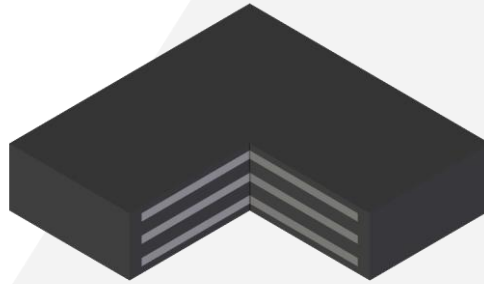


REF	104-03-01-01
CATEGORY	Reinforced Elastomeric Bearings
VERSION	EN-2.2

[REB] Reinforced Elastomeric Bearings

Product Description Multilayer elastic blocks of vulcanized elastomer reinforced with one or more internal steel plates. In addition to internal plates, REB bearings may also have external steel load plates bonded to the upper or lower elastomer layers.



Uses

- Type of structure. Concrete or steel structure
- Shape: rectangular or circular
- Temperatures: -30°C to 50°C (and up to 70°C for short periods of time)
- Max compression: typically up to 15MPa
- Max rotations: up to 30mRad
- Max displacement: typically equivalent to total height of the bearings (except for types D, E where PTFE vs SS sheets allow for unlimited displacements)
- Displacement restraints: valid for all cases i.e: free sliding (type D and E), guided (type G), fixed (type F) and intermediate (all other types, providing a resistance to horizontal displacement which is proportional to the magnitude of the displacement.
- Need for anchoring: typically when $V_{min} < 3-5MPa$.

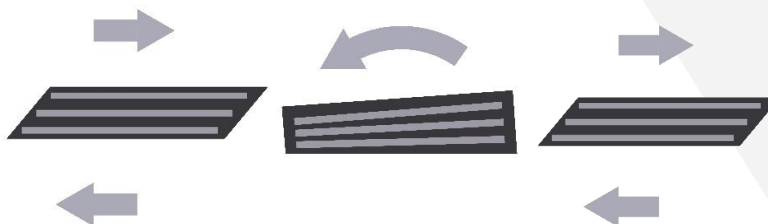
Advantages

- Very easy to install, lightweight (particularly non anchored types)
- Very easy to replace (particularly non anchored types)
- Maintenance free (non- anchored types)
- Resistant to atmospheric agents (particularly when rubber is CR)
- Very competitive pricewise for low vertical loads (up to 500Tn)

Working Principle

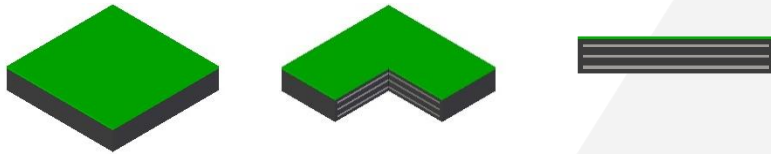
Internal steel sheets provide vertical stiffening effect and reduction of the bulging effect on the massive rubber **Elastomer** surround the steels sheets providing permanent corrosion protection and deformation capability (by rotation and/or translation). The rubber cover is generally 2,5 mm on top and bottom surfaces and 5-6 mm laterally. The number and thickness of layers is defined by the required translation and rotation.

Outer steel plates (when required) provide connection to deck/pylon preventing the possibility of the bearing sliding out of its desired because of asimetric repetitive loading.



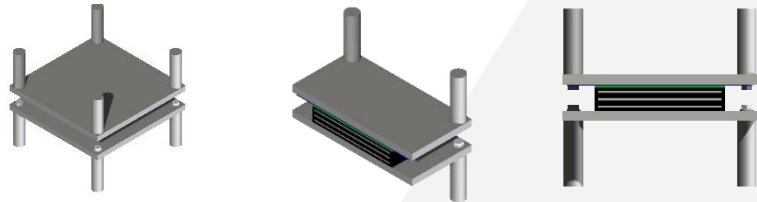
Types				
A NON ANCHORED TYPE A				Laminated fully covered with elastomer with only one steel plate
B NON ANCHORED TYPE B				Laminated fully covered with elastomer with several steel plates
C1 ANCHORED TYPE C1				Anchored, non replaceable, with outer steel plates and bolts. Used with cast-in-situ beams with occasional, temporary and irregular traction forces
C2 ANCHORED TYPE C2				Anchored, Replaceable, with outer steel plates and dowels. Same use as previous.
C3 ANCHORED TYPE C3				Anchored, replaceable, with outer steel plates, elastomer is vulcanised to outer steel plates
C4 ANCHORED TYPE C4				Anchored, with outer steel profiled plates. Friction up to 60% vs concrete. Used in prefabricated beams
C5 ANCHORED TYPE C5				Anchored, replaceable, with outer steel plates and shear keys

