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European Technical Assessment

ETA-13/0039
of 06.05.2019

General part

Technical Assessment Body issuing the European Technical Assessment

Österreichisches Institut für Bautechnik (OIB)
Austrian Institute of Construction Engineering

Trade name of the construction product

mageba RESTON®POT HP

Product family to which the construction product belongs

Pot bearing with special internal sealing for
increased action effects

Manufacturer

mageba SA
Solistrasse 68
CH-8180 Bülach
Switzerland

Manufacturing plant

Comprehensive list of manufacturing plants laid
down in technical documentation

This European Technical Assessment contains

13 pages including 6 annexes
which form an integral part of this assessment

This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of

European Assessment Document (EAD)
EAD 050003-00-0301 Pot bearing with special
internal sealing for increased action effects

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Specific parts

1 Technical description of the product

The pot bearing with special internal sealing mageba RESTON®POT HP is using the fundamental principles of the proven knowledge for pot bearings according to EN 1337-5. In order to reach e.g. high durability (an accumulated sliding path of the internal seal up to 3200 m) and high possible pressure (up to 120 N/mm²) of the pot bearing, a new internal seal is used. The material of this internal seal is different from the ones defined in and covered by the EN 1337-5. The material is used in order to achieve better wear properties as well as better load characteristics. The high durability and high pressure bearings are available in the same bearing types as Pot Bearings (i.e. as fixed, guided or sliding) according to EN 1337-5.

The subject of this ETA is the complete pot bearing, assembled in the factory, whereas the principles for pot bearings according to EN 1337-5 are used.

The mageba RESTON®POT HP is designed for the support of bridges or building works, where the requirements on the individual bearings are critical.

Functional principle of the mageba RESTON®POT HP bearing (numbers referring to Annex A.1): An elastomeric pad (2), made of natural rubber according to EN 1337-5, is placed in a steel pot (1), and a steel piston (5) is placed on top. The elasticity of the elastomeric pad enables rotational movements of the piston (5) about any horizontal axis. The special internal seal (3) prevents the extrusion of the elastomeric pad (2) under pressure and/or rotation.

Depending on whether it is a fixed, guided or free sliding bearing, the mageba RESTON®POT HP can accommodate horizontal forces and movements (longitudinal/transverse) as well as vertical forces.

The pot bearing mageba RESTON®POT HP may be combined with sliding elements in accordance with EN 1337-2, depicted in numbers (6), (7), (8), (9) and (10) in the Annexes A.2-A.5 of this ETA. The sliding elements and the related performances are not subject of the assessment according to this ETA. In case of design of the mageba RESTON®POT HP with sliding elements, for the sliding elements EN 1337-5 in conjunction with EN 1337-2 applies.

The components and materials which constitute possible combinations of the mageba RESTON®POT HP are depicted in Annex A.1 to A.5 in this ETA for free-sliding (PA), guided-sliding (PL, PT), or fixed (PF) pot bearings with load and movement capabilities according Table 1.

Table 1: Types of pot bearings

Type	Description	Load	Movement	Reference Annex
PF	Fixed, restrained in any horizontal direction	x, y, z	$\alpha_x, \alpha_y, \alpha_z$	A.1
PLi *) / PTi **)	Guided, sliding in one horizontal direction	y or x, z	x or y,	A.2
PLe *) / PTe **)			$\alpha_x, \alpha_y, \alpha_z$	A.3
PLe2 *) / PTe2 **)			x or y, α_x, α_y	A.4
PA	Free, sliding in any horizontal direction	z	x and y, $\alpha_x, \alpha_y, \alpha_z$	A.5

*) sliding in longitudinal direction

**) sliding in transversal direction

The pot bearing may be equipped with additional load measuring device(s), if this load measuring device(s) does/do not influence the performance of the pot bearing regarding the requirements according to EN 1337-5 and according to the ETA.

1.1 Technical description of the components

1.1.1 General

If aspects are not specified in detail in this ETA EN 1337-5 applies.

1.1.2 Components

1.1.2.1 Pot

For the pot EN 1337-5 applies. The type (a) of pot construction, defined in EN 1337-5, Figure 5, is used for products according to this ETA.

For the design requirements EN 1337-5 applies, including the use of the simplified formulas given in EN 1337-5, Clause 6.2.2, for the assessment of the pot in order to cover the concerned characteristic contact strength of the elastomeric pad.

1.1.2.2 Piston

For the piston EN 1337-5 applies. For the design requirements EN 1337-5 applies.

