

Structural bearings —

Part 1: General design rules

The European Standard EN 1337-1:2000 has the status of a British Standard

ICS 91.010.30

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW



Document Sharing Hub

National foreword

This British Standard is the official English language version of EN 1337-1:2000.

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 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

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled “International Standards Correspondence Index”, or by using the “Find” facility of the BSI Standards Electronic Catalogue.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 31 and a back cover.

The BSI copyright notice displayed in this document indicates when the document was last issued.

This British Standard, having been prepared under the direction of the Sector Committee for Building and Civil Engineering, was published under the authority of the Standards Committee and comes into effect on 15 October 2000

© BSI 10-2000

ISBN 0 580 36540 9

Amendments issued since publication

Amd. No.	Date	Comments

English version

Structural bearings - Part 1: General design rules

Appareils d'appui structuraux - Partie 1: Indications
générales

Lager im Bauwesen - Teil 1: Allgemeine Regelungen

This European Standard was approved by CEN on 30 April 2000.

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, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.



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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Contents

	Page
Foreword	3
1 Scope	4
2 Normative references	4
3 Definitions and symbols	5
4 General principles	17
5 Design principles	17
6 Bearing resistances	18
7 Basic design features	19
8 Drawing of the support plan	20
Annex A (informative) Notes for guidance	21
Annex B (informative) Typical bearing schedule	25
Annex C (informative) Temperature, shrinkage and creep	30

Foreword

This European Standard 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 December 2000, and conflicting national standards shall be withdrawn at the latest by December 2000.

prEN 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 – Guided bearings and restrained bearings
- Part 9 – Protection
- Part 10 – Inspection and maintenance
- Part 11 – Transport, storage and installation

This Part 1 „General design“ includes Annexes A, B and C (informative).

Further to CEN/TC 167's decision Part 1 and Part 2 form a package of standards and they come into force together, while the other parts come into force separately after the publication of Part 1 and Part 2.

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

1 Scope

This European Standard is applicable to structural bearings, whether used in bridges or in other structures.

This European Standard does not cover:

- a) bearings that transmit moments as a primary function;
- b) bearings that resist uplift;
- c) bearings for moving bridges;
- d) concrete hinges;
- e) seismic devices.

Although it is not intended to regulate temporary bearings this standard may be used as a guide in this case (temporary bearings are bearings used during construction or repair and maintenance of structures).

NOTE 1: Although the specifications given in this European Standard are necessary, they are not sufficient in themselves for the overall design of the structures and for the consideration of geotechnical aspects.

See prEN 1337-2 to prEN 1337-8 for information relating to bearings for which specifications are laid down for certain ranges of temperature only.

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.

prEN 1337-2	Structural bearings – Part 2: Sliding elements
prEN 1337-3	Structural bearings – Part 3: Elastomeric bearings
prEN 1337-4	Structural bearings – Part 4: Roller bearings
prEN 1337-5	Structural bearings – Part 5: Pot bearings
prEN 1337-6	Structural bearings – Part 6: Rocker bearings
prEN 1337-7	Structural bearings – Part 7: Spherical and cylindrical PTFE bearings
prEN 1337-8	Structural bearings – Part 8: Guided bearings and restrained bearings
EN 1337-9 : 1997	Structural bearings – Part 9: Protection
prEN 1337-10	Structural bearings – Part 10: Inspection and maintenance
EN 1337-11: 1997	Structural bearings – Part 11: Transport, storage and installation
ENV 1991-1 : 1994	Eurocode 1: Basis of design and actions on structures – Part 1: Basis of design
ENV 1992-2 : 1996	Eurocode 2: Design of concrete structures – Part 2: Concrete bridges
ENV 1993-2 : 1997	Eurocode 3: Design of steel structures – Part 2: Steel bridges
ENV 1994-2 : 1997	Eurocode 4: Design of composite steel and concrete structures – Part 2: Composite bridges

3 Definitions and symbols

3.1 Definitions

For the purposes of this standard, the following definitions apply:

Ultimate limit state (ULS) and serviceability limit state (SLS) are defined in ENV 1991-1. They apply here in the same way.

