BRITISH STANDARD

BS EN
1337-6:2004

Structural bearings —

Part 6: Rocker bearings

The European Standard EN 1337-6:2004 has the status of a British Standard

ICS 91.010.30

BSI
British Standards

National foreword

This British Standard is the official English language version of EN 1337-6:2004. Together with BS EN 1337-4:2004 supersedes BS 5400-9.1:1983 which will remain current until the publication of the remaining parts of the BS EN 1337 series.

The UK participation in its preparation was entrusted to Technical Committee B/522, Structural bearings, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

Cross-references

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Summary of pages

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EUROPEAN STANDARD

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Structural bearings - Part 6: Rocker bearings

Appareils d'appui structuraux - Partie 6: Appareils d'appui à balanciers

Lager im Bauwesen - Teil 6: Kipplager

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

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Foreword

This document (EN 1337-6:2004) 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of an identical text or by endorsement, at the latest by October 2004, and conflicting national standards shall be withdrawn at the latest by January 2006.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.

1 Scope

This part of EN 1337 specifies the requirements for the design and manufacture of rocker bearings. In order to accommodate displacements rocker bearings can be combined with a sliding element in accordance with EN 1337-2. 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. This part of EN 1337 does not apply to rocker bearings made with materials other than those specified in clause 5.

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.*

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 1083, *Spheroidal graphite cast iron – Classification.*

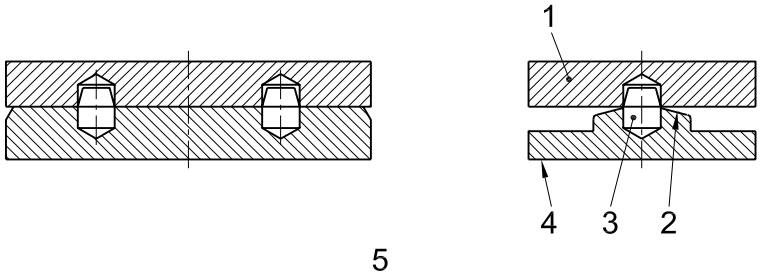
ISO 3755, *Cast carbon steels for general engineering purposes.*

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
line rocker
bearing which is formed by a partial cylindrical surface rolling on a flat plate. It permits rotation about an axis parallel to the axis of the curved surface (see Figure 1). If necessary the rocker and rocker plate can be inverted

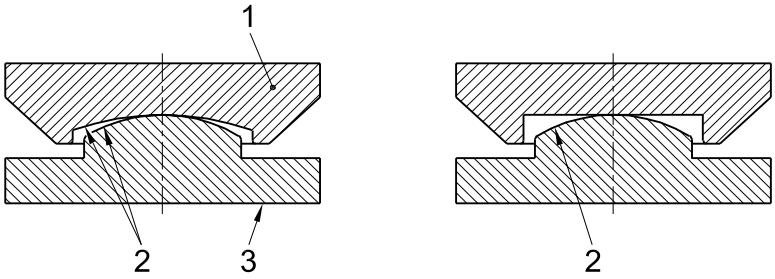


Key

1 Rocker plate
2 Cylindrical surface
3 Line rocker bearing
4 Line rocker
5 Line rocker bearing

Figure 1 —Typical line rocker bearing

3.1.2
point rocker
bearing which is formed by a convex spherical surface rolling on a flat or concave spherical surface of larger radius (see Figure 2)



Key

1 Rocker plate
2 Spherical surfaces
3 Point rocker

Figure 2 — Typical point rocker bearing

3.1.3
rocker
component with a curved convex surface formed on one face. The curved surface can be a portion of a cylinder or sphere (see Figures 1 and 2)

3.1.4
rocker plate
component which operates in contact with the rocker. It can be flat or a concave portion of a sphere (see Figures 1 and 2)

3.1.5
shear dowel
component which provides positive mechanical restrain to horizontal loads

3.2 Symbols

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

α_d total design angular rotation in one direction, in radians (rad)

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)

$e_{2,d}$ design eccentricity due to rotation, in millimetres (mm)

$e_{3,d}$ design eccentricity due to translation, 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 contact surface

N'_{Rd} design resistance per unit length in Newton per millimetre (N/mm)

N_{Rk} characteristic resistance of the contact surface

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

H distance between horizontal section to be verified and rocker contact area, in millimetres (mm)

L effective length of rocker surface, in millimetres (mm)

R radius of convex contact surface, in millimetres (mm)

R_1 radius of concave contact surface, in millimetres (mm)

V_{Sd} total transverse or shear force in Newtons (N)

4 Functional requirements

4.1 General

A rocker bearing shall be capable of transferring applied vertical and horizontal forces between the superstructure and the substructure. Line rockers shall permit rotation in one direction about the rocker axis. Point rockers shall permit rotation about any axis.

Rocker bearings may be used to resist horizontal forces. Resistance shall be by means of positive mechanical restraint such as shear dowels.

4.2 Load bearing capacity

The load bearing capacity of the rocker 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 rocker 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 material as specified in the following and in annex A shall be used in the manufacture of rocker bearing components.

