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 and displacement during a seismic event.

Main properties

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

Design

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

Behaviour

Behaviour law

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

$$ F = K_r D $$

F: Force  \quad K_r: Horizontal stiffness  \quad D: Displacement

Graphic representation

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

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.

CE marking
ISOSISM® HDRB isolators can be supplied with CE marking.

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 δ = 2.5.

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

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

<table>
<thead>
<tr>
<th>$\varnothing$ mm</th>
<th>$T$ mm</th>
<th>$H$ mm</th>
<th>$\Delta_{max}$ mm</th>
<th>$V_{max}$ kN</th>
<th>$V_{max}$ kNm</th>
<th>$K$ kN/mm</th>
<th>$V_{max}$ kNm</th>
<th>$K$ kN/mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>650</td>
<td>47</td>
<td>110</td>
<td>1640</td>
<td>940</td>
<td>0.63</td>
<td>129</td>
<td>3280</td>
<td>1990</td>
</tr>
<tr>
<td>600</td>
<td>70</td>
<td>180</td>
<td>1350</td>
<td>720</td>
<td>0.81</td>
<td>169</td>
<td>3530</td>
<td>2110</td>
</tr>
<tr>
<td>550</td>
<td>90</td>
<td>225</td>
<td>1210</td>
<td>590</td>
<td>1.00</td>
<td>212</td>
<td>3910</td>
<td>2500</td>
</tr>
<tr>
<td>500</td>
<td>120</td>
<td>300</td>
<td>1100</td>
<td>530</td>
<td>1.25</td>
<td>264</td>
<td>4660</td>
<td>3020</td>
</tr>
<tr>
<td>450</td>
<td>180</td>
<td>420</td>
<td>980</td>
<td>480</td>
<td>1.50</td>
<td>329</td>
<td>5550</td>
<td>4230</td>
</tr>
<tr>
<td>400</td>
<td>230</td>
<td>600</td>
<td>810</td>
<td>420</td>
<td>1.75</td>
<td>426</td>
<td>6640</td>
<td>5500</td>
</tr>
<tr>
<td>350</td>
<td>290</td>
<td>900</td>
<td>740</td>
<td>360</td>
<td>2.00</td>
<td>523</td>
<td>7930</td>
<td>6630</td>
</tr>
<tr>
<td>300</td>
<td>420</td>
<td>1200</td>
<td>670</td>
<td>300</td>
<td>2.25</td>
<td>631</td>
<td>9420</td>
<td>8250</td>
</tr>
<tr>
<td>250</td>
<td>600</td>
<td>1800</td>
<td>590</td>
<td>240</td>
<td>2.50</td>
<td>761</td>
<td>11000</td>
<td>9710</td>
</tr>
<tr>
<td>200</td>
<td>900</td>
<td>2700</td>
<td>520</td>
<td>180</td>
<td>2.75</td>
<td>919</td>
<td>13800</td>
<td>11900</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>City Hall - Bucharest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridge - Ragnaness</td>
</tr>
</tbody>
</table>

www.freyssinet.com