliding finger plates of S235 steel or a higher grade steel if desired
- 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 profiles are treated with corrosion protection systems based on ISO 12944 as standard, or on applicable national standards (e.g. ZTV-ING, ASTRA, RVS, ACQPA) as required.

Main dimensions



Type	Movement capacity	S _{min}	S _{max}	A	B	T	Weight
	mm						
GF 120	120	157	277	350	350	330	320
GF 240	240	207	447	350	470	350	490
GF 360	360	262	622	350	660	360	655
GF 480	480	312	792	350	770	370	830
GF 600	600	352	952	350	890	380	1'030
GF 800	800	442	1'242	350	1'090	390	1'330
GF 1000	1'000	525	1'532	350	1'290	400	1'680

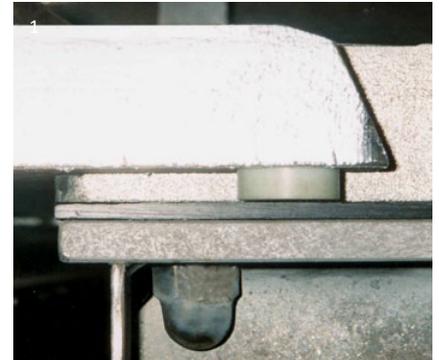
(Dimensions for larger movements on request)

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

Thanks to the modular design of the system, with individual elements of 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



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 that is certified in accordance with ISO 9001:2008. Quality is also frequently inspected by independent institutes, such as the materials testing body (MPA) of the University of Stuttgart. mageba factories are certified for welding in accordance with ISO 3834-2, and according to the current steel construction standard EN 1090.

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 2×10^6 load cycles at a frequency of 3.2 Hz and loads of up to 160 kN. Under this loading, the system fulfilled the demanding requirements of the Austrian RVS 15.45 standard. The system has been awarded national approvals in numerous countries around the world, such as Switzerland and Austria.

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

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, www.mageba.ch, you will find further product information, including reference lists and tender documentation.

Reference projects TENSA®SLIDE Type GF



Audubon Bridge (USA)



Europe Bridge (AT)



Traismauer Bridge (AT)



Bridge Glattzentrum (CH)



Westumfahrung ZH (CH)



Hard Bridge (CH)

mageba expansion joint types



Single gap joints



Cantilever finger joint



Sliding finger joints



Modular expansion joints



engineering connections®