



SLOVENSKI STANDARD
oSIST prEN 1337-4:2018
01-marec-2018

Konstrukcijska ležišča - 4. del: Valjčna ležišča

Structural bearings - Part 4: Roller bearings

Lager im Bauwesen - Teil 4: Rollenlager

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Ta slovenski standard je istoveten z: prEN 1337-4

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EUROPEAN STANDARD
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English Version

Structural bearings - Part 4: Roller bearings

Lager im Bauwesen - Teil 4: Rollenlager

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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prEN 1337-4:2018 (E)**European foreword**

This document (prEN 1337-4:2018) 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 1337-4:2004.

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*, 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.*

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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 1337-4.

1 Scope

This document specifies rules for the design, testing and manufacture of single and multiple roller bearings in which the roller axis is horizontal and movements are perpendicular to the roller axis.

It is applicable to roller bearings with rollers and roller plates made from carbon steel or cast steel or stainless steel.

Roller bearings can be combined with sliding elements, guides and bearings as specified in other parts of this European Standard.

This document is applicable to bearings with monolithic rollers and roller plates not subjected to surface hardening, included through welding.

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*

prEN 1337-3:2018, *Structural bearings — Part 3: Elastomeric bearings*

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

prEN 1337-6:2018, *Structural bearings — Part 6: Rocker bearings*

prEN 1337-7:2018, *Structural bearings — Part 7: Spherical and cylindrical PTFE bearings*

prEN 1337-8:2018, *Structural bearings — Part 8: Guide bearings and Restraint bearings*

EN 1563, *Founding — Spheroidal graphite cast irons*

EN 1992 (all parts), *Eurocode 2: Design of concrete structures*

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

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

EN 10083-1, *Steels for quenching and tempering — Part 1: General technical delivery conditions*

EN 10083-2, *Steels for quenching and tempering — Part 2: Technical delivery conditions for non alloy steels*

EN 10088 (all parts), *Stainless steels*

EN 10160, *Ultrasonic testing of steel flat product of thickness equal or greater than 6 mm (reflection method)*

EN 10164:2004, *Steel products with improved deformation properties perpendicular to the surface of the product — Technical delivery conditions*

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EN 10340, *Steel castings for structural uses*

EN 12680 (all parts), *Founding — Ultrasonic examination*

EN ISO 148 (all parts), *Metallic materials — Charpy pendulum impact test*

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 6506-1, *Metallic materials — Brinell hardness test — Part 1: Test method (ISO 6506-1)*

EN ISO 11666, *Non-destructive testing of welds — Ultrasonic testing — Acceptance levels (ISO 11666)*

EN ISO 17638, *Non-destructive testing of welds — Magnetic particle testing (ISO 17638:2016)*

EN ISO 17640, *Non-destructive testing of welds — Ultrasonic testing — Techniques, testing levels, and assessment (ISO 17640)*

EN ISO 23278, *Non-destructive testing of welds — Magnetic particle testing — Acceptance levels (ISO 23278)*

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3 Terms, definitions and symbols**3.1 Terms and definitions**

For the purposes of this document, the terms and definitions given in prEN 1337-1:2018 and the following 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**roller bearing**

bearing formed by an upper and lower roller plate separated by one or more rollers

3.1.2**roller**

component of a roller bearing with load bearing surfaces of circular cylindrical shape

3.1.3**roller plate**

flat component which transmits force between the roller and the adjacent structure

3.1.4**multiple roller bearing**

bearing comprising more than one roller

3.2 Symbols

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

3.2.1 Latin upper case letters:

E	modulus of elasticity	MPa
M_{Ed}	design eccentricity moment from actions	kNm
M_{Sd}	design eccentricity moment caused by friction	kNm
N_{Ed}	axial design force	kN
N'_{Ed}	design effect from action per unit length	kN/m
N_{Rd}	design resistance	N
N'_{Rd}	design resistance per unit length	kN/m
N_{Rk}	characteristic resistance	kN
N'_{Rk}	characteristic resistance per unit length	kN/m
V_{Sd}	horizontal force generated by friction	kN
$V_{y,d}$	total transverse or shear force	kN

3.2.2 Latin lower case letters:

b	half width of Hertzian contact area	mm
d	diameter of the roller at the contact surface	mm
$e_{1,d}$	total eccentricity due to rolling friction	mm
$e_{2,d}$	design eccentricity due to rotation	mm
$e_{3,d}$	design eccentricity due to translation	mm
e_d	total design eccentricity of vertical load	mm
f_u	tensile strength of material	MPa
f_y	yield strength of material	MPa
g	edge distance	mm
h	distance between horizontal section to be verified and roller contact area	mm
l	length of roller	mm
r	radius of roller, radius of contact surface	mm
t_p	thickness of roller plate	mm
u	relative movement	mm

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3.2.3 Greek letters:

α_d	total design angular rotation about the line of contact, in radians (rad)	rad
γ_M	partial material factor	—
μ_d	design coefficient of rolling friction	—

3.2.4 Subscripts:

eff	effective
k	characteristic
Rd	design resistance
tot	total
x	direction of local axis
y	direction of local axis
z	direction of local axis

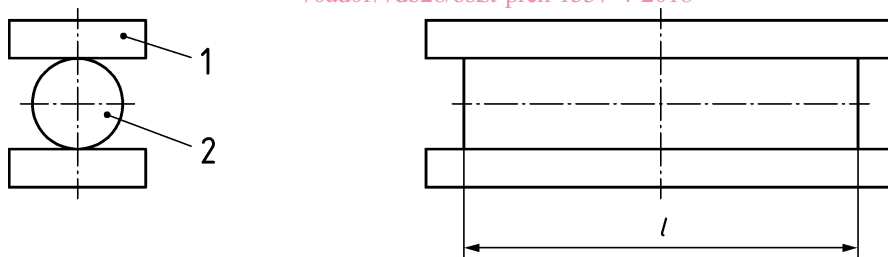
4 Types of roller bearings

4.1 General

The main components of roller bearings in accordance with this document are shown in 4.2 and 4.3.

