



SLOVENSKI STANDARD
SIST EN 1337-4:2004
01-junij-2004

Strukturni nosilci - del 4: Valjni ležajniki

Structural bearings - Part 4: Roller bearings

Lager im Bauwesen - Teil 4: Rollenlager

Appareils d'appui structuraux - Partie 4: Appuis a rouleau

ITEH STANDARD PREVIEW
(standards.iteh.ai)

Ta slovenski standard je istoveten z: EN 1337-4:2004

SIST EN 1337-4:2004

<https://standards.iteh.ai/catalog/standards/sist/c4495368-98d3-4a99-a1bf-011072278efb/sist-en-1337-4-2004>

ICS:

91.010.30 V^@ã}ãããã Technical aspects

SIST EN 1337-4:2004 en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 1337-4:2004

<https://standards.iteh.ai/catalog/standards/sist/c4495368-98d3-4a99-a1bf-011072278efb/sist-en-1337-4-2004>

ICS 91.010.30

English version

Structural bearings - Part 4: Roller bearings

Appareils d'appui structuraux - Partie 4: Appuis à roulement

Lager im Bauwesen - Teil 4: Rollenlager

This European Standard was approved by CEN on 2 February 2004.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

(standards.iteh.ai)

SIST EN 1337-4:2004

<https://standards.iteh.ai/catalog/standards/sist/c4495368-98d3-4a99-a1bf-011072278efb/sist-en-1337-4-2004>



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

Management Centre: rue de Stassart, 36 B-1050 Brussels

Contents

page

Foreword.....	4
1 Scope	5
2 Normative references	5
3 Terms, definitions and symbols	6
3.1 Terms and definitions.....	6
3.2 Symbols	6
3.3 Abbreviations	7
4 Functional requirements	8
4.1 General.....	8
4.2 Load bearing capacity	8
4.3 Rotation capability	9
5 Materials.....	9
5.1 General.....	9
5.2 Carbon steel	9
5.3 Stainless steel	9
5.4 Cast steel	9
6 Design	9
6.1 General.....	9
6.2 Movement	10
6.3 Curved surfaces.....	10
6.4 Surfaces in contact.....	10
6.5 Length of rollers.....	10
6.6 Guidance and security of rollers	10
6.7 Dimensioning of components	10
6.7.1 Dimension of roller	10
6.7.2 Dimensions of roller plates.....	11
6.7.3 Load distribution to other components.....	12
6.8 Particular requirements.....	12
6.8.1 Flat sided rollers	12
6.8.2 Multiple rollers.....	12
6.8.3 Corrosion in the contact line	12
6.8.4 Alignment of components.....	12
6.8.5 Alignment of bearings	12
6.9 Design coefficient of friction	12
6.10 Eccentricities.....	13
6.10.1 Single rollers	13
6.10.2 Eccentricity due to rotation moment of multiple rollers.....	13
6.10.3 Transverse eccentricity.....	14
6.10.4 Total eccentricity.....	14
6.11 Combination with other elements	14
7 Tolerances	14
7.1 Flatness.....	14
7.2 Surface profile.....	14
7.3 Surface roughness	14
7.4 Parallelism of contact surfaces	15
7.5 Diameter of multiple rollers	15
8 Conformity evaluation	15
8.1 General.....	15
8.2 Control of the construction product and its manufacture.....	15
8.2.1 Factory Production Control (FPC).....	15
8.2.2 Initial type testing	15

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 1337-4:2004

<https://standards.iteh.ai/catalog/standards/sist/c4495308-98d3-4a99-afbf-011072278ceb/sist-en-1337-4-2004>

011072278ceb/sist-en-1337-4-2004

8.2.3	Routine testing.....	15
8.3	Raw materials and constituents.....	16
9	Installation	16
10	In-service inspection	16
Annex A (normative) Ferrous materials.....		18
Annex B (informative) Factory Production Control		19
B.1	General.....	19
B.1.1	Objectives.....	19
B.1.2	Documentation.....	19
B.1.3	Operations	19
B.2	Verifications and tests.....	20
B.2.1	General comments.....	20
B.2.2	Monitoring of conformity	20
B.2.3	Tests.....	20
B.2.4	Treatment of construction products which do not conform.....	20
B.2.5	Recording of verification and tests (manufacturer's register).....	20
B.2.6	Traceability.....	21
Annex ZA (informative) Clauses of this European Standard addressing the provisions of the EU Construction Products Directive.....		22
ZA.1	Scope and relevant characteristics.....	22
ZA.2	Procedure(s) for attestation of conformity of roller bearings	24
ZA.2.1	System(s) of attestation of conformity	24
ZA.2.2	EC Certificate and declaration of conformity	28
ZA.3	CE marking and labelling	29
Bibliography	(standards.itech.ai)	31

SIST EN 1337-4:2004

<https://standards.itech.ai/catalog/standards/sist/c4495368-98d3-4a99-a1bf-011072278efb/sist-en-1337-4-2004>

Foreword

This document (EN 1337-4:2004) has been prepared by Technical Committee CEN /TC 167, "Structural bearings", the secretariat of which is held by UNI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2004, and conflicting national standards shall be withdrawn at the latest by January 2006.

