



Structural bearings

Infrastructure | Buildings | Industrial structures

# mageba structural bearings – mastering loads and movements



Glattalbahn Viaduct, Switzerland

## RESTON® POT bearings

well-proven, versatile, durable



**mageba**



# Design and types

## Principle

mageba RESTON®POT bearings ensure the controlled transfer of loads between a structure's superstructure and its substructure. They also accommodate rotations about any axis and – where appropriate – movements of the superstructure. RESTON®POT bearings are generally suitable for use in any type of structure, and can be subjected to low or high loading and frequent movements and rotations.

mageba RESTON®POT bearings are designed and manufactured, per customer requirements, in accordance with relevant standards such as EN 1337, AASHTO, BS 5400, AS5100.4, BRO or IRC:83.

## Components

RESTON®POT bearings consist primarily of a steel pot ① with a lid ②, inside of which is placed an elastomeric pad ③. Under high pressure, the elastomeric pad behaves like a fluid, and allows rotations of the lid and thus of the superstructure to which it is connected.

Depending on whether the pot bearing is fixed, guided sliding or free sliding, it must resist some combination of vertical and horizontal loads, and perhaps also allow movements along one horizontal axis or along all.

In the case of guided sliding and free sliding pot bearings, the upper surface of the lid features a sliding surface of PTFE ④. Together with the sliding plate ⑤ above it, this accommodates longitudinal and/or transverse sliding movements of the superstructure. To reduce frictional resistance and thus horizontal forces to a minimum, the lower surface of the sliding plate features a polished stainless steel sheet. In the case of bearings which should allow movement along one axis only, the direction of movement is controlled by central or external guide bars ⑥. The sliding surface should be protected from dust and debris by a rubber apron, which can be easily removed for inspections. Alternatively, a horizontal protective cover (concertina type with folding sheet) can be used.

The bearing is connected to the superstructure and the substructure by means

of anchor dowels ⑦ or threaded sleeves (depending on design), or alternatively by means of separate anchor plates with shear studs.

Sliding bearings, whether accommodating movements in one direction only or in all directions, can also be equipped, if desired, with external movement scales. These indicate the horizontal movement of the bearing, and thus also that of the superstructure.

## Types

RESTON®POT bearings are designated TF, TE or TA depending on their ability to accommodate sliding movements:

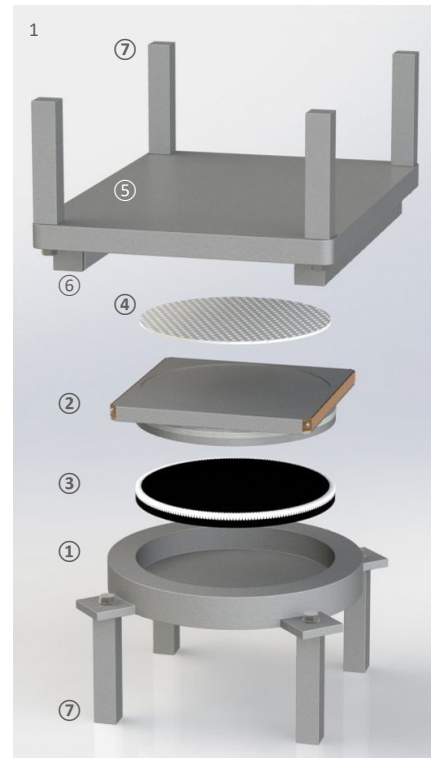
- TF: "Fixed" – The bearing resists horizontal forces in every direction, allowing no sliding movements
- TE: "Guided sliding" – The bearing allows sliding movements along one horizontal axis, and resists forces in a perpendicular direction
- TA: "Free sliding" – The bearing allows horizontal sliding movements in all directions, transmitting no external horizontal forces

## Materials

The following high-quality materials are used in the manufacture of RESTON®POT bearings:

- Steel parts of grade S355 steel
- Elastomeric pad of natural rubber
- Sealing chain of POM
- Certified PTFE with grease dimples
- Certified silicone grease as lubricant
- Sliding sheet of polished, certified austenitic stainless steel (grade 1.4404)
- Sliding strips of 3-layer CMI material (DUB)
- Corrosion protection according to environmental conditions and customer requirements

- 1 Build-up of a TE bearing featuring external guide bars
- 2 Installed TA bearing showing movement scale
- 3 Installed TA and TF bearings with anchor plates



# Properties and installation

## Anchoring

Depending on design, bearings are connected to the superstructure and substructure by means of anchor dowels or threaded sockets, or by anchor plates with shear studs. Anchor dowels are suitable for the transmission of horizontal forces in the case of guided sliding (TE) and fixed (TF) bearings. Threaded sockets are suitable for free sliding (TA) bearings without anchor plates.

The use of anchor plates simplifies future bearing replacement. The number of shear studs on each anchor plate depends on static design requirements. Mixed designs, with anchor plates only above or below, or anchor plate strips, are also possible.