1.1.2.3 External seal

The design and material for the external seal according to EN 1337-5, Clause 7.6, is defined in the technical documentation deposited with the Technical Assessment Body Österreichisches Institut für Bautechnik.

1.1.2.4 Internal seal

The internal seal is made of polyoxymethylene (POM), whereas its geometry and related tolerances and configuration are in line with in EN 1337-5, Annex A.2.2. The internal seal is defined by its identification number POM HP.

The material characteristics are confidential¹ and are deposited with the Technical Assessment Body Österreichisches Institut für Bautechnik.

1.1.2.5 Elastomeric pad

The used elastomeric pads, made of natural rubber and defined by their compound numbers H880006A, 1115 and NR EN 50 16 450-05, are in accordance with EN 1337-5, whereas for the design calculation the maximum characteristic contact strength of the elastomeric pad is declared as 120 N/mm² and a partial safety factor $\gamma_M = 1,3$ is to be used.

For a characteristic contact strength up to 60 N/mm² for the minimum thickness of the elastomeric pad t_{min} EN 1337-5, Cl. 6.2.1.2, applies.

For a characteristic contact strength of 120 N/mm² the minimum thickness of $t_{min} * 1,1$ applies.

The minimum thickness of the elastomeric pad between a characteristic contact strength of 60 N/mm² and 120 N/mm² is determined by means of linear interpolation.

1.1.2.6 Lubricant

The silicon grease used as lubricant is identified by the requirements stated in EN 1337-2, Clause 5.8.2, Table 8, and meets the requirements according to EN 1337-5, Clause 5. The lubricants to be used are deposited with the Technical Assessment Body Österreichisches Institut für Bautechnik.

¹ The technical documentation to this European Technical Assessment is deposited with Österreichisches Institut für Bautechnik and, as far as relevant for the tasks of the notified body involved in the assessment and verification of constancy of performance, handed over to the notified body.

2 Specification of the intended use(s) in accordance with the applicable European Assessment Document (hereinafter EAD)

The mageba RESTON®POT HP is in principle to be used for the intended use according to EN 1337-5, taking into account the extended application stated above regarding loads and increased accumulated sliding path of the internal seal in respect to the one given in EN 1337-5.

This means, mageba RESTON®POT HP may be used for structures related to high traffic volume, resulting in high rotations at the bearing and, therefore, having high wear requirements of the internal seal. They are also suitable for the use in bridges that, due to their geometry, have limited space for bearings, as these bearings can be designed with smaller dimensions in comparison to pot bearings according to EN 1337-5.

Pot bearings which are subjected to rotation α_d greater than 0,030 rad about any horizontal axis (see Figure 1 in this ETA) under the characteristic combination of actions or which incorporate elastomeric pads larger than 1500 mm in diameter are beyond the scope of this ETA.

The relationship between the permanent and variable rotation angles is shown in Figure 1.

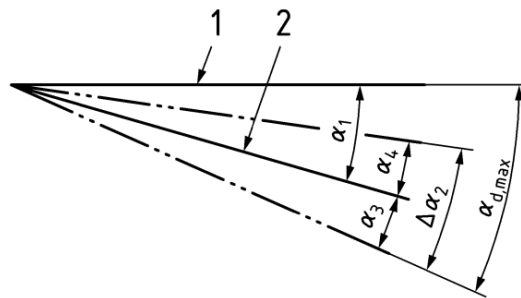


Figure 1: Representation of rotation angles

Key

1	Starting position (after installation)
2	Position due to rotation angle α_1 caused by permanent actions
α_3, α_4	rotation angles due to variable loads
$\alpha_{d,max}$	maximum design rotation

Rotation limitation:

Under the characteristic combination of actions the maximum rotation $\alpha_{d,max}$ shall not exceed 0,03 rad.

Under the frequent combination of actions the difference in rotation $\Delta\alpha_2$ shall not exceed 0,005 rad.

The mageba RESTON®POT HP applies for operating temperatures between -40 °C and +50 °C, whereas for the use in combination with a sliding element operating temperatures between -35 °C and +48 °C according to EN 1337-2 apply.

The provisions made in this European technical assessment are based on an assumed working life of the pot bearing for the intended use of 10 to 25 years when installed in the works, provided that the pot bearing is subject to appropriate installation, use and maintenance as specified by the manufacturer. The assumed intended working life of 10 to 25 years is related to the equivalent approach in EN 1337-5 with reference to Category 2 in EN 1990, Table 2.1.