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 Directive(s).

For relationship with EU Directive(s), see informative annex ZA, which is an integral part of this document.

The European Standard EN 1337 "Structural bearings" consists of the following 11 parts:

Part 1 General design rules

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 restrain bearings

Part 9 Protection

Part 10 Inspection and maintenance

Part 11 Transport, storage and installation

Annex A is normative and annex B is informative.

This document includes a Bibliography.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

ITeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 1337-4:2004](https://standards.iteh.ai/catalog/standards/sist/c4495368-98d3-4a99-a1bf-011072278efb/sist-en-1337-4-2004)

<https://standards.iteh.ai/catalog/standards/sist/c4495368-98d3-4a99-a1bf-011072278efb/sist-en-1337-4-2004>

1 Scope

This part of EN 1337 specifies the requirements for the design and manufacture of single and multiple roller bearings, in which the roller axis is horizontal. In order to accommodate displacements parallel to the roller axis roller bearings can be combined with sliding elements in accordance with EN 1337-2. To permit rotation about the axis perpendicular to the roller axis or about both axes, as for multiple roller bearings, the roller bearings can be combined with bearings from other parts of EN 1337.

This part of EN 1337 does not apply to roller bearings made with materials other than those specified in clause 5.

Bearings which are subjected to rotation greater than 0,05 rad resulting from the characteristic combination of actions are outside the scope of this part of EN 1337.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 1337-1:2000, *Structural bearings — Part 1: General design rules.*

EN 1337-2:2004, *Structural bearings — Part 2: Sliding elements.*

EN 1337-7; *Structural bearings - Part 7: Spherical and cylindrical PTFE bearings.*

EN 1337-9:1997, *Structural bearings — Part 9: Protection.*

EN 1337-10, *Structural bearings — Part 10: Inspection and maintenance.*

EN 1990; *Eurocode - Basis of structural design.*

ENV 1992-1-1; *Eurocode 2: Design of concrete structures - Part 1: General rules and rules for buildings.*

ENV 1993-1-1; *Eurocode 3: Design of steel structures - Part 1-1: General rules and rules for buildings.*

EN 10025, *Hot rolled products of non-alloy structural steels — Technical delivery conditions.*

EN 10083-1, *Quenched and tempered steels — Part 1: Technical delivery conditions for special steels.*

EN 10083-2, *Quenched and tempered steels — Part 2: Technical delivery condition for unalloyed quality steels.*

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

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

EN 10204, *Metallic products — Types of inspection documents.*

EN ISO 4287; *Geometrical product specifications (GPS) - Surface texture: Profile method - Terms, definitions and surface texture parameters (ISO 4287:1997).*

EN ISO 6506-1, *Metallic materials - Brinell hardness test - Part 1: Test method (ISO 6506-1:1999).*

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

3 Terms, definitions and symbols

3.1 Terms and definitions

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

3.1.1

roller bearing

bearing formed by an upper and lower plate separated by one or more rollers (see Figure 1)

3.1.2

roller

accurately machined component of a roller bearing with concentric cylindrical surfaces

3.1.3

roller plate

accurately machined flat component which transmits force to and from the roller and provides the surface on which the roller moves

3.1.4

supporting plate

plate intermediate between the roller plate and the structure

3.1.5

multiple roller bearing

bearing comprising more than one roller

3.1.6

rotation element

additional element required with multiple bearings in order to share the applied normal forces between the rollers

<https://standards.iteh.ai/catalog/standards/sist/c4495368-98d3-4a99-a1bf-011072278efb/sist-en-1337-4-2004>

3.2 Symbols

For the purposes of this European Standard, the following symbols apply.