D1 FREE SLIDING TYPE D1



Type B with PTFE sheet (green) bonded to the elastomer. Used when low friction is required (i.e launchings)

D2 FREE SLIDING TYPE D2



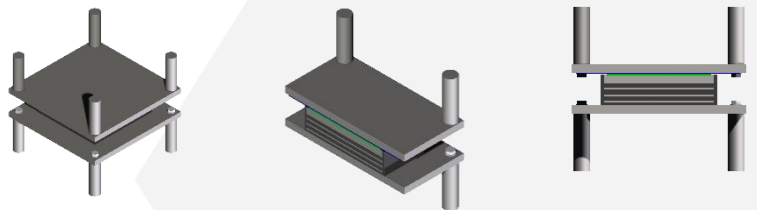
Type D1 bonded to steel plate below and sliding against stainless steel sheet (blue) above.

E1 FREE SLIDING TYPE E1



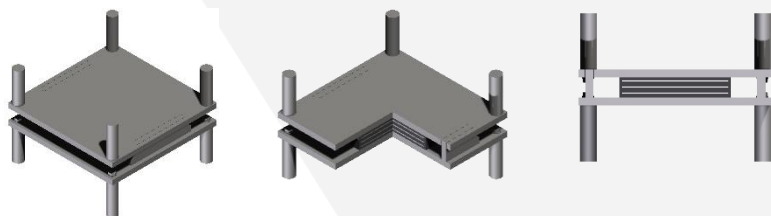
Type C with one outer plate bonded to the elastomer and PTFE sheet recessed in the steel.

E2 FREE SLIDING TYPE E2

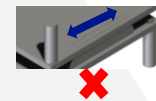


Type E1 bonded to steel plate below and sliding against stainless steel sheet (blue) above.

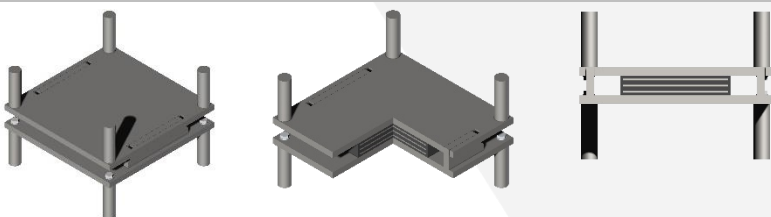
F1 FIXED



Type B bonded to steel plates allowing rotations but not displacements



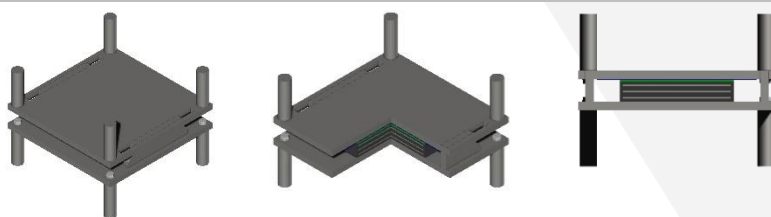
G1 GUIDED TYPE G1



Type B bonded to steel plates allowing rotations and displacements in only one direction



G2 GUIDED TYPE G2



Type D2 with lateral restraints allowing movement in only one direction with very little reaction force