The indications given on the working life cannot be interpreted as a guarantee given by the producer or the Technical Assessment Body, but are to be regarded only as a means for choosing the appropriate product in relation to the expected, economically reasonable working life of the works.

3 Performance of the product and references to the methods used for its assessment

3.1 Performance of the product

Table 2

Basic requirements for construction works	Essential characteristics	Method of assessment	Performance
BWR 1	Load bearing capacity	EAD, Clause 2.2.1	120 [MPa] characteristic strength (f_k)
	Rotation capability	EAD, Clause 2.2.2 and Annex B	<p>Under the characteristic combination of actions: $\alpha_{d,max} \leq 0,03$ rad</p> <p>Under the frequent combination of actions: $\Delta\alpha_{d2} \leq 0,005$ rad</p> <p>Restoring moment factors: Elastomeric pad with compound no. H880006A $F_0 = 0,01$, $F_1 = 0,30$ and $F_2 = 2,65$</p> <p>Elastomeric pad with compound no. NR EN 50 16 450-05 $F_0 = 0,01$, $F_1 = 0,20$ and $F_2 = 1,33$</p> <p>Elastomeric pad with compound no. 1115 $F_0 = 0,01$, $F_1 = 0,33$ and $F_2 = 2,34$</p>
	Durability aspects	EAD, Clause 2.2.3 and Annex A	<p>Assumed working life according to EN 1990 Table 2.1, reference category 2: 10-25 years;</p> <p>Accumulated sliding path of internal seal: 3200 m</p>

4 Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base

According to the decision 2001/19/EC² of the European Commission, as amended, the system(s) of assessment and verification of constancy of performance (see Annex V of Regulation (EU) No 305/2011) is 1.

² Official Journal of the European Communities N° L 005, 10.1.2001, p.6-7

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

Technical details necessary for the implementation of the AVCP system for products according to this ETA are laid down in the control plan deposited by the Technical Assessment Body Österreichisches Institut für Bautechnik.

The notified product certification body shall visit the factory once a year for surveillance of the assessment and verification of constancy of performance.