3.1.1 bearings: Bearings are elements allowing rotation between two members of a structure and transmitting the loads defined in the relevant requirements as well as preventing displacements (fixed bearings), allowing displacements in only one direction (guided bearings) or in all directions of a plane (free bearings) as required.

The most common types of bearings are listed in table 1 and examples of these are illustrated in figure 1 with the corresponding axes of coordinates.

A distinction is made between the following categories:

Category 1: All-round rotating bearings

Category 2: Bearings with uniaxial rotation

Category 3: Spherical and cylindrical bearings when the horizontal load is supported by the curved sliding surface

Category 4: All other bearings

The bearings of Nos 1.1 to 3.1, 3.3, 3.5 to 4.3, 8.1 and 8.2 belong to category 1.

The bearings of Nos 5.1 to 6.2, 7.3 and 7.4 belong to category 2.

The bearings of Nos 3.2, 3.4, 7.1 and 7.2 belong to category 3.

Table 1: Most common types of bearings

1								2	3	4	5	6	7	8	9	10	11	12	13	14	
Relevant parts of the standard								No.	Symbol in the plan view	Symbol in direction		Kind of bearing	Relative movements						Reactions		
2	3	4	5	6	7	8			<i>x</i>	<i>y</i>	displacements		rotation								
											<i>v_x</i> in <i>x</i> -direction	<i>v_y</i> in <i>y</i> -direction	<i>v_z</i> in <i>z</i> -direction	<i>α_x</i> about <i>x</i> -axis	<i>α_y</i> about <i>y</i> -axis	<i>α_z</i> about <i>z</i> -axis	forces	mo-ment			
	X						1.1				Elastomeric bearing (EB)	deforming	deforming	small ²⁾	deforming	deforming	deforming	<i>V_x</i>	<i>V_y</i>	<i>N</i>	
	X					X	1.2				Elastomeric bearing with restraints (RS) for one axis ⁴⁾		none					¹⁾ <i>V_x</i>	<i>V_y</i>	<i>N</i>	
X	X					X	1.3				EB with unidirectional movable sliding part and RS for the other axis	sliding and deforming	none					¹⁾ <i>V_y</i>	<i>N</i>		
X	X						1.4				Elastomeric bearing with multidirectional movable sliding part		sliding and deforming						<i>N</i>		
X	X						1.5				Elastomeric bearing with unidirectional movable sliding part		deforming						<i>V_y</i>	<i>N</i>	
	X					X	1.6				Elastomeric bearing with securing device for two axes	none	none						¹⁾ <i>V_x</i>	<i>V_y</i>	<i>N</i>
X	X					X	1.7				Elastomeric bearing with unidirectional movable sliding part and RS for two axes	sliding							<i>V_y</i>	<i>N</i>	
X	X					X	1.8				Elastomeric bearing with multidirectional movable sliding part and RS for two axes		sliding							<i>N</i>	

(continued)

(continued)

Table 1 (continued)

1								2	3	4		5	6	7	8	9	10	11	12	13			14
Relevant parts of the standard								No.	Symbol in the plan view	Symbol in direction			Kind of bearing	Relative movements						Reactions			
2	3	4	5	6	7	8				x	y			displacements			rotation			forces		mo-	ment
														v_x in x-direction	v_y in y-direction	v_z in z-direction	α_x about x-axis	α_y about y-axis	α_z about z-axis				
			X				2.1					Pot bearing	none	none	very small	deform- ing	deform- ing			V_x	V_y	N	
X			X				2.2					Pot bearing with unidirectional movable sliding part	sliding						¹⁾		V_y	N	
X			X				2.3					Pot bearing with multidirectional movable sliding part		sliding					sliding and de- forming			N	
					X		3.1					Spherical bearing with RS beyond the rotating part	none	none	almost none	sliding	sliding	sliding		V_x	V_y	N	
					X		3.2					Spherical bearing with rotating part likewise as RS								V_x	V_y	N	
X					X		3.3					Spherical bearing with unidirectional movable sliding part (ext. guidance)	sliding						¹⁾		V_y	N	
X					X		3.4					Spherical bearing with unidirectional movable sliding part (int. guidance)									V_y	N	
X					X		3.5					Spherical bearing with multidirectional movable sliding part		sliding								N	