Rockers and rocker plates shall be examined for cracks by ultrasonic testing in accordance with 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.

The hardness of rocker and rocker 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/mm^2.

5.3 Stainless steel

Stainless steel shall be in accordance with EN 10088-2. The minimum tensile strength shall be 510 N/mm^2 for any component.

5.4 Cast steel

Cast steel shall be in accordance with ISO 3755 and annex A.

5.5 Cast iron

Cast iron shall be of spheroidal graphite type in accordance with ISO 1083 and annex A.

6 Design

6.1 General

Design verification with respect to loading, rotation (movement) shall be determined in accordance with clause 5 of EN 1337-1:2000.

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 1 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.

Performance and durability of bearings designed according to this part of EN 1337 are based on the assumption that requirements established in clauses 6 and 7, as relevant, are complied with.

NOTE 2 The design of rocker bearings is based on the assumption that load passes through a Hertzian contact area between two surfaces with dissimilar radii.

NOTE 3 Line rocker bearings permit rotation about an axis parallel to the line of contact. Point rockers permit rotation about any axis.

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

NOTE 4 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 Curved surfaces

The curved surfaces of line rockers shall be of cylindrical shape, those of point rockers shall be spherical.

6.3 Surfaces in contact

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

6.4 Preventing of sliding

Mechanical devices shall be provided to prevent contact surfaces of rocker bearings sliding on one another.

6.5 Dimensioning of components

6.5.1 Dimensions of line rocker

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 rocker contact N'_{Sd} shall meet the following condition under the fundamental combination of actions:

$$N'_{Sd} \leq N'_{Rd} \tag{1}$$

Where $N'_{Rd} = \frac{N'_{Rk}}{\gamma^2_m}$ is the design value of resistance per unit length of rocker contact.

N'_{Rk} is the characteristic value of resistance of the contact surface per unit length.

$$N'_{Rk} = 23 \times R \times \frac{f_u^2}{E_d} \tag{2}$$

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

NOTE 2 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.

In determining the values of N'_{Sd} the effects of asymmetric loading due to transverse eccentricities and applied moments shall be considered (see also 6.10.3 of EN 1337-1:2000).

6.5.2 Point rocker in spherical seating

The concave and convex spherical radii shall be selected so that:

$$N_{Sd} \leq N_{Rd} \tag{3}$$

Where $N_{Rd} = \frac{N_{Rk}}{\gamma^3_m}$ is the design value of resistance of the contact surface.

N_{RK} is the characteristic value of resistance of the contact surface.

$$N_{Rk} = 220 \times \left(\frac{R_1 - R}{R_1 \times R} \right)^2 \times f_u^3 \times \frac{1}{E_d^2} \tag{4}$$

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

NOTE 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.

6.5.3 Point rocker on a flat surface

The spherical radius R in contact with a flat surface shall be selected so that:

$$N_{Sd} \leq N_{Rd} \tag{5}$$

Where $N_{Rd} = \frac{N_{Rk}}{\gamma^3_m}$ is the design value of resistance.

N_{RK} is the characteristic value of resistance of the contact surface.

$$N_{Rk} = 220\ R^2 \times f_u^3 \times \frac{1}{E_d^2} \tag{6}$$

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

NOTE 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.

6.5.4 Load distribution to other components

The rockers and rocker plates shall be so proportioned that loads are adequately distributed to adjacent components.

The maximum load dispersion through a component shall be taken as 45° unless a greater angle is justified by calculations, which take into account the characteristics of the adjacent components and materials. In no case shall load dispersion be assumed beyond a line drawn at 60° to the vertical axis (see Figure 3).

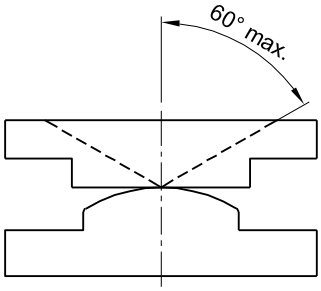


Figure 3 — Load distribution to components

6.6 Particular requirements

6.6.1 Corrosion in the contact line or point

If the materials used in contact area are not intrinsically corrosion resistant then other provisions shall be made in the design to prevent corrosion in the area. These measures may take the form of grease boxes, oil baths, flexible seals or other methods, which can be shown to be effective, or which have been found satisfactory during use. Where dissimilar materials are used in combination the effects of electrolytic corrosion shall be considered.

6.6.2 Alignment

Provision shall be made to ensure that bearing components remain correctly aligned with each other and clamped together between manufacture and installation. Temporary transit devices shall not be used to locate the structure.

6.6.3 Line rocker rotational eccentricity

Eccentricity, e_2, due to rotational movement between the components is:

$$e_2 = \alpha_d \times R \tag{7}$$

See Figure 4.

