TECHNICAL DATA SHEET

ELASTOMERIC BEARINGS TO EN 1337-3 – TYPE A–F

Elastomeric and sliding bearings to EN 1337-3 are mainly used in bridge and viaduct structures, and also in buildings where the design requires bearings to EN 1337-3. They transfer vertical loads – and, where designed accordingly, horizontal loads – between elements of precast and cast-in-place concrete, steel and masonry structures. The bearings accommodate rotation of the supported element; the sliding types also accommodate horizontal movement. Made to project dimensions.

BEARING TYPES

Type	Construction	Fixing to the structure
TYPE A	Single steel plate embedded in elastomer	None
TYPE B	Alternating elastomer and steel plate layers	None
TYPE C1 / C2	Laminated bearing with 1 or 2 outer plates	Anchors through holes in the plates
TYPE D	Elastomer + PTFE + stainless steel plate	None
TYPE E1 / E2	E1 free / E2 guided sliding, ±50…±100 mm	Anchoring system and counterplates
TYPE F	Plain elastomer, also as strips	None

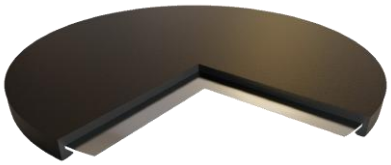
Material properties common to all types are given in the section “Material properties” (Tables 1–4).

BEARING DESCRIPTIONS

TYPE A

Bearing with a single steel plate

A single S235JR steel plate vulcanised inside natural rubber (NR). No mechanical fixing to the structure. Available in rectangular or circular shape.

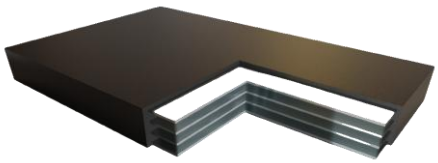


Material properties: Tables 1, 2.

TYPE B

Laminated elastomeric bearing

Alternating layers of natural rubber (NR) and S235JR steel plates, vulcanised inside the rubber. No mechanical fixing to the structure. Available in rectangular or circular shape.



Material properties: Tables 1, 2.

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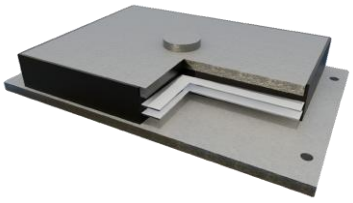
TYPE C
Laminated bearing with outer plates

Laminated bearing (as TYPE B) with one (C1) or two (C2) outer plates of suitable thickness. The plates have holes for anchors that fix the bearing to the structure.



Shown: TYPE C2

Material properties: Tables 1, 2.

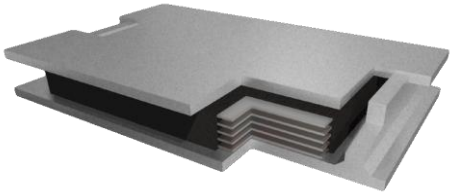
TYPE D
Sliding bearing: elastomer + PTFE + INOX

A layer of plain NR or elastomer laminated with S235JR steel plates, vulcanised to a smooth or embossed PTFE sheet and covered with an AISI 304L stainless steel plate. Circular, square or rectangular; dimensions to order. No mechanical fixing to the structure.

Material properties: Tables 1, 3, 4.

TYPE E
Sliding bearing, displacements ±50...±100 mm

Layers of NR, S235JR steel plates, PTFE and AISI 304L, vulcanised inside the rubber. E1 – multidirectional (free sliding), resists higher horizontal loads than TYPE B. E2 – unidirectional (guided): resists higher loads in the restrained direction and behaves like TYPE B in the other direction. Installed with anchoring and counterplates.

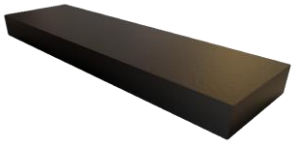


Shown: TYPE E1

Material properties: Tables 1–4.