(continued)

Table 1 (continued)

1								2	3	4	5	6	7	8	9	10	11	12	13	14				
Relevant parts of the standard								No.	Symbol in the plan view	Symbol in direction		Kind of bearing	Relative movements						Reactions					
										x	y		displacements			rotation			forces		mo- ment			
2	3	4	5	6	7	8							v_x in x- direction	v_y in y- direction	v_z in z- direction	α_x about x-axis	α_y about y-axis	α_z about z-axis						
				X			4.1				Steel point rocker bearing	none	none	almost none	rocking	rocking	sliding ¹⁾	V_x	V_y	N				
X				X			4.2				Steel point rocker bearing with unidirectional movable sliding part	sliding												
X				X			4.3				Steel point rocker bearing with multidirectional movable sliding part	sliding	sliding											
				X			5.1				Steel linear rocker bearing	none	none		none ³⁾			none	V_x	V_y	N	M_x		
X				X			5.2				Steel linear rocker bearing with unidirectional movable sliding part	sliding												
X				X			5.3				Steel linear rocker bearing with multidirectional movable sliding part		sliding							sliding			N	M_x
		X					6.1				Single roller bearing	rolling	none					none ¹⁾	V_y	N	M_x			
X		X					6.2				Single roller bearing with sliding part movable in the other direction		sliding									N	M_x	

DocuWA

(continued)

(continued)

Table 1 (concluded)

1								2	3	4	5	6	7	8	9	10	11	12	13		14				
Relevant parts of the standard								No.	Symbol in the plan view	Symbol in direction		Kind of bearing	Relative movements						Reactions						
2	3	4	5	6	7	8			x	y	displacements			rotation			forces		moment						
											v_x in x-direction		v_y in y-direction	v_z in z-direction	α_x about x-axis	α_y about y-axis	α_z about z-axis								
X						X		7.1				Fixed cylindrical bearing	none	none	almost none	none ³⁾	sliding	none	V_x	V_y	N	M_x			
X						X		7.2				Guided cylindrical bearing movable in y direction		sliding								V_x		N	M_x
X						X		7.3				Guided cylindrical bearing movable in x direction	sliding	none									V_y	N	M_x
X						X		7.4				Free cylindrical bearing movable in x and y direction		sliding							sliding			N	M_x
						X		8.1				Guide bearing with restraints for two axes = thrust bearing	none	none	sliding	sliding or deforming	sliding or deforming	sliding or deforming	V_x	V_y					
						X		8.2				Guide bearing with restraints for one axis	sliding							none		V_y			
												Forces	Moments		Displacements		Rotations								

1) For individual types of bearings α_z may have strict tolerances, special design will be necessary if so required. For normal design purposes "none" means no movement other than that due to manufacturing tolerances and deformation.

2) Whether or not v_z is of importance to be checked in individual cases.

3) Combination with a sliding bearing results in unfavourable stresses in the PTFE.

4) Device to transfer the forces V_x or V_y .

NOTE: In practice x is the main direction of movement for bridges (see ENV 1992-2 and ENV 1993-2) and z the direction of the forces due to vertical loads.

For individual types of bearings α_z may have strict tolerances, special design will be necessary if so required. For normal design purposes "none" means no movement other than that due to manufacturing tolerances and deformation.
Whether or not v_z is of importance to be checked in individual cases.
Combination with a sliding bearing results in unfavourable stresses in the PTFE.
Device to transfer the forces V_x or V_y .

NOTE: In practice x is the main direction of movement for bridges (see ENV 1992-2 and ENV 1993-2) and z the direction of the forces due to vertical loads.