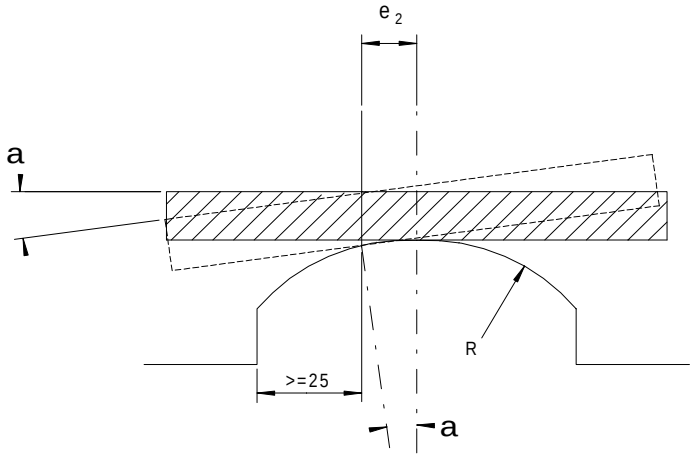


Figure 4 — Line rocker eccentricity

The total rocker eccentricity due to rotational eccentricity effect shall be taken as $e_{2,d} = 2 \times e_2$ to allow for the effect of rolling friction at the contact surfaces.

6.6.4 Point rocker rotational eccentricity

Eccentricity, e_2, due to rotational movement between the components is:

$$e_2 = \frac{\alpha_d}{\left(\frac{1}{R}\right) - \left(\frac{1}{R_1}\right)} \quad (8)$$

See Figure 5.

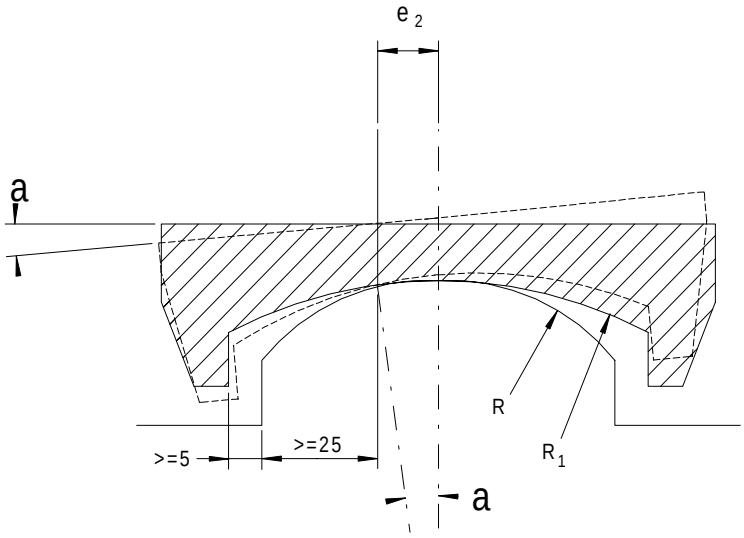


Figure 5 — Point rocker eccentricity

The total rocker eccentricity due to rotational eccentricity effect shall be taken as $e_{2,d} = 2 \times e_2$ to allow for the effect of rolling friction at the contact surfaces.

6.6.5 Eccentricity due to horizontal load

Eccentricity, $e_{3,d}$ of vertical load due to horizontal design load is:

$$e_{3,d} = \frac{V_{Sd} \times H}{N_{Sd}} \quad (9)$$

6.6.6 Total eccentricity

Total eccentricity e_d is:

$$e_d = e_{2,d} + e_{3,d} \quad (10)$$

Where no provision is made for prestressing the fixing bolts the total eccentricity in any direction shall not exceed 1/6 of the plate dimension in that direction for a rectangular plate or 1/8 the plate diameter if circular, i.e the contact stress at the extremities shall be greater than zero. At maximum design rotation α_d there shall be a minimum clearance of 5 mm between opposing components as shown in Figure 5.

6.6.7 Limiting rotation condition

The dimensions of the curved surface shall be such that the contact line or point is at least 25 mm from any discontinuity in the curved surface at maximum rotation (see Figures 4 and 5). Rotation about an axis perpendicular to the rocker axis of a line rocker is not permitted.

6.7 Combination with other elements

When a rocker bearing is combined with elements from other parts of this part of EN 1337, the characteristics and kinetics of all elements and their interaction, together with the stiffnesses, moments and eccentricities of the structural components shall be considered.

7 Tolerances

7.1 Flatness

The tolerance on flatness of rocker plates in the direction of the rocker axis shall be in accordance with Table 1.

7.2 Surface profile

The surface profile tolerance for the length of the curved surface over which contact can occur shall be in accordance with Table 2.

Table 1 — Flatness tolerance for rocker plates

Material	**Effective length *L* (mm)**	
	≤ 250	> 250
	Tolerance mm	Tolerance mm
Steel ≤ 300 HV	0,1	$0{,}0004 \times L$
Steel > 300 HV	0,075	$0{,}0003 \times L$

Table 2 — Surface profile tolerance for rockers

Material	**Effective length *L* (mm)**	
	≤ 250	> 250
	Tolerance (mm)	Tolerance (mm)
Steel ≤ 300 HV	0,05	0,05
Steel > 300 HV	0,025	0,025

7.3 Surface roughness

The surface roughness of the rocker and rocker plate, measured in accordance with EN ISO 4287, shall not exceed the values shown in Table 3.

