SLOVENSKI STANDARD
oSIST prEN 1337-5:2018

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Konstrukcijska ležišča - 5. del: Lončna ležišča

Structural bearings - Part 5: Pot bearings

Lager im Bauwesen - Teil 5: Topflager

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ICS:

91.010.30	Tehnični vidiki	Technical aspects

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English Version

Structural bearings - Part 5: Pot bearings

Lager im Bauwesen - Teil 5: Topflager

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 167.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (prEN 1337-5:2018) has been prepared by Technical Committee CEN/TC 167 “Structural bearings”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 1337-5:2005.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Regulation 305/2011.

For relationship with EU Regulation 305/2011, see informative Annex ZA, which is an integral part of this document.

prEN 1337, *Structural bearings*, consists of the following 8 parts:

— *Part 1: General*;

— *Part 2: Sliding elements*;

— *Part 3: Elastomeric bearings*;

— *Part 4: Roller bearings*;

— *Part 5: Pot bearings*;

— *Part 6: Rocker bearings*;

— *Part 7: Spherical and cylindrical PTFE bearings*;

— *Part 8: Guide bearings and Restraint bearings*.

The major technical changes are listed below:

— Complete technical and editorial revision of the document; it is not possible to list all implemented changes to this edition of EN 1337-5.

1 Scope

This document specifies rules for the design, testing and manufacture of fixed and sliding pot bearings.

It is applicable to pot bearings:

— with elastomeric pads made from natural rubber (NR) or chloroprene rubber (CR) up to 1 500 mm diameter,

— with pot and piston made from ferrous materials,

— with seals tested for different accumulated slide paths due to rotations between piston and pot of a) 500 m, b) 1 000 m or c) 2 000 m,

— with seals made from specific austenitic steel, brass, POM or carbon filled PTFE,

— subjected to operating temperature ranges between –25 °C and +50 °C or –40 °C and +50 °C,

— subjected to operating temperatures up to +70 °C for repeated periods of less than 8 h.

This document will be used in conjunction with prEN 1337-1:2018 and other relevant parts of the prEN 1337 series.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

prEN 1337-1:2018, *Structural bearings — Part 1: General*

prEN 1337-2:2018, *Structural bearings — Part 2: Sliding elements*

EN 1991-2, *Eurocode 1: Actions on structures — Part 2: Traffic loads on bridges*

EN 1993-1-1:2005, *Eurocode 3: Design of steel structures — Part 1-1: General rules and rules for buildings*

EN 1993-2:2006, *Eurocode 3 — Design of steel structures — Part 2: Steel Bridges*

EN 1993 (all parts), *Eurocode 3: Design of steel structures*

EN 10025 (all parts), *Hot rolled products of structural steels*

EN 10083-3, *Steels for quenching and tempering — Part 3: Technical delivery conditions for alloy steels*

EN 10088-2:2014, *Stainless steels — Part 2: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes*

EN 10113-1, *Hot-rolled products in weldable fine grain structural steels — Part 1: General delivery conditions*

EN 10204:2004, *Metallic products — Types of inspection documents*

EN 12167:2016, *Copper and copper alloys — Profiles and bars for general purposes*

EN ISO 527-1, *Plastics — Determination of tensile properties — Part 1: General principles (ISO 527-1)*

EN ISO 527-2, *Plastics - Determination of tensile properties — Part 2: Test conditions for moulding and extrusion plastics (ISO 527-2)*

EN ISO 1133 (all parts), *Plastics — Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics (ISO 1133, all parts)*

EN ISO 1183 (all parts), *Plastics — Methods for determining the density of non-cellular plastics (ISO 1183, all parts)*

EN ISO 2039-1, *Plastics — Determination of hardness — Part 1: Ball indentation method (ISO 2039-1)*

EN ISO 4287, *Geometrical product specifications (GPS) — Surface texture: Profile method — Terms, definitions and surface texture parameters (ISO 4287)*

