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Supersedes DIN 4141-14, September 1985 edition, DIN 4141-14/A1, May 2003 edition, DIN 4141-14/A1 Corrigendum 1, February 2005 edition, DIN 4141-15 and DIN 4141-140, January 1991 editions, DIN 4141-140/A1, May 2003 edition, and DIN 4141-150, January 1991 edition (but see start of validity).

Structural bearings

Part 3: Elastomeric bearings

English version of DIN EN 1337-3

Lager im Bauwesen – Teil 3: Elastomerlager

Start of validity

This standard is valid from 1 December 2005. DIN 4141-14, September 1985 edition, DIN 4141-14/A1, May 2003 edition, DIN 4141-15 and DIN 4141-140, January 1991 editions, DIN 4141-140/A1, May 2003 edition, and DIN 4141-150, January 1991 edition, shall remain valid until December 2006.

It should be noted that, in Germany, CE conformity marking of construction products will be permitted once this standard has been listed in the *Bundesanzeiger* (German Federal Law Gazette) (1 December 2005 or later).

National foreword

This standard has been prepared by CEN/TC 167 'Structural bearings' (Secretariat: Italy).

The responsible German body involved in its preparation was the *Normenausschuss Bauwesen* (Building and Civil Engineering Standards Committee), Technical Committee 00.91.00 *Lager im Bauwesen (DIN 4141)* (Sp CEN/TC 167 *Structural Bearings*).

Amendments

This standard differs from DIN 4141-14, September 1985 edition, DIN 4141-14/A1, May 2003 edition, DIN 4141-14/A1 Corr. 1, February 2005 edition, DIN 4141-15 and DIN 4141-140, January 1991 editions, DIN 4141-140/A1, May 2003 edition, and DIN 4141-150, January 1991 edition, as follows:

- a) The specifications have been harmonized with the provisions for construction products with CE conformity marking.
- b) The specifications have been brought into line with the semiprobabilistic safety concept using partial safety factors.

Previous editions

DIN 4141-14: 1985-09;
 DIN 4141-14/A1: 2003-05;
 DIN 4141-14/A1 Corr.1: 2005-02;
 DIN 4141-15: 1991-01;
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Document comprises 91 pages.

English version

Structural bearings

Part 3: Elastomeric bearings

Appareils d'appui structuraux – Partie 3: Lager im Bauwesen – Teil 3:
Appareils d'appui en élastomère Elastomerlager

This European Standard was approved by CEN on 2004-06-04.

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

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

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Foreword

This document (EN 1337-3:2005) 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 September 2005, and conflicting national standards shall be withdrawn at the latest by December 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.

This 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

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 applies to elastomeric bearings with or without complementary bearing devices to extend their field of use such as flat sliding elements covered by EN 1337-2 or sliding surface described in 4.4.4, as used in bridge structures or any other structure with comparable support conditions.

This part of EN 1337 applies to elastomeric bearings with dimensions in plan up to (1200 x 1200) mm and does not cover elastomeric bearings made with other elastomers materials than those specified in 4.4.1. It applies to laminated bearings types A, B, C, laminated sliding bearings types E and D, plain pad and strip bearings type F.

This part deals with bearings for use in operating temperatures ranging from – 25 °C to + 50 °C and for short periods up to + 70 °C.

It is recognised that the air temperature in some regions of Northern Europe is lower than –25 °C.

In this case of very low operating temperature (down to – 40 °C), it is essential that bearing characteristics comply also with the shear modulus at very low temperature (see 4.3.1.3. and annex F)

2 Normative references

The following referenced documents are indispensable for the application 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.

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

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

prEN 1337-8, *Structural bearings - Part 8: Guide bearings and restrain bearings.*

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

EN 1337-10; *Structural Bearings - Part 10: Inspection and maintenance.*

EN 1337-11; *Structural bearings - Part 11: Transport, storage and installation.*

EN 10025-1, *Hot rolled products of structural steels - Part 1: General technical delivery conditions.*

EN 10025-2, *Hot rolled products of structural steels - Part 2: Technical delivery conditions for non-alloy structural steels*

ISO 34-1, *Rubber, vulcanized or thermoplastic - Determination of tear strength - Part 1: Trouser, angle and crescent test pieces.*

ISO 37, *Rubber, vulcanized or thermoplastic - Determination of tensile stress-strain properties.*

ISO 48, *Rubber, vulcanized or thermoplastic - Determination of hardness (hardness between 10 IRHD and 100 IRHD).*

ISO 188, *Rubber, vulcanized or thermoplastic - Accelerated ageing and heat resistance tests.*

ISO 815, *Rubber, vulcanized or thermoplastic - Determination of compression set at ambient, elevated or low temperatures.*

ISO 1431-1, *Rubber, vulcanized or thermoplastic - Resistance to ozone cracking - Part 1: Static strain testing.*

3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1337-1:2000 and the following apply.

