FREYSSINET IN ROMANIA - FREYROM

FREYSSINET

FREYROM
SUSTAINABLE TECHNOLOGY

Modernizarea linei CF Bucuresti Nord-Jilava-Giurgiu Nord-Giurgiu Nord Frontiera
ROMANIA

Anreprenor general
PORR Construct

Beneficiar
Caile Ferate Romane

Filiala Freyssinet
FREYROM
Durata lucrarilor
Inceput: Iunie 2022
Sfartsit: August 2023

Aparat de reazem tip oala

Aparat de reazem anti-ridicare

MISIUNEA FREYROM

FREYROM a furnizat și instalat 72 de bucăți aparate de reazem tip TETRON CD 7 linii de rosturi de dilatație „sub balast".

Cele 72 de aparate de reazem, cu o capacitate de sarcina intre 3660 si 16 000 kN si greutate intre 97 si 4 950 kg, au fost instalate pe 4 poduri: Neajlov, Sabar I si II si podul peste Arges. Intre aceste 72 de aprate s-au regasit si 4 aparate de reazem speciale anti-ridicare.

Cele 7 linii de rosturi de dilatatie ''sub-balast'' reprezinta o premiera in Romania pentru aceste tipuri de rosturi, care si-au demonstrat fiabilitatea de-a lungul anilor in multe proiecte FREYSSINET din toata lumea.

PRODUSE / PRODUCTS

SEISMIC PROTECTION

ISOSISM® PDS

PRESTRESSED DAMPING SPRINGS

Data sheet n°: FT En C V 5 9 V01 – 06/24

- Provides a fixed point in service conditions
- Dissipates energy during seismic events
- Re-centers the structure after an earthquake
- Fully operational after an earthquake
- Optimal for railway bridges in moderate to high seismic zones

Description

The ISOSISM® PDS is a seismic device described as Fluid Spring Damper in the standard EN 15129.

The device combines three structural functions:

- The fixed point up to a defined threshold
- A spring or recentring capacity
- Energy dissipation as viscous damper

Areas of use

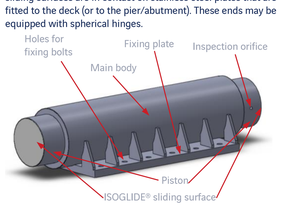
The ISOSISM® PDS is intended for projects where:

- The structure shall not move under service loads, such as braking loads and wind loads
- The seismic loads need to be reduced, to enable an optimization of the structural design
- Seismic loads are higher than service loads. It is typically the case of moderate to high seismic zones

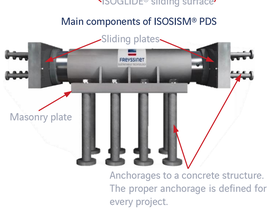
It is an optimal solution for railway bridges with continuous deck, in moderate to high seismic zones.

General concept

The ISOSISM® PDS works in a single, axial, direction. Along its perpendicular axes it behaves as a sliding device.
Both devices' ends are fitted with sliding surfaces. The main body is fixed to the pier/abutment (or to the deck), while the sliding surfaces are in contact on stainless steel plates that are fitted to the deck (or to the pier/abutment). These ends may be equipped with spherical hinges.



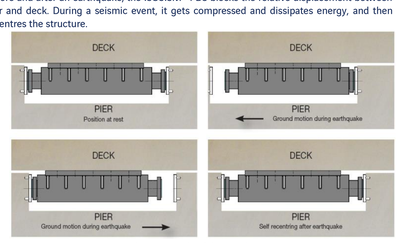
Main components of ISOSISM® PDS



Auxiliary components of ISOSISM® PDS

Working scheme

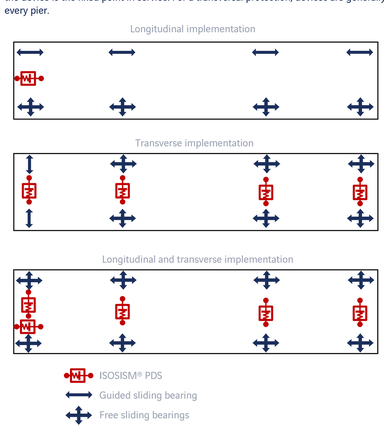
Before and after an earthquake, the ISOSISM® PDS blocks the relative displacement between pier and deck. During a seismic event, it gets compressed and dissipates energy, and then recentres the structure.



Working principle of the ISOSISM® PDS

Implementation in bridges

For a longitudinal protection, a single pier or abutment is usually provided with ISOSISM® PDS the device is the fixed point in service. For a transversal protection, devices are generally installed on every pier.