EN ISO 4288, *Geometrical product specifications (GPS) — Surface texture: Profile method — Rules and procedures for the assessment of surface texture (ISO 4288)*

EN ISO 7500-1:2015, *Metallic materials — Calibration and verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Calibration and verification of the force-measuring system (ISO 7500-1:2015)*

ISO 37, *Rubber, vulcanized or thermoplastic — Determination of tensile stress-strain properties*

ISO 48, *Rubber, vulcanized or thermoplastic — Determination of hardness (hardness between 10 IRHD and 100 IRHD*

ISO 1083, *Spheroidal graphite cast irons — Classification*

ISO 1817, *Rubber, vulcanized or thermoplastic — Determination of the effect of liquids*

ISO 3755, *Cast carbon steels for general engineering purposes*

ISO 6446, *Rubber products — Bridge bearings — Specification for rubber materials*

ISO 23529, *Rubber — General procedures for preparing and conditioning test pieces for physical test methods*

3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1.1
accumulated slide path
sum of the relative movements between the internal seal and the pot wall resulting from variable rotations

3.1.2
elastomeric pad
circular component which provides the rotational capability by deformation

3.1.3
external seal
component or material which is used to exclude moisture and debris from the gap between the piston and the pot

3.1.4
internal seal
component which prevents escape of the elastomeric material through the gap between the wall of the pot and the piston when a compressive force is applied

3.1.5
lubricant
special grease used to reduce the friction between the pad and the metallic components for the purpose of reducing wear and the rotation stiffness

3.1.6
piston
component which closes the open end of the recess in the pot and bears on the elastomeric pad

3.1.7
pot
component with a machined circular recess which contains the elastomeric pad, piston and internal seal

3.1.8
pot bearing
structural bearing consisting of an elastomeric pad (rotational element) confined in a recess by means of a close fitting piston and an internal seal

Note 1 to entry: The orientation of the bearing is not restricted.

3.1.9
restoring moment
moment generated from the elastomeric pad caused by the rotation deformation

3.1.10
sliding pot bearing
pot bearing combined with a sliding element to accommodate translational movements

3.1.11
slide path
relative movements of internal seal to pot wall

3.2 Symbols

For the purposes of this document, the following symbols apply:

Latin upper case letters

A	cross section area	mm^2
d_{int}	internal diameter of pot	mm
d_{ext}	outer diameter of pot ring	mm
E	modulus of elasticity	
k_0	factor in restoring moment formula for zero rotation	
k_1	factor in restoring moment formula for lubricated pad	
k_2	factor in restoring moment formula for unlubricated pad	
R_w	resistance of weld	N/mm^1
V_{xy}	resultant applied horizontal load	N
h	depth of the cylindrical recess	mm
$M_{rt;exp}$	restoring moment from pad and internal seal in test	Nmm
M_{rt}	restoring moment from pad and internal seal	Nmm
M_{fric}	additional moment from friction between piston and pot	Nmm
$M_{tot;r}$	total resistance moment from rotation	Nmm
N	axial force	N
r	radius of contact surface	mm
t_{base}	thickness of the pot base	mm
V	total transverse or shear force	N
V^1_{tot}	total transverse or shear force per unit length	N
V_{el}	shear force due to elastomer pressure	N
T	temperature	

Latin lower case letters

a	additional clearance for rotation	
b	width of piston face	mm
b_{cal}	calculated piston/pot contact width	mm
c	factor used in slide path expression	
d_{el}	diameter of elastomeric pad	mm
d_{int}	internal diameter of pot	mm
d_{ext}	outer diameter of pot ring	mm

f_u	ultimate strength of material	N/mm^2
f_y	yield strength of material	N/mm^2
$f_{el;d}$	design contact strength of the elastomer	N/mm^2
$s_{A,d}$	accumulated slide path	
t_{el}	nominal thickness of elastomeric pad	mm
w	Vertical deflection	mm