## Sealing chain

The heart of a RESTON®POT bearing is its elastomeric pad. To ensure that it functions properly and reliably, it requires a sealing element at the gap between the bearing's pot and lid. For this purpose, mageba uses a POM sealing chain. In contrast to common brass seals, which simply rest on top of the elastomeric pad, the POM sealing chain is vulcanised into the pad, becoming an integral part of it. The potentially serious consequences of poorly placed sealing rings are thus avoided. The POM sealing chain offers the following advantages:

- Secure anchoring in the elastomeric pad
- Hard, highly wear-resistant plastic (POM)
- Individual links which can freely adapt to any deformations

## Sliding materials

For sliding bearings, mageba uses only PTFE of certified bridge bearing quality. The sliding surfaces feature grease dimples to enable grease to be stored. Certified silicone grease, which maintains its consistency and remains effective even at  $-35^{\circ}\text{C}$ , is used. To keep frictional resistance as low as possible, the lower surface of the sliding plate features a polished stainless steel sheet.

## Installation

RESTON®POT bearings must be handled with proper care during unloading and installation. Sliding surfaces, movement indicators and corrosion protection are particularly susceptible to damage and must be protected accordingly.

Bearings are pre-assembled in the factory. Anchor dowels and threaded sockets are generally delivered loose, to optimise volume for transport. The bearing's pot, lid and sliding plate are bolted together for transport by means of temporary fittings.

- **Pre-setting:** The exact pre-setting values must be made known before commencement of fabrication, because pre-setting always takes place in the factory. Only trained experts may adjust the pre-setting on site.
- **Positioning:** The bearing location plan is the key element in the correct installation of the bearings. The structure's axes are marked on the bearings by grooves. This enables the bearings to be positioned precisely. The height is adjusted and horizontalness ensured by means of regulating screws. The reference point for the installation height is the middle of the cover or sliding plate.
- **Fixing:** After positioning, the anchor recesses (if any) are concreted. The subsequently placed mortar bed should not be more than 50 mm thick; the use of mortar which is able to flow beneath the bearing is recommended.
- **Taking into service:** The bearing must be able to move freely as soon as it is connected to both superstructure and substructure. This requires the temporary transport fittings to be cut and removed.



- 1 A TE bearing with anchor plates
- 2 POM sealing chain
- 3 A TE bearing with removable rubber dust protection apron
- 4 Optional console for 3-point levelling surface



# Quality and support

## Quality

Over the past five decades, mageba has supplied over 50,000 structural bearings for projects all around the world. The quality and durability of mageba bearings is thus ensured not only by their well-proven product properties, but also by the extensive experience of our personnel.

mageba operates a process-oriented quality system that is certified in accordance with ISO 9001:2008. Quality is also regularly checked by independent bodies such as the materials testing institute (MPA) of the University of Stuttgart. mageba factories are approved for welding in accordance with ISO 3834-2, and certified in accordance with the current steel construction standard EN 1090.

## CE conformity

RESTON®POT bearings that are designed and manufactured in accordance with EN 1337 are marked with the CE label. This indicates that they fulfil all requirements of the standard and that the manufacturing facilities are systematically and regularly inspected by an independent certification body. RESTON®POT bearings can also be manufactured in accordance with German standards (and marked with a Ü-label), or Austrian standards.

## Optional features

Depending on customer and national requirements, RESTON®POT bearings can additionally be equipped with the following features:

- 3-point levelling surface for precise levelling of the bearing
- Folding sheet as horizontal dust protection for the sliding surface instead of a rubber apron

## Special solutions

For special requirements, mageba offers the following bearing variations:

- **RESTON®ILM** Incremental Launch Method bearings: Facilitating construction of the bridge by the incremental launch method, and also serving as permanent bearings following completion of construction
- **RESTON®POT LIFT-CONTROL** lifting and measuring bearings: Provide permanent electronic monitoring of structural loads and, if required, can be used to lift the bridge
- **RESTON®POT UPLIFT** pressure/tension bearings: Allow temporary load reversal by preventing uplift

## Offers

Quotations are provided on the basis of the types and numbers of bearing required. If desired, mageba can determine the types of bearing required, if provided with the following information:

- Maximum, minimum and permanent vertical loads and corresponding horizontal loads (ULS)
- Displacements and rotations in the structure's longitudinal and transverse directions
- General information about the structure (concrete strength, available space for bearings, etc.)

## Support

Our experienced product specialists are always ready to provide you with further information and to advise you in selecting the optimal solution for your project.

You can also find further product information, including data sheets with standard bearing dimensions and reference lists, at [mageba-group.com](http://mageba-group.com).

## Project references - RESTON®POT bearings



Storebaelt West Bridge (DK)



Pont sur le Buron (CH)



Pont de la Poya (CH)



Øresund Bridge (DK/SE)



Vasco da Gama Bridge (PT)



Conference Centre (HK)

## mageba structural bearings



Deformation bearings



Spherical bearings



Lifting/measuring bearing



ILM bearing



engineering connections®