SLOVENSKI STANDARD
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Konstrukcijska ležišča - 7. del: Sferična in cilindrična PTFE ležišča

Structural bearings - Part 7: Spherical and cylindrical PTFE bearings

Lager im Bauwesen - Teil 7: Kalotten- und Zylinderlager mit PTFE

Ta slovenski standard je istoveten z: **prEN 1337-7**

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English Version

Structural bearings - Part 7: Spherical and cylindrical PTFE bearings

Lager im Bauwesen - Teil 7: Kalotten- und Zylinderlager mit PTFE

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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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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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 1337-7:2018) 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 1337-7:2004.

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*, consist 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 1337-7.

1 Scope

This document specifies rules for the design, manufacture and testing and of spherical and cylindrical sliding PTFE bearings.

It is applicable to spherical and cylindrical sliding bearings with an included angle up to 60° for spherical and 75° for cylindrical sliding bearings.

This document will be used in conjunction with the relevant parts of this standard 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*

prEN 1337-5:2018, *Structural bearings — Part 5: Pot bearings*

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

3 Terms , definitions and symbols

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
backing plate
metallic component which supports sliding materials

3.1.2
cylindrical PTFE bearing
bearing consisting of a backing plate with a convex cylindrical surface (rotational element) and a backing plate with a concave cylindrical surface between which a PTFE sheet and the mating material form a curved sliding surface (see Figure 3)

Note 1 to entry: Cylindrical PTFE bearings are also used in combination with flat sliding elements and guides to form free or guided bearings (see Figure 4)

3.1.3
guide
sliding element which restrains a sliding bearing from moving in one axis

3.1.4
lubricant
special grease used to reduce the friction and wear in the sliding surfaces

3.1.5
mating surface
hard smooth metallic surface in contact with the sliding material (PTFE, CM1 or CM2)

3.1.6
Polytetrafluoroethylene
PTFE
thermoplastic material used for its low coefficient of friction

3.1.7
sliding materials
materials which form sliding surfaces

3.1.8
sliding surface
combination of a pair of flat or curved surfaces of different materials which allow relative displacements

3.1.9
spherical PTFE bearing
bearing consisting of a backing plate with a convex spherical surface (rotational element) and a backing plate with a concave spherical surface between which a PTFE sheet and the mating material form a curved sliding surface (see Figure 1)

Note 1 to entry: Spherical PTFE bearings are also used in combination with flat sliding elements and guides to form free or guided bearings (see Figure 2).

3.2 Symbols

The most frequently occurring symbols are defined below. Those that are local, and unique to a particular clause, are defined at their first appearance.

A	contact area	mm^2
d	diameter, diagonal, depth	mm
e	eccentricity	mm
f	tensile or compressive strength	MPa
l	contact length of the PTFE in cylindrical bearings	mm
N	axial force; force normal to principal bearing surface	N; kN
r	radius of the curved contact surface	mm
t	thickness	mm
V	transverse or shear force	N; kN
μ	coefficient of friction	—
α	angle of rotation	rad
β	deviation angle from vertical axis of the line of action of the applied load	
γ	partial factor	—
λ	ratio, coefficient	—
θ	included angle of the spherical or cylindrical surface	°

Indices

b	backing plate	
max	maximum	—
min	minimum	
red	reduced	
tot	total	—
x, y, z	coordinates	—
PTFE	Polytetrafluoroethylene	

4 Types of spherical and cylindrical bearings

4.1 General

Spherical and cylindrical bearings consist of a concave part which supports a convex part. Rotations are enabled by the convex element sliding along the curved contact surface with the concave element. The forces in z-direction are transferred through the convex part by the sliding element into the concave part. The bearing can be used in inverted position also. Figure 1 shows a typical cross section of a fixed spherical PTFE bearing.

Figure 1 — Spherical PTFE bearing

4.2 Spherical bearings

Spherical bearings comprise a spherical convex and a spherical concave part and are fixed bearings which allow rotations about any axis.

With flat sliding elements spherical bearings form free bearings (see Figure 2 a)). With guides the free bearing becomes a guided bearing (see Figures 2 b) and 2 c)). With a restraining ring the free bearing becomes a fixed bearing (see Figure 2 d)).