Greek letters

γ_m	partial material factor	
α	rotation angle rad	
α_g	resultant rotation angle due to permanent actions	rad
α_Q	resultant rotation angle due to traffic loads	rad
α_{rt}	rotation angle in restoring moment test	rad

Subscripts

bot	lower, bottom	
d	design, design value	
k	characteristic	
R	resistance	
fric	resulting from friction	
rt	restoring	
top	upper	
tot	total	
E	internal forces and moments from actions	N, Nmm
u	ultimate limit state	
w	weld	
el	elastomer	

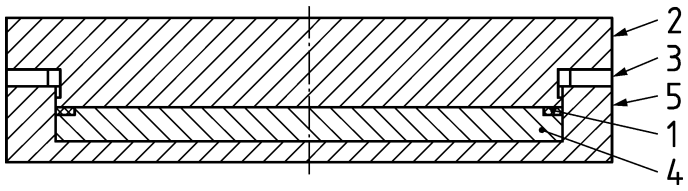
3.3 Abbreviations

PTFE	polytetrafluoroethylene
POM	polyoxymethylene (acetal)

4 Types of pot bearings

4.1 General

The components of a pot bearing are shown in Figure 1.



Key

1 internal seal
2 piston
3 external seal (in this area)
4 elastomeric pad
5 pot

Figure 1 — Components of a pot bearing

The pot may be formed in various ways as shown in Figure 2. Different types of internal seal can be used. The piston can be shaped in two ways in the area of contact with the pot wall. The bearing can be used in inverted position also.

Pot bearings may be combined with sliding elements in accordance with prEN 1337-2:2018.

4.2 Types of pot construction

There are four construction types for pots (see Figure 2):

— Type a): made of a monolithic plate,

— Type b): made from a ring with a base plate welded inside,

— Type c): made from a ring welded to a base plate.

— Type d): made from a ring connected to a base plate with a recess and bolts.