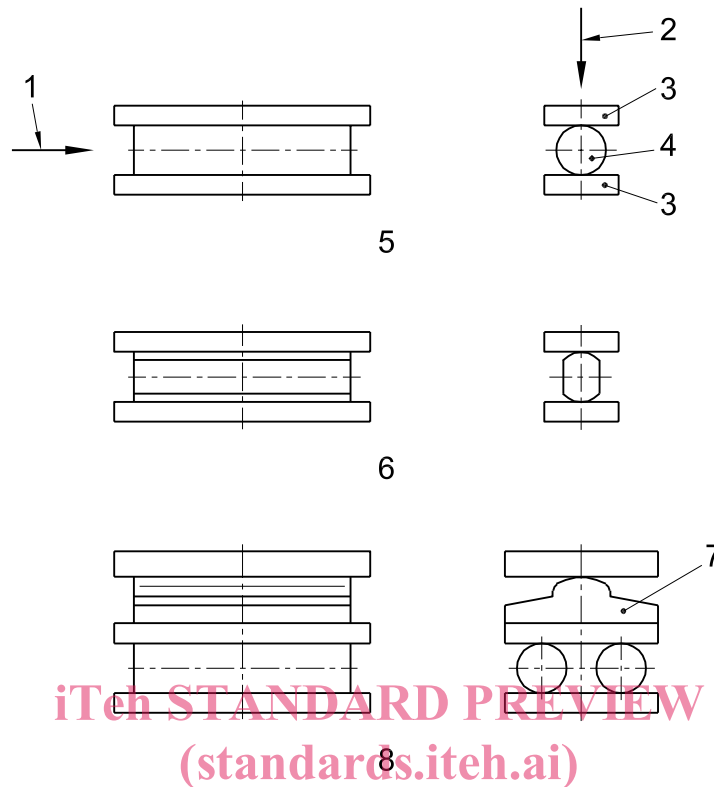
α_d	total design angular rotation about the line of contact, in radians (rad)
b	width of Hertzian contact area, in millimetres (mm)
E_d	design modulus of elasticity, in Newtons per square millimetre (N/mm ²)
e_d	total design eccentricity of vertical load, in millimetres (mm)
$e_{1,d}$	total eccentricity due to rolling friction, in millimetres (mm)
$e_{2,d}$	design eccentricity due to rotation, in millimetres (mm)
$e_{3,d}$	design eccentricity due to translation, in millimetres (mm)
D	diameter of the roller at the contact surface, in millimetres (mm)
f_u	ultimate strength of material, in Newtons per square millimetre (N/mm ²)
f_y	yield strength of material, in Newtons per square millimetre (N/mm ²)
N_{Rd}	design resistance of the roller plates in Newtons (N)
N_{Rd}	design resistance per unit length in Newton per millimetre (N/mm)
N_{RK}	characteristic resistance of the roller plates

N_{RK}	characteristic resistance per unit length in Newton per millimetre (N/mm)
N_{Sd}	design axial force, in Newtons (N)
N_{Sd}	design axial force per unit length in Newton per millimetre (N/mm)
γ_m	partial material safety factor
L	effective length of roller, in millimetres (mm)
M_{Sd}	rotation moment, in Newton millimetres (Nmm)
R	radius of contact surface, in millimetres (mm)
t_p	thickness of roller plate, in millimetres (mm)
μ_d	design coefficient of rolling friction
H	distance between horizontal section to be verified and roller contact area in millimetres (mm)
V_{Sd}	total transverse or shear force in Newtons (N)

3.3 Abbreviations

ULS	Ultimate Limit State
NDP	Nationally Determined Parameters
FPC	Factory Production Control


 iTeh STANDARD PREVIEW
 (standards.iteh.ai)
[SIST EN 1337-4:2004](https://standards.iteh.ai/catalog/standards/sist/c4495368-98d3-4a99-a1bf-011072278efb/sist-en-1337-4-2004)
<https://standards.iteh.ai/catalog/standards/sist/c4495368-98d3-4a99-a1bf-011072278efb/sist-en-1337-4-2004>



Key

- 1 Horizontal force
- 2 Normal force
- 3 Roller plate
- 4 Roller
- 5 Single roller bearing
- 6 Flat sided roller bearing
- 7 Rotation element
- 8 Multiple roller bearing

[SIST EN 1337-4:2004](https://standards.iteh.ai/catalog/standards/sist/c4495368-98d3-4a99-a1bf-011072278efb/sist-en-1337-4-2004)
<https://standards.iteh.ai/catalog/standards/sist/c4495368-98d3-4a99-a1bf-011072278efb/sist-en-1337-4-2004>

Figure 1 — Types of roller bearing

4 Functional requirements

4.1 General

A roller bearing shall be capable of transferring normal forces between the superstructure and the substructure. It shall permit translation perpendicular to the roller axis and rotation about that axis.

All roller bearings shall incorporate a mechanical restraint system to resist applied horizontal forces along the axis of the roller.

4.2 Load bearing capacity

The load bearing capacity of the roller bearing shall be obtained from the design verification as a function of the geometry and the steel properties.

4.3 Rotation capability

The rotation capability of the roller bearing is an intrinsic characteristic of the system based on its geometry and shall be declared by the manufacturer. Its maximum value shall be 0,05 rad.