Table 3 —Surface roughness

Material	Surface roughness (µm)
Steel ≤ 300 HV	25,0
Steel > 300 HV	6,3

7.4 Parallelism of contact surfaces

Before installation, where the upper and lower surfaces of a bearing are intended to be parallel, the deviation from parallelism between any two pairs of points on the surface shall not be more than 0,1 % when the difference in the vertical distance between each pair is expressed as a percentage of the horizontal distance separating them. Where the upper and lower surfaces are intended to be inclined in relation to each other a similar tolerance shall apply between the actual and intended inclination.

8 Conformity evaluation

8.1 General

The inspections specified in this clause shall be carried out to demonstrate conformity of the product (rocker bearings) with this part of EN 1337. In the case of sliding rocker bearings, clause 8 of EN 1337-2:2004 also applies.

The given procedure for evaluation of conformity is also valid for non serial production.

8.2 Control of the construction product and its manufacture

8.2.1 Factory production control (FPC)

The extent and frequency of FPC by the manufacturer and of controls during type testing by a third party (if required) shall be conducted in accordance with Table 4. Certificates containing material properties established in clause 5 shall be individually examined during the FPC and shall be retained by the manufacturer of the rocker bearing and by the third party (if required).

NOTE For factory production control see annex B.

8.2.2 Initial type testing

The extent of type-testing shall be conducted in accordance with Table 4.

Type testing shall be performed prior to commencing manufacture. It shall be repeated if changes in the construction product or manufacturing processes occur.

Type testing shall be supplemented with the relevant calculations from clause 6 for the evaluation of the final performance of the rocker bearing.

8.2.3 Routine testing

The routine testing shall be carried out continuously by the manufacturer in accordance with Table 4.

8.3 Raw materials and constituents

Compliance with the product requirements specified in clause 5 shall be verified by means of inspection certificates in accordance with EN 10204 to the level stated in Table 5.

9 Installation

The bearings shall be installed within a tolerance of ± 0,003 rad of the intended inclination of the contact surfaces to the structure.

10 In-service inspection

In-service inspection shall be in accordance with the requirements of EN 1337-10. Visible defects shall include cracking of rocker or rocker plates, misalignment of the rocker, gap between rocker and rocker plates in the intended contact area.

In the case of sliding rocker bearings the inspection of the sliding surfaces shall be as for EN 1337-2 and EN 1337-7.

Table 4 — Control and testing of the rocker bearing

Type of control		Subject of control	Control in accordance with	Frequency
Factory production control	LBC, RC	Dimensions	Manufacturer's drawings	Every bearing
	LBC	Flatness	7.1	
	LBC, RC	Surface profile	7.2	
	LBC	Surface roughness	7.3	
	LBC	Parallelism	7.4	
	LBC	Hardness of hardened steel	annex A	
	LBC, D	Freedom from cracks	5.1	
	D	Corrosion protection	EN 1337-9	
Type-testing	LBC, RC	Dimensions	Manufacturer's drawings	Once or more (according to 8.2.2)
	LBC	Mechanical characteristics of steel	annex A	
	D	Freedom from cracks	5.1	
	D	Corrosion protection	EN 1337-9	
LBC = relevant to load bearing capacity RC = relevant to rotation capability D = relevant to durability				

Table 5 — Specific testing of raw materials and constituents

Type of inspection certificate in accordance with EN 10204	Subject of control	Control in accordance with	Frequency
3.1.B	Carbon steel	5.2	Every batch
	Stainless steel	5.3	
	Cast steel	5.4	
	Cast iron	5.5	

Annex A
(normative)

Ferrous materials

Ferrous material classes

Material class	Tensile strength (Minimum) [N/mm²]	Yield strength (Minimum) [N/mm²]	Impact / at temperature (Minimum) [J]	Surface hardness (Maximum) [HV 10]	Elongation (Minimum) [%]	Friction coefficient (Maximum)
A	340	240	27 / 0°C	150	25	0,05
B	490	335	27 / -20°C	250	21	0,05
C	600	420	27 / -20°C	450	14	0,02
D	1350	1200	11/-20°C	480	12	0,02
Cast Iron	500	320	-	200	8	0,05

Annex B
(informative)

Factory Production Control (FPC)

B.1 General

B.1.1 Objectives

The manufacturer should exercise a permanent factory production control (FPC).

NOTE A quality management system based on the relevant part of the EN ISO 9000 series or equivalent, including specific requirements from this part of EN 1337, can be considered as suitable.

The manufacturer is responsible for organizing the effective implementation of the FPC system. Tasks and responsibilities in the production control organization should be documented and this documentation should be kept up-to-date. In each factory the manufacturer can delegate the action to a person having the necessary authority to:

a) identify procedures to demonstrate conformity of the construction product at appropriate stages;

b) identify and record any instance of non-conformity;

c) identify procedures to correct instances of non-conformity.