3.1.1

batch

individual mix or blend of mixes of elastomer, when used for bearing production or a number of identical components produced at the same machine setting

3.1.2

elastomer

macromolecular material, which returns to approximately its initial dimensions and shape after substantial deformation by a weak stress and release of stress. In this part of the standard it defines the compound that will be used for the production of a rubber part or parts.

3.1.3

elastomeric bearing

bearing comprising a block of vulcanised elastomer that may be reinforced with one or more steel plates

3.1.4

laminated bearing

elastomeric bearing reinforced internally with one or more steel plates, chemically bonded during vulcanisation

3.1.5

plain pad bearing

elastomeric bearing consisting of a solid block of vulcanised elastomer without internal cavities

3.1.6

sliding elastomeric bearing

laminated bearing with a PTFE sheet, at top surface, which may be vulcanised directly onto the outer layer of elastomer or fixed to a steel plate, in contact with a sliding plate

3.1.7

sliding plate

component which bears on and is immediately adjacent to the top sliding surface of a bearing. It can be:

- a) a single piece of austenitic steel,
- b) a thin plate of austenitic steel fixed to a mild steel supporting plate,
- c) a thin plate of austenitic steel bonded to an elastomeric interlayer which is vulcanised to a mild steel supporting plate.

3.1.8

strip bearing

plain pad bearing for which the length is at least ten times the width

3.1.9

top sliding surface

polytetrafluoroethylene surface vulcanised on to an elastomeric bearing, in contact with the sliding plate which allows relative translatory displacement

3.2 Symbols

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

3.2.1 Latin upper case letters

A Overall plan area of elastomeric bearing mm²

A'	Effective plan area of laminated bearing (area of the steel reinforcing plates) mm ²
A_r	Reduced effective plan area of elastomeric bearing mm ²
C_c	Compressive stiffness of a bearing N/mm
D	Overall diameter of circular bearing mm
D'	Effective diameter of circular laminated bearing mm
E	Modulus of elasticity MPa
E_b	Bulk modulus MPa
E_{cs}	Intersecting compression modulus MPa
E_d	Design load effects
F_{xd}, V_{yd}	Horizontal design forces N: kN
F_{xy}	Maximum resultant horizontal force obtained by vectorial addition of v_x and v_y N: kN
F_{zd}	Vertical design force N: kN
G	Nominal value of conventional shear modulus of elastomeric bearing MPa
G_{dyn}	Conventional shear modulus of elastomeric bearing under dynamic actions MPa
G_e	Shear modulus of elastomer MPa
G_g	Conventional shear modulus of elastomeric bearing determined by testing MPa
K_{ce}	Factor for strain due to compressive load for elliptical bearing
K_{de}	Factor for vertical deflection for load for elliptical bearing
K_{se}	Factor for restoring moment for elliptical bearing
K_f	Friction factor
K_h	Factor for induced tensile stresses in reinforcing plate
K_L	Type loading factor
K_m	Moment factor
K_p	Stress correction factor for the steel reinforcing plates
K_r	Rotation factor
K_s	Factor for restoring moment
M_e	Experimental value of restoring moment N x mm: kN x m
M_d	Design value of restoring moment N x mm: kN x m
R_d	Design value of resistance

R_{xy}	Resultant of the forces resisting to translatory movement
S	Shape factor
S_1	Shape factor for the thickest layers
S_d	Design value of an internal force or moment of a respective vector of several internal forces or moments
T_o	Average total initial thickness of bearing ignoring top and bottom covers mm
T_b	Total nominal thickness of bearing mm
T_{bo}	Mean total initial thickness of bearing mm
T_e	Total nominal thickness of elastomer mm
T_q	The average total initial thickness of elastomer in shear, including the top and bottom covers when these are not restrained for shearing. mm

3.2.2 Latin lower case letters

a	Overall width of bearing (shorter dimension of rectangular bearing) mm
a_e	Minor axis of elliptic bearing
a'	Effective width of laminated bearing (width of the steel reinforcing plates) mm
b	Overall length of a bearing (longer dimension of a rectangular bearing) mm
b_e	Major axis of elliptical bearing
b'	Effective length of a laminated bearing (length of the steel reinforcing plates) mm
c	compression stiffness N/mm
f_y	Yield stress of steel N/mm ²
l_p	Force free perimeter of elastomeric bearing
n	Number of elastomer layers
t	Thickness of plain pad or strip bearing mm
t_e	Effective thickness of elastomer in compression mm
t_i	Thickness of an individual elastomer layer in a laminated bearing mm
t_p	Thickness of PTFE sheet mm
t_s	Thickness of steel reinforcing plate mm
t_{so}	Thickness of outer steel reinforcing plate mm
v_{cd}	Total vertical deflection mm
v_x	Maximum horizontal relative displacement in direction of dimension a mm
v_y	Maximum horizontal relative displacement in direction of dimension b mm
v_z	Vertical movement/deflection mm
v_{xy}	Maximum resultant horizontal relative displacement obtained by vectorial addition of v_x and v_y mm

3.2.3 Greek letters

α	Angular rotation of a bearing rad
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