Issued in Vienna on 06.05.2019
by Österreichisches Institut für Bautechnik

The original document is signed by

Rainer Mikulits
Managing Director

mageba RESTON®POT HP (fixed) type PF

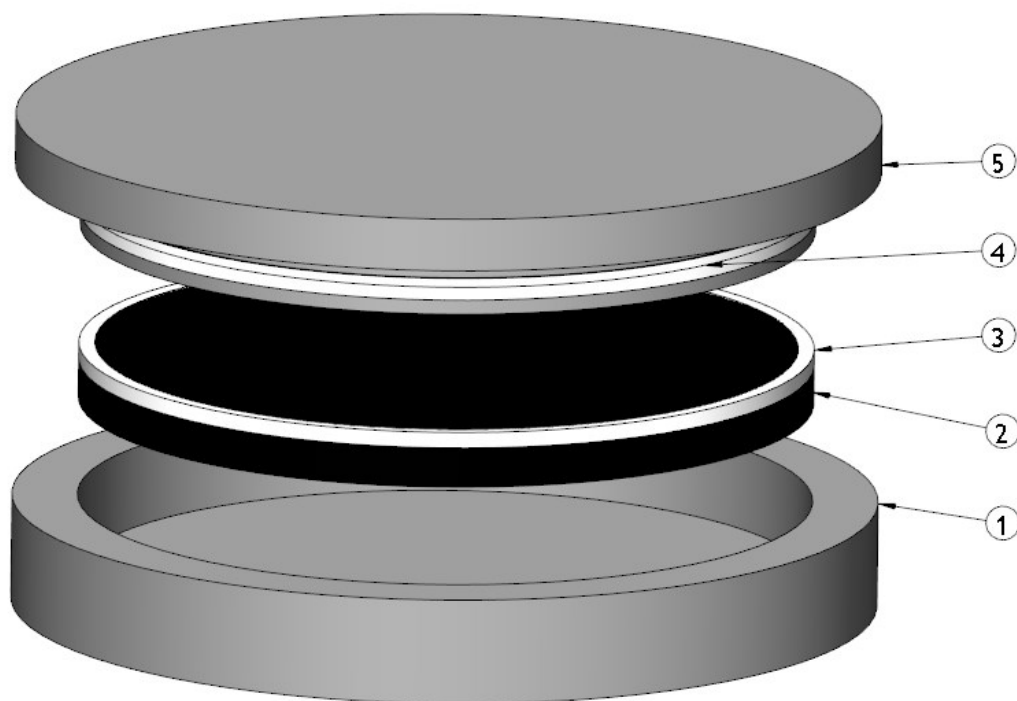


Figure 2: Exploded assembly, fixed type

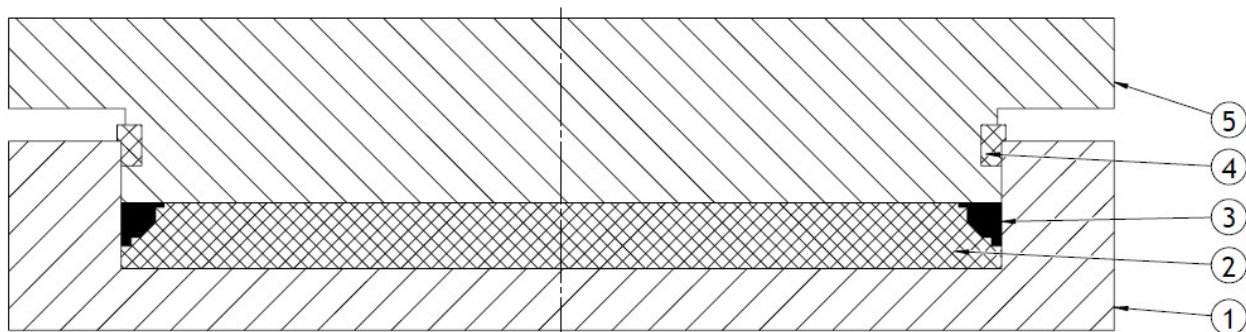


Figure 3: Cross section, fixed type

Key

- 1 Pot
- 2 Elastomeric pad
- 3 Special internal seal
- 4 External seal
- 5 Piston