TYPE F
Plain elastomeric bearing

Bearing made entirely of natural rubber (NR). Available in various dimensions and thicknesses, with holes, and as strips. No mechanical fixing to the structure.



Material properties: Table 1.

DESIGN

Bearing dimensions and the number and thickness of elastomer layers and steel plates are selected according to the design loads, displacements and rotations. Verification to EN 1337-3 covers the total elastomer strain, steel plate stresses, rotation and stability conditions, and the non-sliding condition. For sliding bearings (TYPE D, TYPE E), friction between PTFE and stainless steel is also taken into account.

To select a bearing, provide the design loads, displacements and rotations (see “Tender / specification text”) or the bearing schedule – we will select a suitable bearing on that basis.

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MATERIAL PROPERTIES

Table 1. Natural rubber (NR) properties

Property	Unit	Requirement	Test method
Hardness	IRHD	60	ISO 48:2010
Hardness tolerance	IRHD	± 3	ISO 48:2010
Tensile strength	MPa	≥ 16.00	ISO 37:2011
Elongation at break	%	≥ 425	ISO 37:2011
Compression set (25 %, 24 h, 70 °C)	%	≤ 30	ISO 815-1:2008
Tear strength	N/mm	≥ 8	ISO 34-1:2010
Hardness change after ageing (70 °C, 7 days)	IRHD	-5 / +10	ISO 188:2011
Tensile strength change after ageing (70 °C, 7 days)	%	± 15	ISO 188:2011
Elongation change after ageing (70 °C, 7 days)	%	± 25	ISO 188:2011
Ozone resistance (25 pphm, 30 %, 96 h, 40 °C)	–	No cracking	ISO 1431-1:2012
Brittleness temperature	°C	-25 / +70	ISO 812:2011
Rubber-to-metal bond strength	N/mm	≥ 7	ISO 813:2010
Shear modulus G	MPa	0.9	EN 1337-3:2005

Table 2. Structural steel S235JR properties

Property	Unit	Requirement	Test method
Tensile strength	N/mm^2	R > 400	EN 10025
Yield strength	N/mm^2	Rs > 320	EN 10025
Elongation at break	%	A > 19.8	EN 10025

Table 3. PTFE sliding layer properties

Property	Unit	Requirement	Test method
Density	g/cm^3	2.14 – 2.18	ASTM D792
Hardness	Shore D	51 – 60	ASTM D2240
Tensile strength	N/mm^2	> 20	ASTM D4745
Elongation at break	%	> 200	ASTM D4745
Compressive strength at 1 % deformation	N/mm^2	4 – 5	ASTM D695
Deformation after 24 h under 13.7 N/mm^2 load	%	14 – 17	ASTM D621
Permanent deformation after 24 h recovery	%	7 – 8	ASTM D621
Dynamic coefficient of friction	–	0.06	ASTM D1894
Service temperature	°C	-200 / +200	–
Coefficient of thermal expansion (25–100 °C)	10^{-5}/°C	12 – 13	ASTM D696

Table 4. Stainless steel AISI 304L properties (at 20 °C)

Property	Unit	Requirement	Test method
Brinell hardness	HB	130 – 150	–
Tensile strength	N/mm^2	500 – 680	–
Yield strength	N/mm^2	175 – 300	–
Minimum resistance	–	160	–

TENDER / SPECIFICATION TEXT

Elastomeric bearing to EN 1337-3, natural rubber (NR), 60 IRHD, G = 0.9 MPa.
Product: METALBETA TYPE ☐ A ☐ B ☐ C1 ☐ C2 ☐ D ☐ E1 ☐ E2 ☐ F
Shape: ☐ rectangular ☐ circular
Dimensions a × b (or diameter D): _____ mm Thickness t: _____ mm
Design vertical load $F_{z,d}$: max _____ kN, min _____ kN
Design horizontal loads $F_{x,d}$ / $F_{y,d}$: _____ / _____ kN
Displacements v_x / v_y: ± _____ / ± _____ mm Rotation α_d: _____ rad
Quantity: _____ pcs.

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