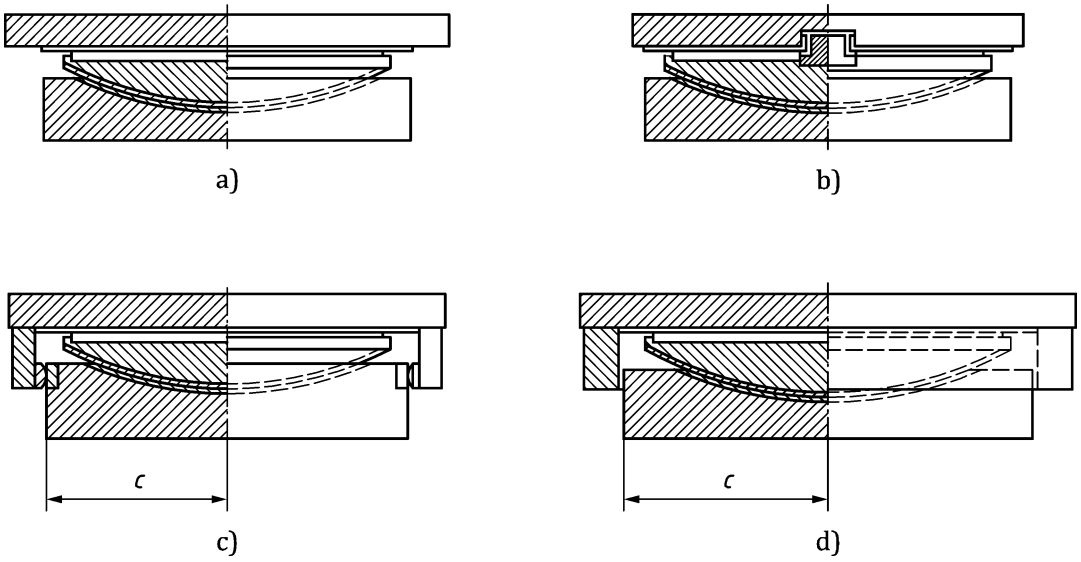
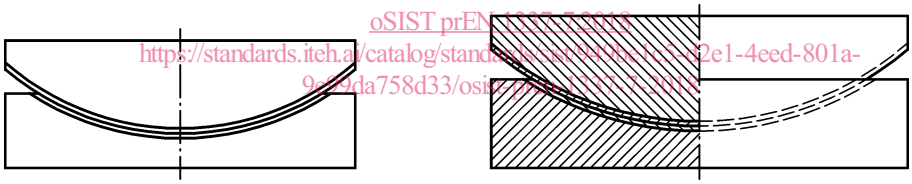


Figure 2 — Spherical PTFE bearing combined with flat sliding elements

4.3 Cylindrical bearings

Cylindrical bearings comprise a cylindrical convex and a cylindrical concave part and are guided bearings which allow rotations about the cylinder axis and movements along it. With guides the guided bearing (see Figure 3 a)) becomes a fixed bearing (see Figure 3 b)). Cylindrical bearings are susceptible to restraining moments about the transverse axis of the cylinder.



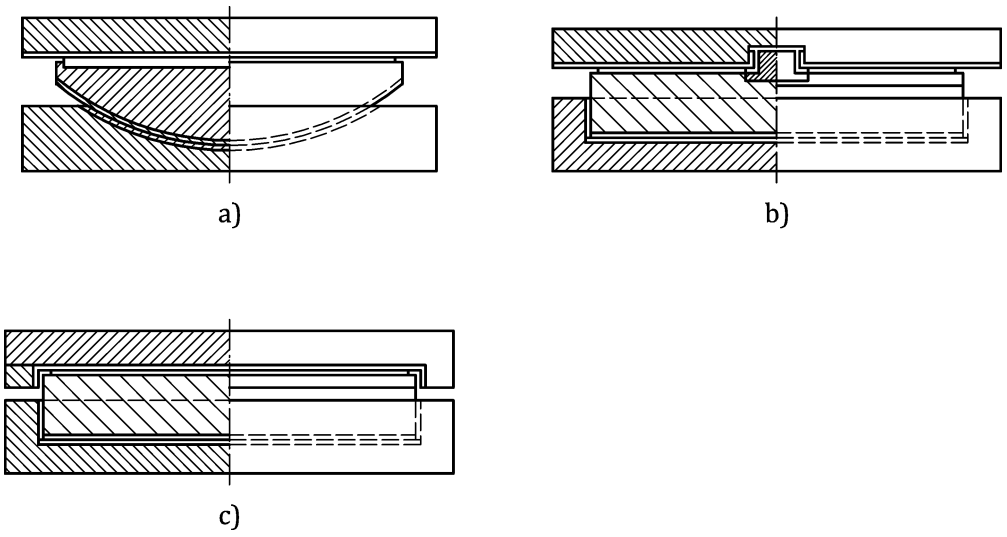
Key

a) without end stops for displacements in *y*-direction

b) fixed by end stops and sliding surface

Figure 3 — Cylindrical PTFE bearings

With flat sliding elements the fixed cylindrical bearings form free bearings (see Figure 4 a)). With guides the free cylindrical bearing becomes a guided bearing (see Figures 4 b) and c)).



Key

a) Free for displacements in any directions

b) Guided by an internal guide for displacement in *x*-direction

c) Guided by external guides for displacement in *x*-direction

Figure 4 —Cylindrical PTFE bearings combined with flat sliding elements

5 Materials

The materials used shall be in accordance with prEN 1337-2:2018.

6 Design

6.1 General

prEN 1337-1:2018 applies.

This clause gives requirements for the design of components which are specific to spherical and cylindrical bearings and which are in addition to those given in prEN 1337-2:2018 and comprise the design of the curved sliding surfaces and the design of the backing plates.

Secondary effects due to the action of the restraints shall also be considered.

The selected material shall be verified in accordance with the principles given in the relevant parts of the EN 1993 series, e.g. EN 1993-1-10.

6.2 Design verification for curved sliding surfaces

Forces and moments acting on the curved sliding surface due to friction resistance, externally applied horizontal loads and the rotated condition of the bearing shall be taken into account when determining the resulting total eccentricity e_{tot} of the axial force $N_{z,d}$.

The eccentricity is the perpendicular distance between the crossing point “A” and the z-axis.