

## General description

The ISOSISM® HDRB (High Damping Rubber Bearing) is an isolator designed using an elastomeric block (natural rubber or neoprene) reinforced with metal bands bonded by vulcanising. It is designed and manufactured in accordance with EN 15129.

It is usually a type B (fully encased) or type C (fitted with outer plates) isolator manufactured to the dimensions required for the project. It is available in square or round formats.

The damping provided by the ISOSISM® HDRB results from the nature of the elastomeric mixture and reduces the acceleration and displacement of structures during a seismic event.



## Applications

The ISOSISM® HDRB has numerous applications in buildings, nuclear power plants, civil engineering structures, etc. It isolates the structure from the movement of the ground by forming flexible connections that increase the fundamental period of vibration of the structure to be protected and reduce its acceleration by a ratio of up to 2 or 3.

## Main properties

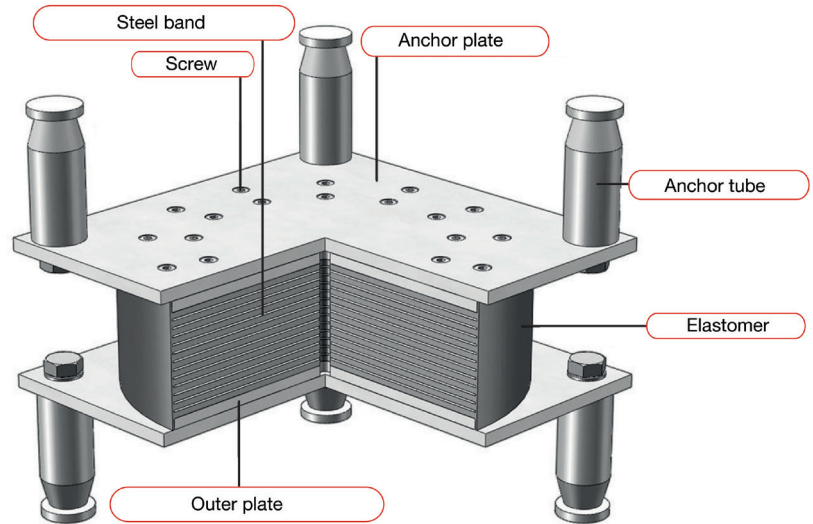
- High recentring capability;
- Moderate damping capacity ( $\xi \leq 16\%$  and  $\geq 6\%$ );
- Moderate maximum displacement;
- Zero maintenance.



Bridge over the River Tagus in Santarém, Portugal

## Design

In addition to their isolating qualities, these isolators bear the vertical loads of the structure and recentre it after dynamic stress.



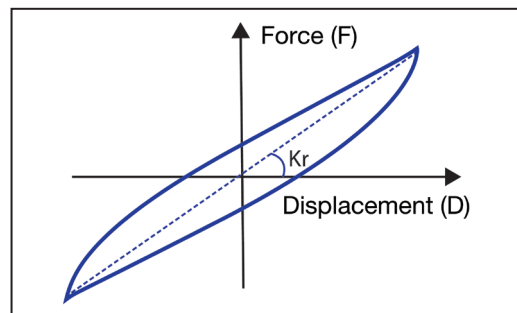
## Behaviour

### Behaviour law

The behaviour law of the ISOSISM® HDRB can be modeled as follows:

$$F = K_h \cdot D$$

F: Force     $K_h$ : Horizontal stiffness    D: Displacement



### Graphic representation

The device can be shown using the following graphic representation in accordance with EN 15129.

Graphic representation of an ISOSISM® HDRB  
plan view



Graphic representation of an ISOSISM® HDRB  
elevation



HDRB® isolators are shown in their deformed position in order to emphasise their lateral flexibility.

## Tests

ISOSISM® HDRBs have undergone numerous dynamic tests to guide and validate Freyssinet's technical development process.



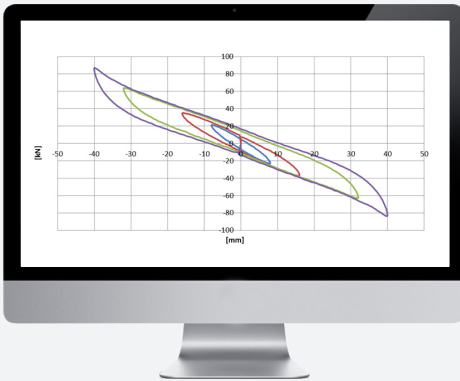
Dynamic and static tests on ISOSISM® HDRB isolators



Dynamic and static tests on ISOSISM® HDRB isolators

## CE marking

ISOSISM® HDRB isolators can be supplied with CE marking.



Standard dynamic test curve

## Freyssinet Services

Freyssinet can produce structural designs with earthquake protection devices, including HDRB isolators.