B.1.2 Documentation

The manufacturer should draw up and keep up-to-date documents defining the FPC which he applies. The manufacturer's documentation and procedures should be appropriate to the construction product and manufacturing process. All FPC systems should achieve an appropriate level of confidence in the conformity of the construction product. This involves:

a) preparation of documented procedures and instructions relating to FPC operations, in accordance with the requirements of this part of EN 1337 (see B.1.3);

b) effective implementation of these procedures and instructions;

c) recording of these operations and their results;

d) use of these results to correct any deviations, repair the effects of such deviations, at any resulting instances of non-conformity and, if necessary, revise the FPC to rectify the cause of non-conformity.

B.1.3 Operations

FPC includes the following operations:

a) specification and verification of raw materials and constituents;

b) controls and tests to be carried out during manufacture of the construction product according to a frequency laid down;

c) verifications and tests to be carried out on finished construction products according to a frequency which may be laid down in the technical specifications and adapted to the product and its conditions of manufacture.

NOTE 1 The operations under (b) centre as much on the intermediate states of the construction product as on manufacturing machines and their adjustment, and equipment etc. These controls and tests and their frequency are chosen based on type of construction product and composition, the manufacturing process and its complexity, the sensitivity of product features to variations in manufacturing parameters etc.

NOTE 2 With regard to operations under (c), where there is no control of finished construction products at the time that they are placed on the market, the manufacturer should ensure that packaging and reasonable conditions of storage do not damage construction products and that the construction product remains in conformity with the technical specification.

NOTE 3 The appropriate calibrations should be carried out on defined measuring and test instruments.

B.2 Verifications and tests

B.2.1 General comments

The manufacturer should have or have available the installations, equipment and personnel which enable him to carry out the necessary verifications and tests. He may, as his agent, meet this requirement by concluding a sub-contract agreement with one or more organizations or persons having the necessary skills and equipment.

The manufacturer should calibrate or verify and maintain the control, measuring or test equipment in good operating condition, whether or not it belongs to him, with a view to demonstrating conformity with the specification or the test reference system to which the specification refers.

B.2.2 Monitoring of conformity

If necessary, monitoring is carried out of the conformity of intermediate states of the product and at the main stages of its production.

This monitoring of conformity focuses where necessary on the construction product throughout the process of manufacture, so that only products having passed the scheduled intermediate controls and tests are dispatched.

B.2.3 Tests

Tests should be in accordance with the test plan (Tables 4 and 5) and be carried out in accordance with the methods indicated in this part of EN 1337.

NOTE Initial type tests on the product may not be carried out by the manufacturer himself but should be carried out and validated by an approved body.

The manufacturer should establish and maintain records which provide evidence that the construction product has been tested. These records should show clearly whether the construction product has satisfied the defined acceptance criteria. Where the construction product fails to satisfy the acceptance measures, the provision for non-conforming product should apply.

B.2.4 Treatment of construction products which do not conform

If control or tests show that the construction product does not meet the requirements, then necessary corrective measures should immediately be taken. Construction products or batches not conforming should be isolated and properly identified. Once the fault has been corrected, the test or verification in question should be repeated.

If construction products have been delivered before the results are available, a procedure and record should be maintained for notifying customers.

B.2.5 Recording of verifications and tests (manufacturer's register)

The results of factory production controls should be properly recorded in the manufacturer's register. The construction product description, date of manufacture, test method adopted, test results and acceptance criteria should be entered in the register under the signature of the person responsible for control who carried out the verification.

With regard to any control result not meeting the requirements of this part of EN 1337, the corrective measures taken to rectify the situation (e.g. a further test carried out, modification of manufacturing process, scrapping or rectifying of the product) should be indicated in the register.

In the case of third party surveillance the records should be made available to the third party for examination.

B.3 Traceability

It is the manufacturer's, or his agent's responsibility to keep full records of individual construction products or product batches, including their related manufacturing details and characteristics and to keep records of to whom these construction products or batches were first sold. Individual construction products or batches of products and their related manufacturing details should be completely identifiable and traceable. In certain cases, for example bulk products, a rigorous traceability is not possible.

Annex ZA
(informative)

Clauses of this European Standard addressing the provisions of the EU Construction Products Directive

ZA.1 Scope and relevant characteristics

This part of EN 1337 has been prepared under a mandate[1)] given to CEN by the European Commission and the European Free Trade Association.

The clauses of this part of EN 1337 shown in this annex meet the requirements of the mandate given under the EU Construction Products Directive (89/106/EEC).

Compliance with these clauses confers a presumption of fitness of the rocker bearings covered by this annex for the intended uses indicated herein; reference shall be made to the information accompanying the CE marking.

> **WARNING:** Other requirements and other EU Directives, not affecting the fitness for intended use, can be applicable to the rocker bearings falling within the scope of this European Standard.