mageba RESTON®POT HP (with internal guide) type PLi /PTi

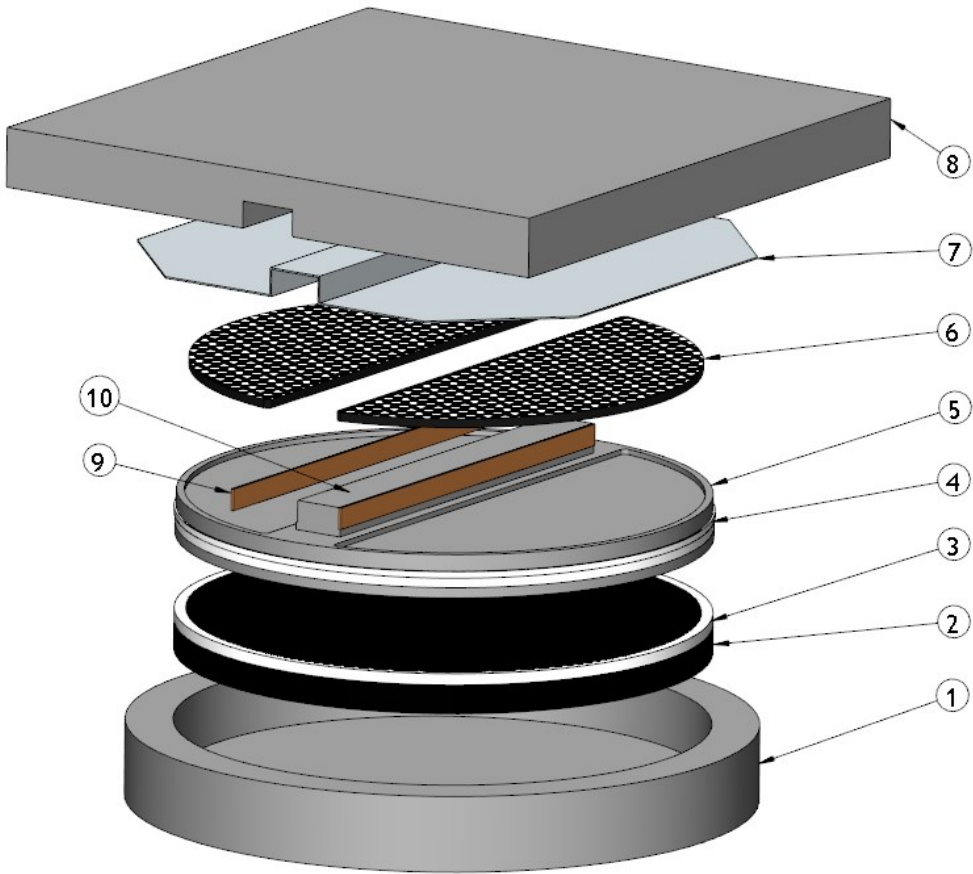


Figure 4: Exploded assembly, type guided, internally

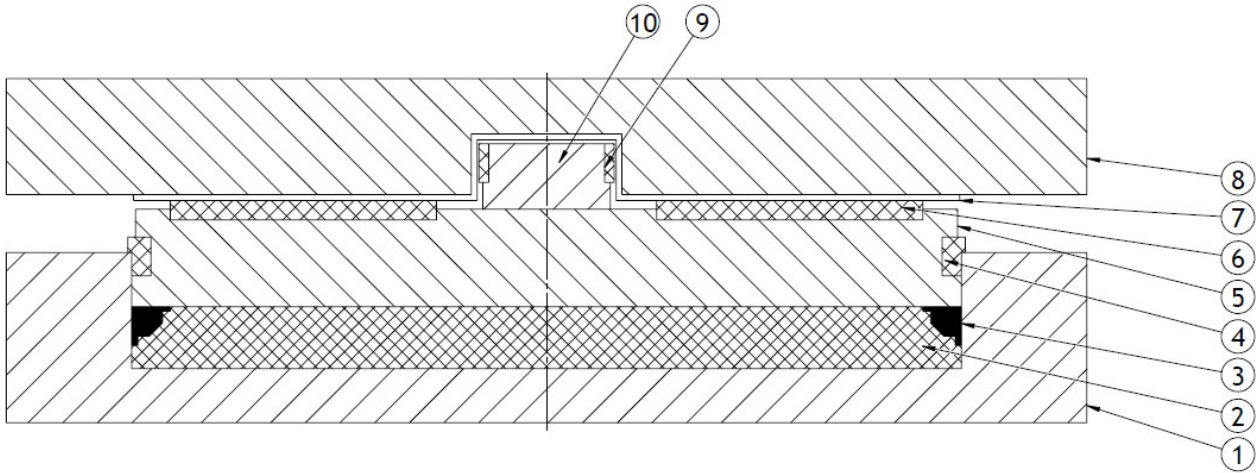


Figure 5: Cross section, type guided, internally

Key

- 1 Pot
- 2 Elastomeric pad
- 3 Special internal seal
- 4 External seal
- 5 Piston

- 6 Sliding Disc
- 7 Sliding Sheet
- 8 Sliding Plate
- 9 Sliding Strip
- 10 Guide Bar

<p>mageba RESTON®POT HP</p> <p>Main components, type with internal guide</p>	<p>Annex A.2 of European Technical Assessment</p> <p>ETA-13/0039</p>
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mageba RESTON®POT HP (with external guide) type PLe/PTe