## Local sales contact

## Range

The composition of the elastomeric mixture determines the isolator's damping capacity.

The mechanical characteristics of the elastomer make the isolator capable of withstanding seismic deformation of up to  $\tan\gamma = 2,5$ .

Three types of mixture are available for different shear modulus G and damping values:

- Model HDRB 0.4 -10: Modulus G=0.4 MPa – Damping = 10% (at  $\tan\gamma = 1$ )
- Model HDRB 0.8 -10: Modulus G=0.8 MPa – Damping = 10% (at  $\tan\gamma = 1$ )
- Model HDRB 1.4 -16: Modulus G=1.4 MPa – Damping = 16% (at  $\tan\gamma = 1$ )

Ø: Diameter

$T_r$ : Total thickness of elastomer

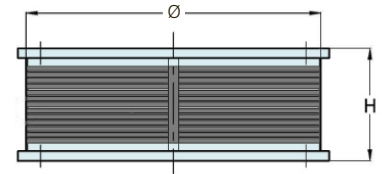
H: Total height of isolator

$\Delta_{max}$ : Maximum horizontal displacement

$V_{max}$ : Maximum vertical load under zero displacement

$V_{seism}$ : Maximum vertical load under seismic displacement

$K_r$ : Horizontal stiffness



Ø mm	$T_r$ mm	HDRB 0.4 - 10					HDRB 0.8 - 10					HDRB 1.4 - 16				
		H mm	$\Delta_{max}$ mm	$V_{max}$ kN	$V_{seism}$ kN	$K_r$ kN/mm	H mm	$\Delta_{max}$ mm	$V_{max}$ kN	$V_{seism}$ kN	$K_r$ kN/mm	H mm	$\Delta_{max}$ mm	$V_{max}$ kN	$V_{seism}$ kN	$K_r$ kN/mm
Ø300	45	129	110	1640	940	0.63	129	95	3280	1990	1.26	129	75	5410	3760	2.20
Ø300	70	169	170	1050	320	0.40	169	150	2110	790	0.81	169	120	3700	1740	1.41
Ø350	55	145	135	2540	1420	0.70	165	115	5080	3050	1.40	165	95	7430	5480	2.45
Ø350	75	177	185	1860	660	0.51	197	160	3730	1550	1.03	197	130	6530	3080	1.80
Ø400	60	147	150	3290	1910	0.84	167	130	6590	4060	1.68	167	100	8150	7710	2.93
Ø400	90	192	225	2240	690	0.56	212	195	4480	1700	1.12	212	155	7850	3640	1.95
Ø450	72	165	180	4540	2510	0.88	185	155	9080	5230	1.77	185	125	10380	9230	3.09
Ø450	108	219	260	3020	840	0.59	239	230	6050	1980	1.18	238	185	1380	4250	2.06
Ø500	84	197	210	5130	2770	0.93	217	180	10260	5810	1.87	217	145	11030	10450	3.27
Ø500	126	257	290	3420	960	0.62	277	270	6840	2030	1.25	277	215	11030	4670	2.18
Ø550	88	198	220	6320	3500	1.08	218	190	11720	7470	2.16	228	150	15630	13740	3.78
Ø550	144	275	320	3860	1090	0.66	295	310	7720	2090	1.32	312	250	13520	4970	2.31
Ø600	96	209	240	8260	4580	1.18	249	205	13990	9620	2.36	260	165	18660	16890	4.12
Ø600	144	275	350	5500	1510	0.79	315	310	11010	3560	1.57	332	250	18660	7630	2.75
Ø650	108	241	270	9030	4920	1.23	272	230	18070	10380	2.46	272	185	19520	18510	4.30
Ø650	162	313	380	6020	1660	0.82	350	350	12050	3620	1.64	350	280	19520	8180	2.87
Ø700	120	253	300	9890	5300	1.28	304	260	19780	10990	2.57	315	205	25520	20250	4.49
Ø700	170	318	410	6980	1940	0.91	374	365	13960	4600	1.81	390	295	34430	9970	3.17
Ø750	130	286	325	12070	6230	1.36	338	280	23480	12900	2.72	350	225	29360	23260	4.76
Ø750	170	338	425	9230	2780	1.04	394	365	18470	6770	2.08	410	295	29360	13790	3.64
Ø800	132	285	330	14040	7690	1.52	336	285	24330	16000	3.05	358	225	36500	28870	5.33
Ø800	176	341	440	10530	3480	1.14	396	380	21060	8210	2.28	426	305	36500	16640	4.00

Range given for guidance: ISOSISM® HDRB isolators can be produced for larger vertical loads and displacements.

## Structural connections

The isolators are connected to metal structures using bolts. They are connected to concrete structures using anchor tubes or studs.

ISOSISM® HDRB isolators can be installed in new or existing structures.



Bridge - Rognanas



City Hall - Bucharest

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