NOTE In addition to any specific clauses relating to dangerous substances contained in this part of EN 1337, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the EU Construction Products Directive, these requirements need also to be complied with, when and where they apply.
Note : an informative database of European and national provisions on dangerous substances is available at the Construction web site on EUROPA (CREATE, accessed through
http://europa.eu.int/comm/enterprise/construction/internal/dangsub/dangmain.htm

Table ZA.1.1 - Relevant clauses for rocker bearings for buildings and civil engineering works

Product:	Rocker bearings (Figure 1) as covered in the scope of this part of EN 1337		
Intended use:	In buildings and civil engineering works		
Essential characteristics	**Requirement clauses in this and other European Standard(s)**	**Levels and/or classes**	**Notes**
Load bearing capacity	EN 1337-6:2004 Clauses 4.1 4.2 6	None	Design value, in kN
Rotation capability	EN 1337-6:2004 Clauses 4.1 4.3 6	None	Design value, in radians
Durability Against repeated loading Against low and high temperature Against corrosion	EN 1337-6:2004 Clauses 5 annex A 5 annex A 6.6. EN 1337-9:1997, clause 4	None	

1) M/104 "Structural bearings" as amended by M/132 (anti-seismic devices are covered by CEN/TC 340).

Table ZA.1.2 - Relevant clauses for rocker bearings with flat sliding elements for buildings and civil engineering works

Product:	Rocker bearings (Figures 1 and 2) with flat sliding elements as covered by the scope of this part of EN 1337		
Intended use:	In buildings and civil engineering works		
Essential characteristics	**Requirement clauses in this and other European Standard(s)**	**Levels and/or classes**	**Notes**
Load bearing capacity	EN 1337-6:2004 Clauses 4.1 (functional requirements – general) 4.2 (load bearing capacity) 6 (design)	None	Design value in kN
Rotation capacity	EN 1337-6:2004 Clauses 4.1 (functional requirements – general) 4.3 (rotation capability) 6 (design)		Design value in radians
Durability Against repeated loading Against low and high temperature Against corrosion	EN 1337-6:2004 Clauses 5 annex A 5 annex A 6.6.1 (corrosion in the contact line or point) EN 1337-9:1997, clause 4		
Load bearing capacity (of sliding element)	EN 1337-2:2004 clauses 5 (material properties) 6.8.3 (compressive stress verification) 6.9 (design verification of backing plates)		Design value in kN
Coefficient of friction (of sliding element)	EN 1337-2:2004 clauses 4 (functional requirements) 5 (material properties) 6 (design requirements) 7 (manufacturing, assembly and tolerances)		Tabulated value (Table 11)
Durability aspects (of sliding element)	EN 1337-2:2004 clause 7 (manufacturing, assembly and tolerances) EN 1337-9:1997; clause 4		

The requirement on a certain characteristic is not applicable to those Member States (MSs) where there are no regulatory requirements on that characteristic for the intended use of the product. In this case, manufacturers placing their products on the market of these MSs are not obliged to determine nor declare the performance of their products with regard to this characteristic and the option "No performance determined" (NPD) in the information accompanying the CE marking (see clause ZA.3) may be used. The NPD option may not be used, however, where the characteristic is subject to a threshold level.

ZA.2 Procedure(s) for attestation of conformity of rocker bearings

ZA.2.1 System(s) of attestation of conformity

The system(s) of attestation of conformity of rocker bearings indicated in Table ZA.1.1 and ZA.1.2 in accordance with the Decision of the Commission Decision 95/467/EC of 24/10/1995 are the following:

Table ZA.2 - System(s) of attestation of conformity

Product	Intended use(s)	Level(s) or Class(es)	Attestation of conformity systems
Structural bearings	In buildings and civil engineering works where requirements on individual bearings are critical [a]	None	1
	In buildings and civil engineering works where requirements on individual bearings are not critical [b]		3
System 1: See annex III.2.(i), without audit testing of samples System 3: See annex III.2.(ii), second possibility			
[a] Critical in the sense that those requirements may, in case of failure of the bearing, put the whole works or part thereof beyond those limit states regarded as serviceability and ultimate. [b] Not critical in the sense that those requirements may not, in the case of failure of the bearing, put the whole works or part thereof beyond those limit states regarded as serviceability and ultimate and there is no risk to life.			

The attestation of conformity of the roller bearings in Table ZA.1.1 shall be based on the evaluation of conformity sub-clauses of clause 8 of EN 1337-6:2004 indicated in Tables ZA.3.1 to ZA.3.2.

Table ZA.3.1 - Assignment of evaluation of conformity tasks for rocker bearings intended to be subject to critical requirements

Tasks		Contents of the task	Evaluation of conformity clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to all characteristics of Table ZA.1.1 and Table ZA.1.2 where relevant	EN 1337-6:2004 clauses 8.1 (conformity evaluation – general) 8.2.1 (factory production control) 8.3 (raw materials) annex B (FPC)
	Further testing (evaluation) of samples taken at the factory, where relevant	All characteristics of Table ZA.1.1 and Table ZA.1.2 where relevant	EN 1337-6:2004 clauses 8.1 (conformity evaluation – general) 8.2.3 (routine testing)
Tasks for the notified body	Initial type testing	All characteristics of Table ZA.1.1 and Table ZA.1.2 where relevant	EN 1337-6:2004 clauses 8.1 (conformity evaluation – general) 8.2.2 (initial type testing)
	Initial inspection of factory and of FPC	Parameters related to all characteristics of Table ZA.1.1 and Table ZA.1.2 where relevant	EN 1337-6:2004 clauses 8.1 (conformity evaluation – general) 8.2.1 (factory production control) 8.2.3 (routine testing) 8.3 (raw materials) annex B (FPC)
	Continuous surveillance, assessment and approval of FPC	Parameters related to all characteristics of Table ZA.1.1 and Table ZA.1.2 where relevant	