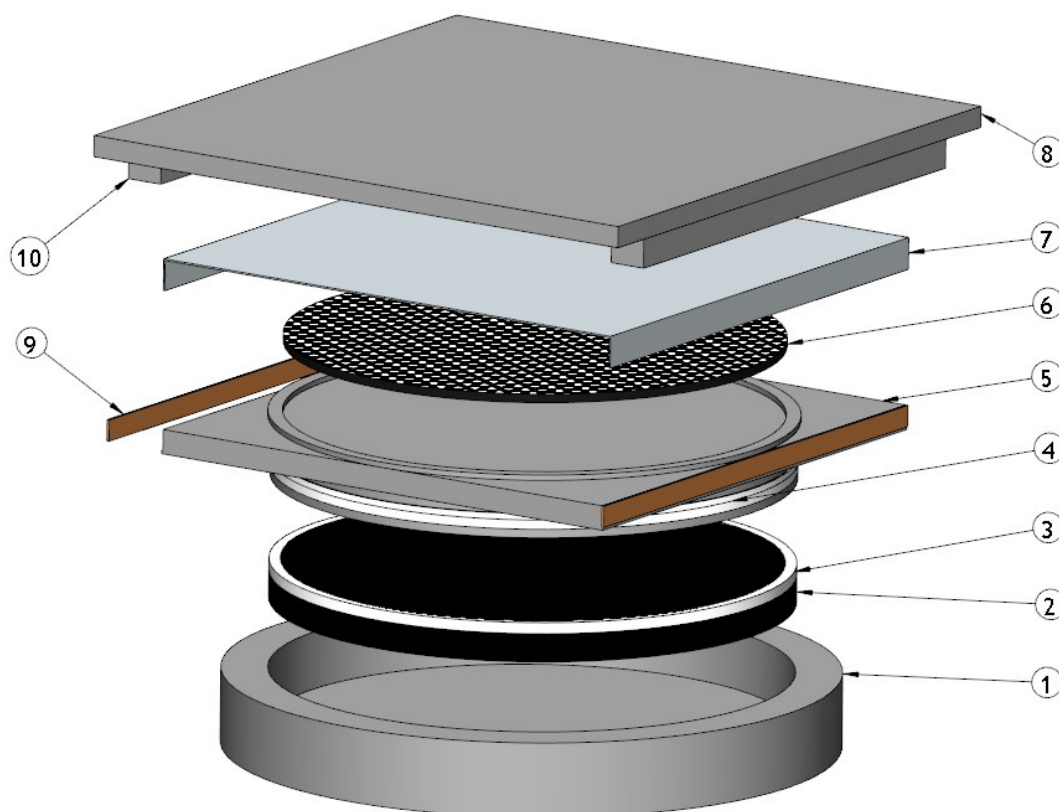


Figure 6: Exploded assembly, type guided, externally

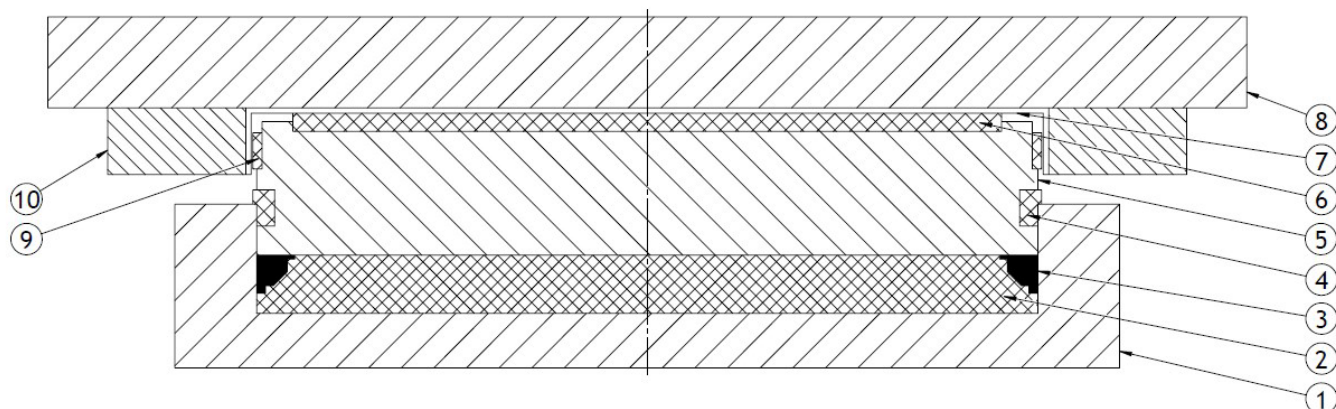


Figure 7: Cross section, type guided, externally

Key

- 1 Pot
- 2 Elastomeric pad
- 3 Special internal seal
- 4 External seal
- 5 Piston

- 6 Sliding Disc
- 7 Sliding Sheet
- 8 Sliding Plate
- 9 Sliding Strip
- 10 Guide Bar

mageba RESTON®POT HP (with external guide) Type PLe2, PTe2 (blocked α_z)