5 Materials

5.1 General

Only ferrous materials as specified in the following and in annex A shall be used in the manufacture of rollers and roller plates.

Rollers and roller plates shall be examined for cracks by ultrasonic methods in accordance with the requirements of EN 10160 or by magnetic particle or dye penetrant methods. No components with linear defects revealed by these procedures are acceptable.

The low temperature impact properties of all steel mentioned in the following and in annex A shall comply with the requirements given in annex A. Impact tests shall be conducted as specified in the relevant standards. The minimum energy at -20 °C for the average of 3 samples shall be as given in annex A. Only one of these 3 samples may have a lower value which shall be at least 0,7 x the average specified in annex A.

Rollers and roller plates shall not have a surface hardness greater than that specified in annex A.

The hardness of roller and roller plates shall be verified in accordance with EN ISO 6506-1. Both the hardness of the contact surfaces and the variation in hardness across the section shall be verified by tests carried out on the contact surfaces and across the ends.

5.2 Carbon steel

Carbon steel shall be in accordance with the requirements of EN 10025 or EN 10083-1 and EN 10083-2. The minimum yield strength shall be 240 N/mm².

5.3 Stainless steel

Stainless steel shall be in accordance with EN 10088-2. The minimum tensile strength shall be 490 N/mm² for any component.

5.4 Cast steel

Cast steel shall be in accordance with ISO 3755.

6 Design

6.1 General

NOTE 1 The design of roller bearings is based on the assumption that load passes through a Hertzian contact area between two surfaces with dissimilar radii. Design verification with respect to loading, rotation (movement) should be determined in accordance with clause 5 of EN 1337-1:2000.

Performance and durability of bearings designed according to this part of EN 1337 are based on the assumption that requirements established in 6.2 to 6.11 and clause 7, as relevant, are complied with.

The design values of the effects (forces, deformations, movements) from the actions at the supports of the structure shall be calculated from the relevant combination of actions according to EN 1990.

NOTE 2 The decisive design values should be available from a bearing schedule as shown in EN 1990, annex E.1. Until EN 1991 is available the guidance given in annex B of EN 1337-1:2000 can be used. Sliding elements should be designed and manufactured in accordance with EN 1337-2.

γ_m values are defined in Eurocodes EN 1992 to EN 1999. The recommended value is $\gamma_m = 1$.

NOTE 3 When values for partial factors have been selected in Member States, which diverge, for specific works, from the recommended value given in EN 1992 to EN 1999, these values apply in the territory of this member State. Such values are defined in the national annex attached to the relevant Eurocodes.

6.2 Movement

NOTE Roller bearings provide for translation in one direction only. Single rollers permit rotation about the line of contact but multiple rollers require additional elements to accommodate rotation.

Roller bearings for use in curved parts of structures shall have additional sliding elements and/or rotation elements to ensure uniform distribution of load across the roller. The axis of rotation shall be perpendicular to the direction of movement.

6.3 Curved surfaces

The curved surfaces shall be of cylindrical shape.

6.4 Surfaces in contact

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

6.5 Length of rollers

The length of a roller shall not be less than twice its diameter nor greater than six times its diameter.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 1337-4:2004](https://standards.iteh.ai/catalog/standards/sist/c4495368-98d3-4a99-a1bf-011072278efb/sist-en-1337-4-2004)

[https://standards.iteh.ai/catalog/standards/sist/c4495368-98d3-4a99-a1bf-](https://standards.iteh.ai/catalog/standards/sist/c4495368-98d3-4a99-a1bf-011072278efb/sist-en-1337-4-2004)

6.6 Guidance and security of rollers

Guidance shall be provided to ensure that the axis of rolling is maintained correctly. Location shall be such that true rolling occurs during movement. Where gearing is used as security, the pitch circle diameter of the gear teeth shall be the same as the diameter of the rollers.

6.7 Dimensioning of components

6.7.1 Dimension of roller

NOTE 1 The ability of curved surfaces and plates to withstand deformation under load is dependent upon the hardness of the material of which they are made. There is not a constant relationship between hardness and yield stress of steel but there is between hardness and ultimate strength. Consequently the following expressions are based on the ultimate strength of the material.

The design axial force per unit length of roller contact N_{Sd} shall meet the following condition under the fundamental combination of actions:

$$N_{Sd} \leq N_{Rd} \quad (1)$$

Where $N_{Rd} = \frac{N_{Rk}}{\gamma_m^2}$ is the design value of resistance per unit length of roller contact.

N_{Rk} is the characteristic value of resistance of the contact surface per unit length.

$$N_{Rk} = 23 \times R \times \frac{f_u^2}{E_d} \quad (2)$$