Table ZA.3.2 - Assignment of evaluation of conformity tasks for rocker bearings intended to be subject to non critical requirements

Tasks		Contents of the task	Evaluation of conformity clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to all characteristics of Table ZA.1.1 and Table ZA.1.2 where relevant	EN 1337-6:2004 clauses 8.1 (conformity evaluation – general) 8.2.1 (factory production control) 8.3 (raw materials) annex B (FPC)
Tasks for the notified body	Initial type testing	All characteristics of Table ZA.1.1 and Table ZA.1.2 where relevant	EN 1337-6:2004 clauses 8.1 (conformity evaluation – general) 8.2.2 (initial type testing)

The attestation of conformity of the sliding rocker bearings in Table ZA.1.2 shall be based on the evaluation of conformity sub-clauses of clause 8 of EN 1337-6:2004 indicated in Tables ZA.3.3 to ZA.3.4.

Table ZA.3.3 - Assignment of evaluation of conformity tasks for sliding rocker bearings intended to be subject to critical requirements

Tasks		Contents of the task	Evaluation of conformity clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to all characteristics of Table ZA.1.2	EN 1337-6:2004 clauses 8.1 (conformity evaluation – general) 8.2.1 (factory production control) 8.3 (raw materials) annex B EN 1337-2:2004 clauses 8.2.1 (control of the product and its manufacture – general) 8.2.3 (FPC) 8.3 (raw materials and constituents) 8.4 (sampling)
	Further testing (evaluation) of samples taken at the factory, where relevant	All characteristics of Table ZA.1.1	EN 1337-6:2004 clauses 8.1 (conformity evaluation – general) 8.2.3 (routine testing)
Tasks for the notified body	Initial type testing	All characteristics of Table ZA.1.1	EN 1337-6:2004 clauses 8.1 (conformity evaluation – general) 8.2.2 (initial type testing)
	Initial inspection of factory and of FPC	Parameters related to all characteristics of Table ZA.1.2	EN 1337-6:2004 clauses 8.1 (conformity evaluation – general) 8.2.1 (factory production control) 8.2.3 (routine testing) 8.3 (raw materials) annex B EN 1337-2:2004 clauses 8.2.1 (control of the product and its manufacture – general) 8.2.3 (FPC) 8.3 (raw materials and constituents) 8.4 (sampling)
	Continuous surveillance, assessment and approval of FPC	Parameters related to all characteristics of Table ZA.1.2	

Table ZA.3.4 - Assignation of evaluation of conformity tasks for sliding rocker bearings intended to be subject to non critical requirements

Tasks		Contents of the task	Evaluation of conformity clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to all characteristics of Table ZA.1.1	EN 1337-6:2004 clauses 8.1 (conformity evaluation – general) 8.2.1 (factory production control) 8.3 (raw materials) annex B (FPC) EN 1337-2:2004 clauses 8.2.1 (control of the product and its manufacture – general) 8.2.3 (FPC) 8.3 (raw materials and constituents) 8.4 (sampling)
Tasks for the notified body	Initial type testing	All characteristics of Table ZA.1.1	EN 1337-6:2004 clauses 8.1 (conformity evaluation – general) 8.2.2 (initial type testing) EN 1337-2:2004 clauses 8.2.1 (control of the product and its manufacture – general) 8.2.3 (FPC) 8.3 (raw materials and constituents) 8.4 (sampling)

ZA.2.2 EC Certificate and declaration of conformity

When compliance with the conditions of this annex is achieved:

a) for bearings under system 1, the certification body shall draw up a certificate of conformity (EC Certificate of conformity) with the information indicated below. This Certificate of conformity entitles the manufacturer to affix the CE marking, as described in ZA.3.

- name, address and identification number of the certification body;
- name and address of the manufacturer, or his authorised representative established in the EEA and place of production;
- description of the product (type, identification, use,…);
- provisions to which the product conforms (e.g. annex ZA of this EN);
- particular conditions applicable to the use of the product (e.g. provisions for the use of a bearing under certain conditions, etc);
- the number of the certificate;
- conditions and period of validity of the certificate, where applicable;
- name of, and position held by, the person empowered to sign the certificate.

In addition, the manufacturer shall draw up a declaration of conformity (EC Declaration of conformity) including the following:

- name and address of the manufacturer, or his authorised representative established in the EEA;
- name and address of the certification body;
- description of the product (type, identification, use,…), and a copy of the information accompanying the CE marking;
- provisions to which the product conforms (i.e. annex ZA of this EN);
- particular conditions applicable to the use of the product (e.g. provisions for use under certain conditions, etc.);
- number of the accompanying EC Certificate of conformity;
- name of, and position held by, the person empowered to sign the declaration on behalf of the manufacturer or his authorised representative.