Typical fittings layout of a bridge with ISOSISM® PDS

TETRON SB SPHERICAL

There are three types of bearing, distinguished by their movement capacity:

Type	Free sliding bearing	Guided sliding bearing	Fixed bearing
	GL	GGL/GGT	FX
Symbol			
Vertical load			
Rotation	Up to 50 mrad	Up to 50 mrad	Up to 50 mrad
Movement Horizontal	Multidirectional	Unidirectional	Blocked

Design basis

The structure of the bearings is designed on the basis of the following parameters:

- Vertical load;
- Acceptable movement;
- Acceptable rotation;
- Exposure temperatures;
- Acceptable stresses on the supports;
- Horizontal load.

The design can be produced in accordance with various standards, the most common of which are EN 1337 and AASHTO LRFD 2012.

Isoslide®, for compact, stronger bearings

Sliding surfaces conventionally formed by stainless steel/PTFE or chrome steel/PTFE contact accept limited stresses. Freyssinet therefore now offers a new material known as Isoslide® to replace the PTFE. Isoslide® accepts higher stresses, in most cases making it possible to reduce the bearing dimensions. The tables on the following pages show the two sliding material options available for TETRON SB bearings. Isoslide® is also five times more wear resistant than PTFE, which is particularly beneficial for applications involving frequent, repetitive movements.

Designation

The designation of TETRON SB bearings identifies their main characteristics.

GL Free sliding bearing	**20,000** Vertical load at ULS in kN	.	**250** Total acceptable longitudinal movement in mm	.	**40** Total acceptable transverse movement in mm
GGT Transverse guided bearing		-	**800** Vertical load at ULS in kN	.	**40** Total acceptable transverse movement in mm
GGL Longitudinal guided bearing		-	**800** Transverse load at ULS in kN	.	**40** Total acceptable longitudinal movement in mm
FX Fixed bearing		-	**900** Horizontal load at ULS in kN (resultant of x/y*)		

This gives the following designations, for example:

** x: longitudinal axis*
y: transverse axis

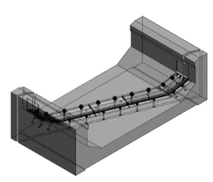
With PTFE

- TETRON SB GL 20,000.250.40
- TETRON SB GGL 20,000-800.40
- TETRON SB FX 20,000-900

With Isoslide®

- TETRON SB ISO GL 20,000.250.40
- TETRON SB ISO GGL 20,000-800.40
- TETRON SB ISO FX 20,000-900

EXPANSION JOINTS FOR RAILWAYS



TW joint (3 types)

The TW joint, used as a sub-ballast joint, is made of rubber, vulcanized to the internal metal structure. It is anchored to the slab by chemical anchors so that movement is achieved by deformation of the rubber parts for the TW60/130 and by sliding of the components for the other types. Accessories available: plastic caps and centering rings for fixings; drain tubes, flashings.

Longitudinal movement absorption:
- 50 mm (± 25 mm) to 100 mm (± 50 mm) in service condition, 50 mm to 150 mm in seismic condition.
Vertical movement absorption:
- 40 mm for TW60/130 model, 50 mm for other models.

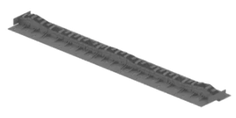
- ✓ Longitudinal movement absorption
- ✓ Vertical movement absorption
- ✓ Watertightness

Sub-ballast joint

This joint is designed for medium expansion length railway structures (60 to 100m), where the variation of the space between the deck and the abutments is such that the ballast layer must not be interrupted.
It consists of
(1) a metal cover fixed to the deck (2) a metal part called a "knife" on which the cover slides (3) a metal plate fixed to the back wall which holds the knife.

Different types of corrosion protection can be proposed.

- ✓ Longitudinal movement absorption: 0 to 150mm
- ✓ Vertical movement absorption: from -10mm to +10mm
- ✓ Jacking of the structure without dismantling



Ballast retaining joint

Designed for large expansion length railway structures, where the variation of the space between the deck and the abutments is such that the ballast layer must be interrupted.
It includes
(1) a metal angle with a sequence of stiffeners, fixed on either side of the joint (2) an adjustable vertical plate, according to the profile of the ballast (3) an elastomeric joint cover to prevent ballast from entering the joint (4) a chain of metal springs supporting the joint cover (5) pre-stressed anchors nailing the angles to the structure.

Different types of corrosion protection can be proposed.
Longitudinal movement absorption: from 0mm up to 900 mm.
Vertical movement absorption: from -50mm to +50mm.

- ✓ Railway bridges with expansion > 150m
- ✓ Prevents ballast from entering the joint gap
- ✓ Setting possibilities: 200mm in height, 100mm longitudinally