H HIGH ROTATION



Type B with enhanced properties to allow high rotations

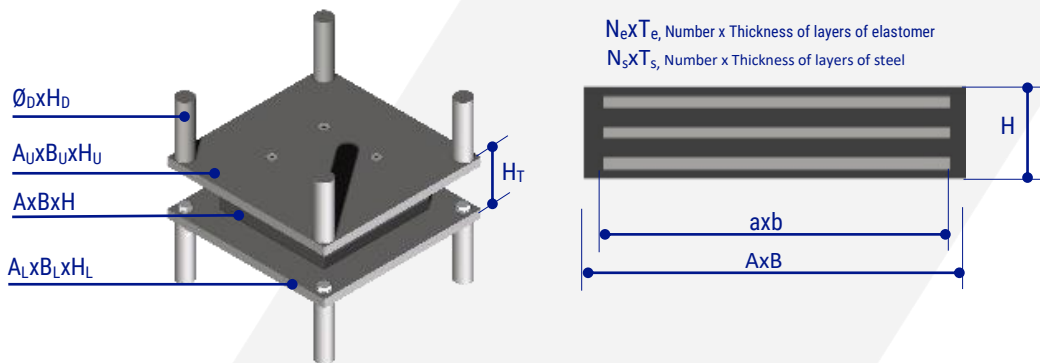
P NON REINFORCED



Elastomer without steel sheets. Used to uniformly transfer loads between prefabricated concrete elements

Design Standards EN-1337 or AASHTO

Dimensions



Materials

- Steel elements dowels and masonry plates

Element	Parameter	EN 1337-5 (EN 10025)	AASHTO (ASTM A709)
Steel elements	Standard and grade	S355 acc. To EN 10025	ASTM A709-11 GR.50 TYPE 1

- Rubber element [4]

Element	Parameter	EN 1337-5 (ISO 6446)	AASHTO (ASTM D 4014)
Nat Ruber NR	Hardness	50 ± 5 HSh	50 ± 5 HSh
Chloroprene CR			
	Tensile strength	≥ 15,5 MPa	≥ 15,5 MPa
	Elongation	≥ 400 %	≥ 400 %
	Compression set (22 h, 70°C)	≤ 25 %	≤ 25 %

NR is natural product.

CR is synthetic chloroprene and thus resistant to ozone and ultraviolet radiation.

If desired a combination of NR core and CR shell can be supplied offering the advantages of both materials.

- Sliding surface: PTFE dimpled sheet vs Stainless Steel

Element	Parameter	EN 1337-5 (EN 1337-2)	AASHTO (ASTM 4894)
PTFE dimpled sheet	Stand specc gravity	2.14 – 2.20 gr/cm ³	2.13 – 2.19 gr/cm ³
	Tensile strength	29.0 – 40.0 MPa	≥ 27.6 MPa
	Elongation	300 %	300 %

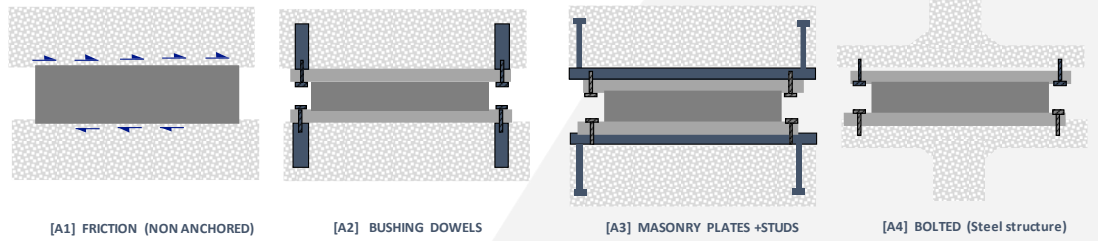
Element	Parameter	EN 1337-5 (EN 337-2)	AASHTO (SAE)
Lubrifiant		Silicon grease acc. to EN 1337-2	Silicon Grease acc. To SAE AS 8660

Element	Parameter	EN 1337-5 (EN 1337-2)	AASHTO (ASTM A 240)
Stainless steel sheet	Standard and grade	1.4404+2B acc. EN 10088-2 (AISI 316)	ASTM A 240 gr. 304 (AISI 304)