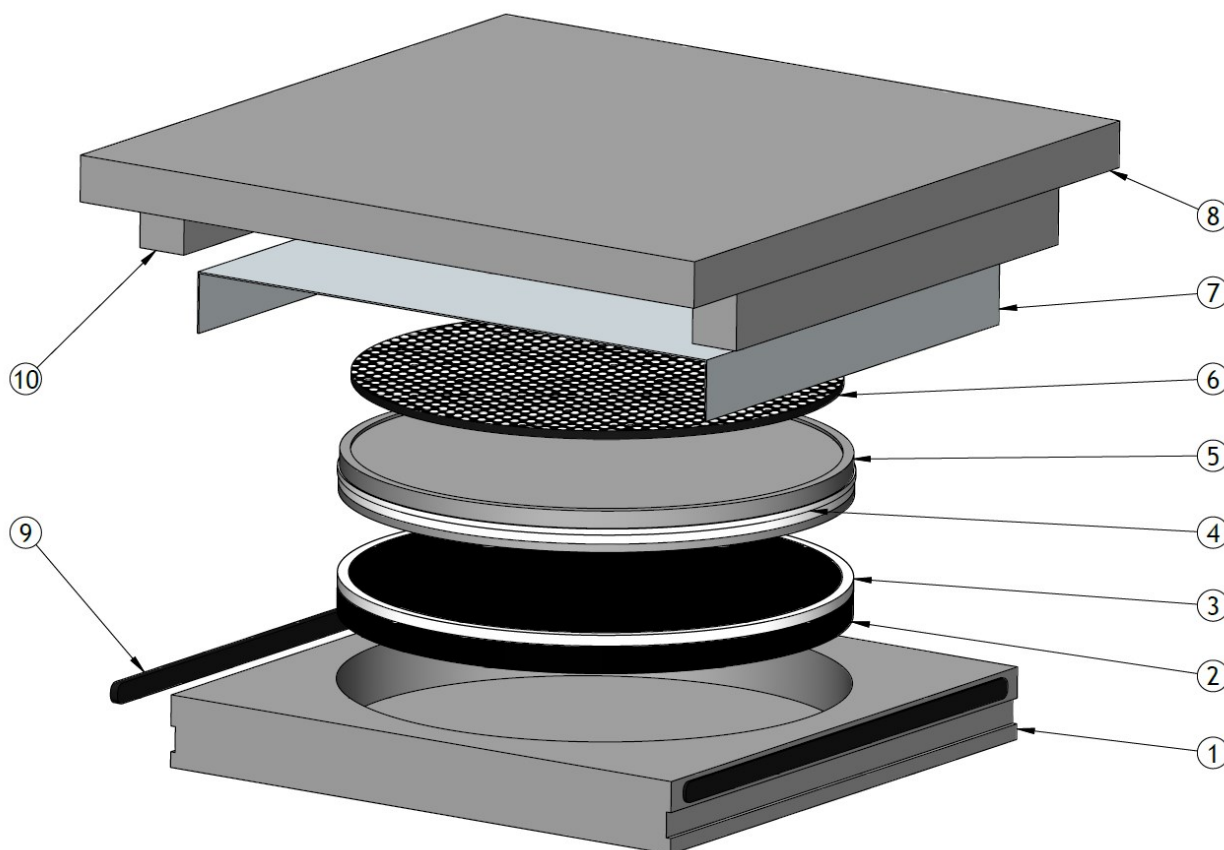


Figure 8: Exploded assembly, type PLe2; PTe2 (external guides)

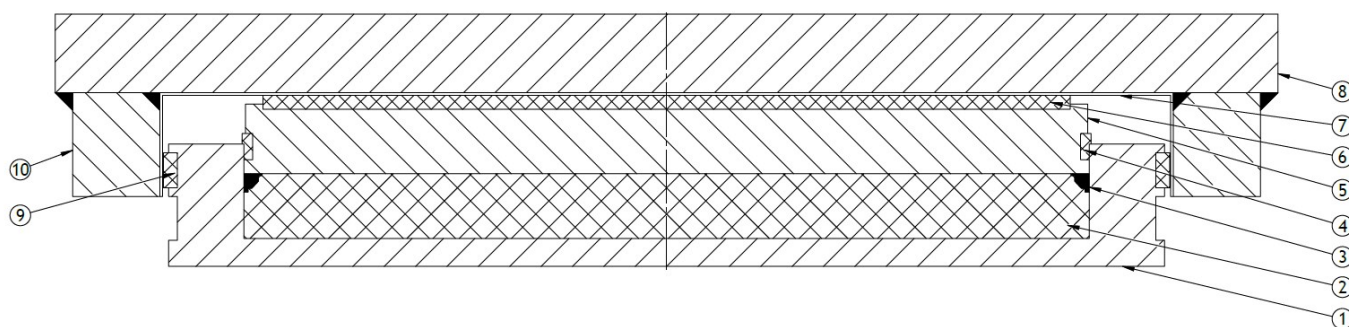


Figure 9: Cross section, type PLe2 / PTe2 (external guides)

Key

- 1 Pot
- 2 Elastomeric pad
- 3 Special internal seal
- 4 External seal
- 5 Piston

