

Structural bearings —

Part 3: Elastomeric bearings

The European Standard EN 1337-3:2005 has the status of a British Standard

ICS 91.010.30

National foreword

This British Standard was published by BSI. It is the UK implementation of EN 1337-3:2005. It partially supersedes BS 5400-9-1:1983 and BS 5400-9-2:1983 which will remain current until the remaining parts of the BS EN 1337 series have been published, the last part being Part 8.

The UK participation in its preparation was entrusted to Technical Committee B/522, Structural bearings.

A list of organizations represented on B/522 can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

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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of an identical text or by endorsement, at the latest by September 2005, and conflicting national standards shall be withdrawn at the latest by December 2006.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