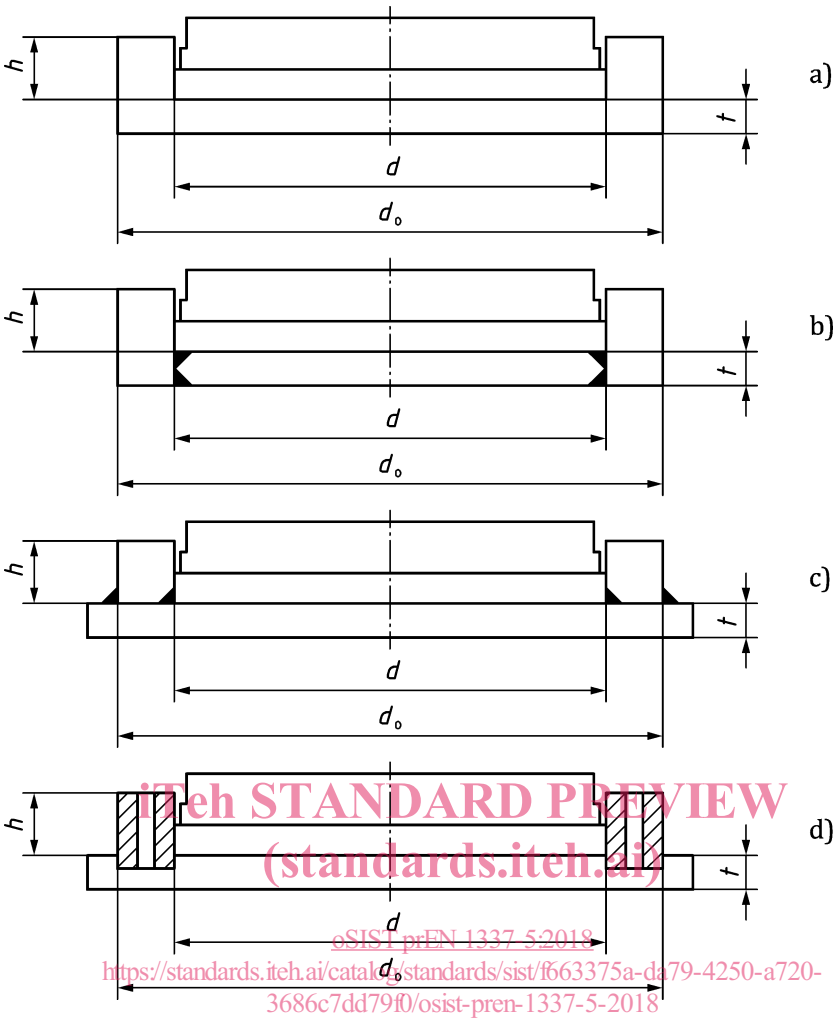


Figure 2 — Types of pot construction

4.3 Types of internal seal

4.3.1 General

The internal seals are classified with regard to the standard accumulated slide path as follows:

— Seals with accumulated slide path “a”, 500 m (see 4.3.2);

— Seals with accumulated slide path “b”, 1 000 m (see 4.3.3);

— Seals with accumulated slide path “c”, 2 000 m (see 4.3.4).

4.3.2 Seals type “a”

The stainless steel seal is classified for an accumulated sliding movement $S_R = c \times 500$ m in the structure

The sealing ring shall be made from stainless steel strip formed into an equal or unequal angle section inserted between the elastomeric pad and the pot wall with the ends overlapping. The top surface may have notches, see Figure 3.

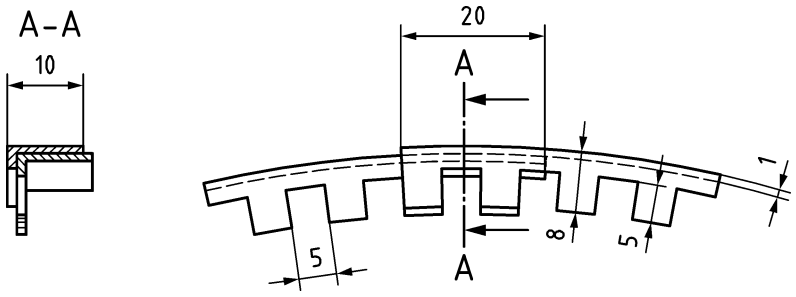


Figure 3 — Typical notched stainless steel seal

The sealing ring shall be made from stainless steel strip formed into an equal or unequal angle section inserted between the elastomeric pad and the pot wall.

The leg length and thickness of the section shall meet the following.

a) with notches:

where diameter $d_{el} \leq 700$ mm — leg length 5 mm to 10 mm, thickness 1 mm minimum; where diameter $d_{el} > 700$ mm leg length 15 mm to 17 mm, thickness 1,5 mm minimum; the minimum overlap of the ring ends shall be 20 mm; where the thickness > 1 mm, the ends shall be reduced in thickness at the overlap position.

b) without notches:

minimum leg length 3 mm;

minimum thickness 1 mm;

minimum overlap 5 mm;

where the thickness > 1 mm, the ends shall be reduced in thickness at the overlap position.

4.3.3 Seals type “b”

The brass seal is classified for an accumulated sliding movement $S_R = c \times 1\,000$ m in the structure.

Internal brass seals shall be fitted into a recess formed in the edge of the upper surface of the elastomeric pad and shall consist of a number of split rings formed to the internal diameter of the pot. When fitted, the gap between the ends of the ring shall not exceed 0,5 mm. The gaps in adjacent rings shall be equally disposed around the perimeter of the pot. Where possible no gap should coincide with the point of maximum rotation movement on the pot wall.

Rings with a minimum cross-section of 10 mm × 2 mm may have slits 7 mm deep, cut 0,5 mm wide spaced at 5 mm around the internal diameter to facilitate forming. Rings with a smaller cross-section shall not have slits.