- 6 Sliding Disc
- 7 Sliding Sheet
- 8 Sliding Plate
- 9 Sliding Strip
- 10 Guide Bar

mageba RESTON®POT HP (free sliding) type PA

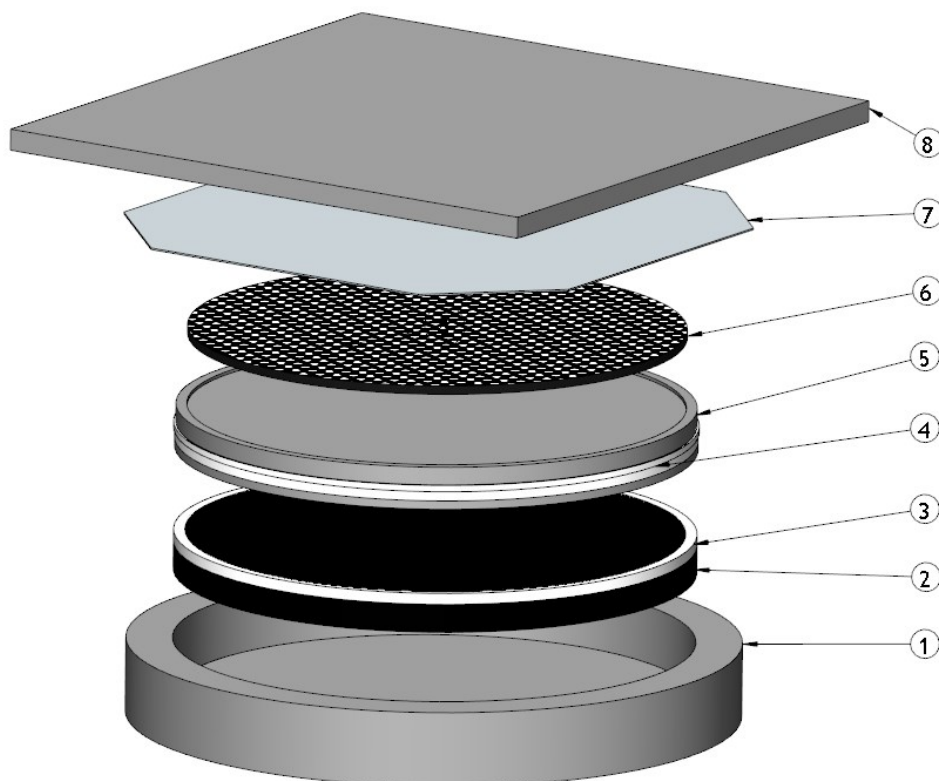


Figure 10: Exploded assembly, type free sliding

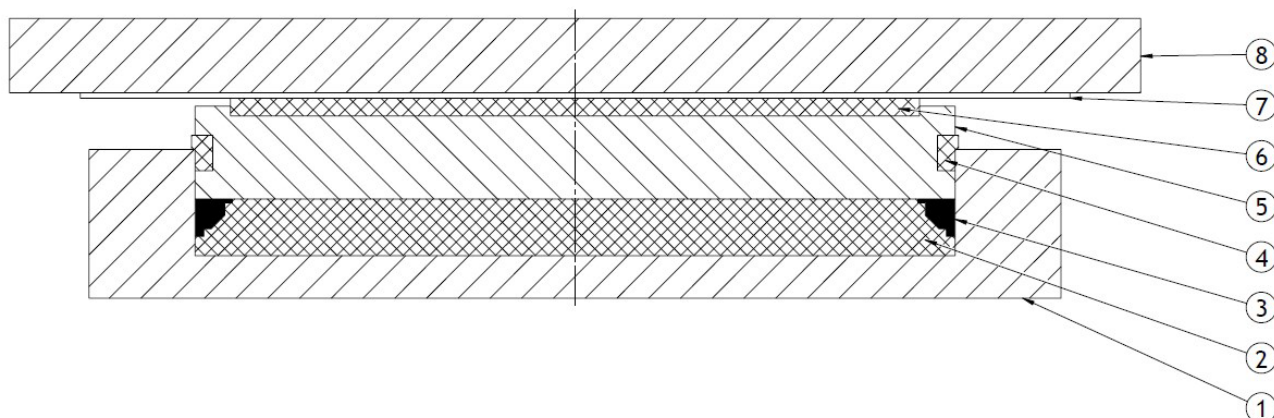


Figure 11: Cross section, type free sliding

Key

- 1 Pot
- 2 Elastomeric pad
- 3 Special internal seal
- 4 External seal
- 5 Piston

- 6 Sliding Disc
- 7 Sliding Sheet
- 8 Sliding Plate

Reference documents

- European Assessment Document, EAD 050003-00-0301 Pot bearing with special internal sealing for increased action effects
- EN 1337-2:2004 Structural bearings – Part 2: Sliding Elements
- EN 1337-5:2005 Structural bearings – Part 5: Pot bearings
- EN 1990:2002+AC:2008+AC:2010 Eurocode – Basis of structural design

mageba RESTON®POT HP Reference Documents	Annex A.6 of European Technical Assessment ETA-13/0039
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