4.2 Single roller bearing

The main components of a single roller bearing are shown in Figure 1.

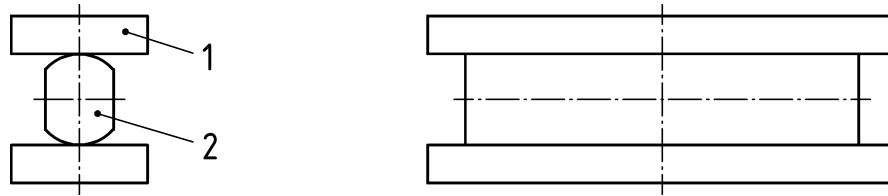


Key

- 1 roller plate
- 2 roller with circular cylindrical contact surface

Figure 1 — Main components of a single roller bearing

The roller may be flat sided as shown in Figure 2.

**Key**

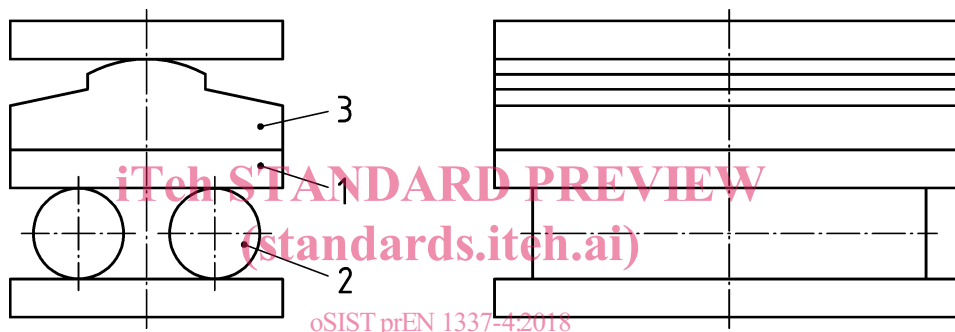
- 1 roller plate
- 2 flat sided roller with circular cylindrical contact surface

Figure 2 — Main components of a flat sided single roller bearing

A single roller bearing allows rotation about the roller axis.

4.3 Multiple roller bearing

The main components of a multiple roller bearing are shown in Figure 3.

**Key**

- 1 roller plate
- 2 roller
- 3 example of an additional load distribution and rotation element

Figure 3 — Main components of a multiple roller bearing

Rotations are enabled by a rotation element.

5 Materials

5.1 Materials for rollers and roller plates

5.1.1 General

Rollers and roller plates shall be manufactured from ferrous materials in accordance with 5.1.2 to 5.1.5, 5.2 and Table 1.

The ability of curved surfaces and plates to withstand deformation under load depends on the hardness of the material of which they are made.

Rollers and roller plates shall consist of the same quality class.

Surfaces of roller and roller plate in contact shall have the same nominal strength and hardness.

NOTE There is not a constant relationship between hardness and yield stress of steel but there is between hardness and ultimate strength.

Table 1 — Ferrous material classes

Material class	Tensile strength (minimum) N/mm ²	Yield strength (minimum) N/mm ²	Impact / at temperature (minimum)	Surface hardness (maximum) HV 10	Elongation (minimum) %	Friction coefficient μ_d
A	340	240	27 J / -20 °C	150	25	0,05
B	490	335	27 J / -40 °C	250	21	0,05
C	600	420	27 J / -40 °C	450	14	0,02

5.1.2 Carbon steel

Carbon steel shall be in accordance with the EN 10025 series or EN 10083-1 and EN 10083-2.

5.1.3 Stainless steel

Stainless steel shall be in accordance with the EN 10088 series of standards.

5.1.4 Cast iron

Spheroidal graphite iron (ductile iron) shall be in accordance with EN 1563. Cast iron shall have an elongation at break $\geq 12,5$ %.

5.1.5 Cast steel

Cast steel shall be in accordance with EN 10340. Cast steel shall have an elongation at break $\geq 12,5$ %.

5.2 Materials for other components

The materials for other components shall be ferrous materials selected for their specific performance which may require high ductility and or wear resistance.

6 Design

6.1 General

prEN 1337-1:2018 applies.

The design rules are based on the principle of normal forces being transferred through a Hertzian contact area between two surfaces with dissimilar radii.

A single roller bearing allows rotation by a rocking movement of the roller plates. Multiple roller bearings do not allow rotation by a rocking movement of the roller plates.

Roller bearings may be combined with an additional rotation element to allow rotation perpendicular to the roller axis. For multiple roller bearings this additional load distribution and rotation element distributes the vertical force between the rollers and can allow rotation about a single axis or any axis. These elements shall be in accordance with the relevant part of the prEN 1337 series.

Notches and discontinuities in highly stressed areas should be avoided as they can act as stress raisers and therefore cause premature fracture due to fatigue cracking.

Components made of cast steel or cast iron shall be subjected to non-destructive testing according to the relevant part of the EN 12680 series. For the structural design a γ_{M8} factor shall be used. The recommended value for γ_{M8} is 1,7. 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.