The above mentioned declaration and certificate shall be presented in the official language or languages of the

Member State in which the product is to be used.

b) for bearings under system 3, the manufacturer or his agent established in the EEA shall prepare and retain a declaration of conformity (EC Declaration of conformity), which entitles the manufacturer to affix the CE marking. The certificate shall include:

- name and address of the manufacturer, or his authorised representative established in the EEA, and place of production;
- description of the product (type, identification, use,…), and a copy of the information accompanying the CE marking;
- provisions to which the product conforms (i.e. annex ZA of this EN);
- particular conditions applicable to the use of the product (e.g. provisions for use under certain conditions, etc);
- name and address of notified laboratory(ies);
- name of, and position held by, the person empowered to sign the declaration on behalf of the manufacturer or his authorised representative.

The declaration shall be presented in the official language or languages of the Member State in which the product is to be used.

ZA.3 CE marking and labelling

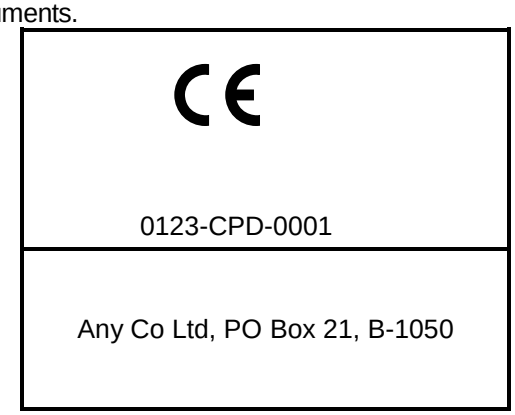
The manufacturer or his authorised representative established within the EEA is responsible for the affixing of the CE marking. The CE marking symbol to affix shall be in accordance with the Directive 93/68/EC and shall be shown on the bearings (or when not possible it may be on the accompanying label, the packaging or on the accompanying commercial documents e.g. a delivery note).

The following information shall accompany the CE marking symbol:

- identification number of the certification body (only for products under system 1);
- name or identifying mark and registered address of the producer;
- the last two digits of the year in which the marking is affixed;
- number of the EC Certificate of conformity or factory production control certificate (if relevant);
- reference to this part of EN 1337;
- description of the product: generic name, material, dimensions,.. and intended use;
- information on those relevant essential characteristics listed in Tables ZA.1.1 and ZA:1.2 which are to be declared presented as:
  - declared values and, where relevant, level or class (including “conforming” for pass/fail requirements, where necessary) to declare for each essential characteristic as indicated in "Notes" in Tables ZA.1.and ZA.1.2, and;
  - as an alternative, standard designation(s) alone or in combination with declared values as above and;
  - “No performance determined” for characteristics where this is relevant.

The “No performance determined” (NPD) option may not be used where the characteristic is subject to a threshold level. Otherwise, the NPD option may be used when and where the characteristic, for a given intended use, is not subject to regulatory requirements in the Member State of destination.

Figures ZA.1 and ZA.2 give examples of the information to be given on the product, label, packaging and/or commercial documents.



CE conformity marking, consisting of the «CE»-symbol given in Directive 93/68/EEC.

Identification number of the certification body(when relevant)

Name or identifying mark and registered address of the manufacturer

Figure ZA.1 - Example of CE marking information on the bearing

CE	*CE conformity marking, consisting of the «CE»-symbol given in Directive 93/68/EEC.*
0123-CPD-0001	*Identification number of the certification body(when relevant)*
Any Co Ltd, PO Box 21, B-1050	*Name or identifying mark and registered address of the manufacturer*
03	*The last two digits of the year in which the marking was affixed*
0123-CPD-0456	*Number of the EC certificate of conformity*
EN 1337-6:2004	*No. of European Standard*
BEARING N° …….	*Identification of product and intended use*
Rocker bearing for minimum operating temperature of xxxx ^{O}C [2], for uses in buildings and civil engineering works where requirements on individual bearings are critical BEARING [3], Characteristic load bearing capacity (kN) Characteristic rotation capability (rad) Durability, conforming	*and* *Information on mandated characteristics*

Figure ZA.2 - Example CE marking information on the accompanying documents

In addition to any specific information relating to dangerous substances shown above, the product should also be accompanied, when and where required and in the appropriate form, by documentation listing any other legislation on dangerous substances for which compliance is claimed, together with any information required by that legislation.
Note: European legislation without national derogations need not be mentioned

[2] This information shall be declared by the manufacturer.

[3] In the absence of Nationally Determined Parameters (NDP), e.g. partial safety factors, the manufacturer shall provide the accumulated slide path capability (if required) and the grade of the steel used for the components, as well as the geometrical characteristics of the bearing.

Bibliography

[1] EN ISO 9000:2000, *Quality management systems – Fundamentals and vocabulary (ISO 9000:2000).*

[2] EN ISO 9001:2000, *Quality management systems – Requirements (ISO 9001:2000).*

[3] EN ISO 9004:2000, *Quality management systems – Guidelines for performance improvements (ISO 9004:2000).*

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