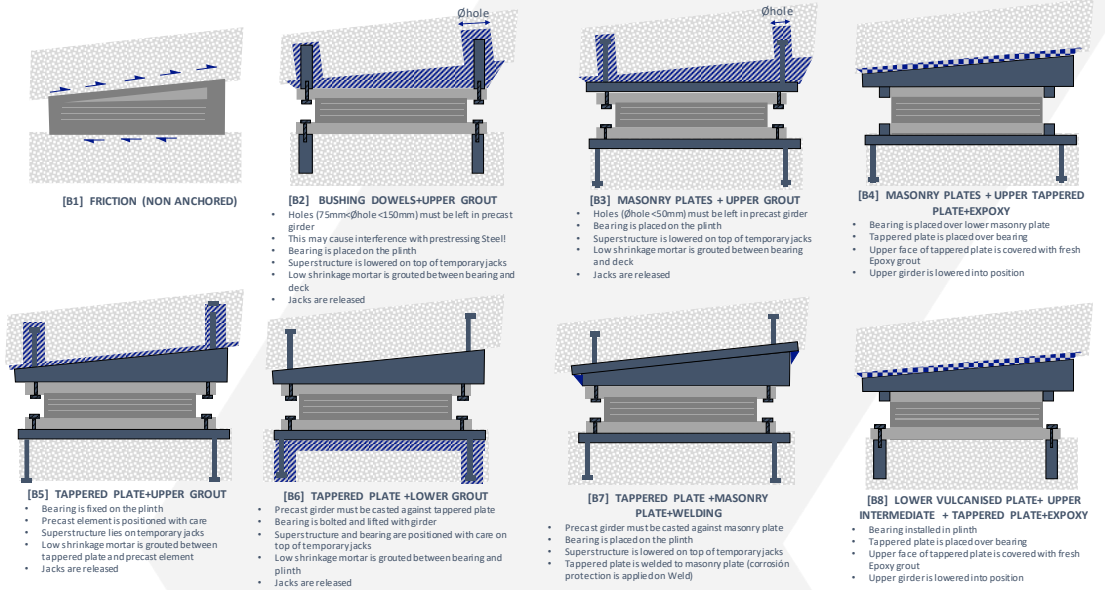
- Sliding surface on guides: CM1 vs Stainless Steel
- Bolts: 10.9

Fastening options

• **CAST IN SITU ELEMENTS**



• **PRECAST ELEMENTS (SUCH AS GIRDERS). Most cost-efficient solution is B8**



Corrosion Protection

• **Standard Protection**

Designation EN12944-5	Corrosivity category	Type of surface	Primer NDFT	Inter NDFT	Inter NDFT	Final NDFT	Expected Durability
A4.14-EP-PUR	C4	Mechanical Cleaning	Zn (R) 60µm	Epoxy 80µm	NA	AP 60µm	Medium
A4.15-EP-PUR	C4	Mechanical Cleaning	Zn (R) 60µm	Epoxy 80µm	Epoxy 80µm	AP 60µm	High
A5M.06-EP-PUR	C5-M, C5-I	Mechanical Cleaning	Zn (R) 60µm	Epoxy 100µm	Epoxy 100µm	AP 60µm	High
A8.02-EP-PUR	C5-M, C5-I	TS 85Zn-15Al	Epoxy 60µm	Epoxy 100µm	NA	AP 80µm	High
A8.04-EP-PUR	C5-M, C5-I	TS 85Zn-15Al	Epoxy 60µm	Epoxy 80µm	Epoxy 80µm	AP 60µm	High

AP: Aliphatic Polyurethane TS: Thermal Spray coating (Epoxy Sealed)

C4: Highly Corrosive C5-M: Extremely Corrosive Marine C5-I: Extremely Corrosive Industrial

- Other types of protections are available on demand
- Standard RAL: 7037

Designation Examples:

Product Reinforced Elastomeric Bearings	Type	A Length of REB PAD in mm	B Width of REB PAD in mm	H Height of REB PAD in mm	Identification Number
R	L/V/S	800	800	40	ABCDE
R	L/V/S	160	160	70	12345

A,B and H correspond exclusively to the dimensions of the rubber pad without outer plates or dowels
 L corresponds to type A/B/F bearings, V to C bearings, and S to D/E bearings.
 When REB is circular A-B is replaced by diameter, i.e: RL- Ø160-40-ABCDE

Durability	Design Lifetime: 50 years
Warranty	Standard warranty against defects in materials, function, integrity and corrosion protection: 5 years
Certificates	It can be produced with and without CE mark
Typical dimensions	On demand

Required information to produce quotation	<p>For each bearing:</p> <ul style="list-style-type: none"> • Nsd,max Nsd,min Maximum and Minimum vertical loads • NGd NQd Maximum Vertical permanent and life Load • Fyd Fxd Maximum horizontal loads in both axis • Most adverse combination of maximum horizontal load and minimum vertical load • Δx+ and Δy+ movements in longitudinal and transverse direction • Δx.pv Preset value to counteract irreversible displacements (i.e creep, shrinkage) • θx+ and θy+ rotations in longitudinal and transverse direction • Concrete strength in upper and lower interphase • Desired fastening if anchored
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Reference Projects

