

TRANSPEC™ PDS

(TRANSPEC™ PRESTRESSED DAMPING SPRING)



FREYSSINET
SUSTAINABLE TECHNOLOGY

Triple function:

- Restrain movement under standard service conditions
- Dissipate energy during seismic event
- Re-center the structure after earthquake

SEISMIC PROTECTION OF STRUCTURES

Technical data sheet reference: FT En C V 5 2 3

FIELD OF APPLICATIONS

Connections between bridge decks and piers or abutments.

DESCRIPTION

Earthquakes transfer to the structure high amount of energy coming from the ground. When the structure has a low natural damping capacity, external dampers can be added to reduce the energy transferred to the structure. Fluid viscous dampers are the most efficient solutions to dissipate large amount of energy over short ranges of displacement.

The prestressed damping spring **Transpec™ PDS** combines the advantages of a Fluid Viscous Damper and a Hydraulic Prestressed Spring. The spring behaviour will relocate the structure to its initial position after earthquake. It works also as a fixed point, restraining movements under standard service conditions, thanks to the initial prestressing force in the spring.

PRINCIPLES

The **Transpec™ PDS** unit dissipates energy by lamination of a viscous fluid and transforms it into heat. The damping efficiency of the unit is calibrated to meet the behaviour law required by the design office. Stroke and capacity are customized on request.

BENEFITS

- Three major functions gathered in a single device
- High sustainability: the unit moves only during dynamic events.
- Compact design
- High efficiency
- Maintenance free

OPERATING PRINCIPLES

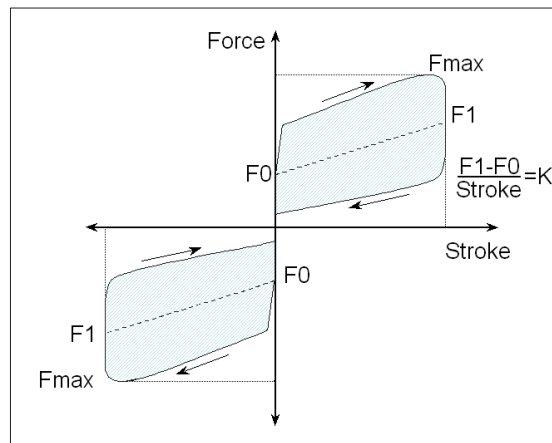
Static behaviour

Under the prestress load F_0 the structure is restrained by the device. Above F_0 level the compressibility of the fluid in the unit provides the spring function.

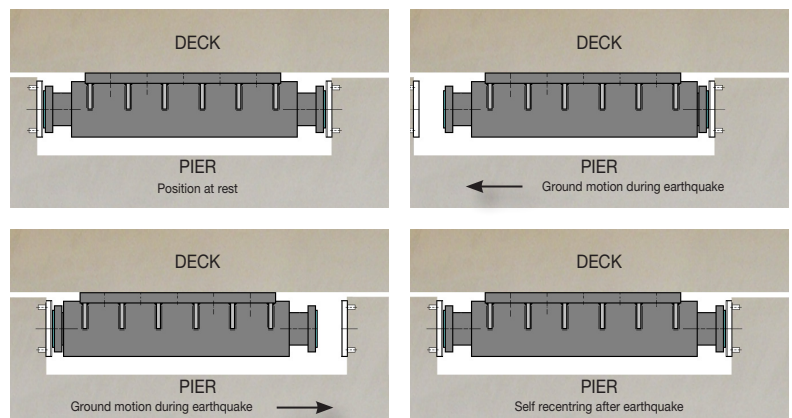
Dynamic behavior

Under the prestress load F_0 the unit behaves in a static mode. Above F_0 level the viscosity of the fluid in the unit generates the damping function. The spring function re-centers the structure to its original position.

The behavior law of the units can be modeled with the following formula $F = F_0 + Kx + CV^\alpha$, with $\alpha = 0.15$.



Dynamic behaviour of a PDS



OPERATING TEMPERATURE

The Transpec™ PDS unit can be operated under a temperature range of -30°C up to 50°C.

INSTALLATION

Units can be installed in longitudinal or transversal direction of the deck. They are equipped at each end with a low friction sliding material in order to accommodate thermal movement of the structure.



Longitudinal protection of a railway deck
8 units PDS 2200-3600-50



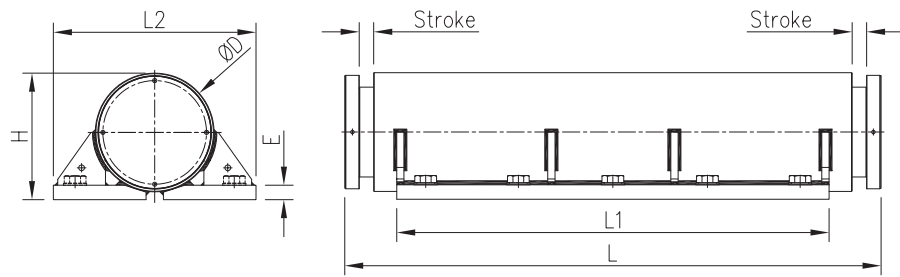
Transpec™ PDS



Free sliding interface



Transversal protection of a deck
PDS 1200-2800-20



Designation	F0 (kN)	Stroke (mm)	Fmax (kN)	Stiffness K (kN/mm)	Length L (mm)	Height H (mm)	Diameter D (mm)	Fixing plate		
								length L1 (mm)	width L2 (mm)	thickness E (mm)
PDS 100-290-50	100	±50	290	1,6	660	155	130	520	260	25
PDS 100-290-100	100	±100	290	0,8	1020	165	130	780	260	35
PDS 250-670-50	250	±50	670	3	900	215	180	760	360	35
PDS 250-670-100	250	±100	670	1,5	1370	230	180	1130	360	50
PDS 500-1210-50	500	±50	1210	5	1130	285	240	990	480	45
PDS 500-1210-100	500	±100	1210	2,5	1680	305	240	1440	480	65
PDS 750-1660-50	750	±50	1660	7	1220	320	270	1080	540	50
PDS 750-1660-100	750	±100	1660	3,5	1800	340	270	1560	540	70
PDS 1000-2000-50	1000	±50	2000	10	1300	345	290	1160	580	55
PDS 1000-2000-100	1000	±100	2000	5	1870	360	290	1630	580	70
PDS 1500-3000-50	1500	±50	3000	12	1520	415	350	1380	700	65
PDS 1500-3000-100	1500	±100	3000	6	2190	435	350	1950	700	85
PDS 2000-3610-50	2000	±50	3610	20	1610	460	390	1470	780	70
PDS 2000-3610-100	2000	±100	3610	10	2240	480	390	2000	780	90
PDS 2500-4520-50	2500	±50	4520	25	1670	505	430	1530	860	75
PDS 2500-4520-100	2500	±100	4520	12,5	2280	520	430	2040	860	90
PDS 3000-5420-50	3000	±50	5420	30	1740	545	470	1600	940	75
PDS 3000-5420-100	3000	±100	5420	15	2350	565	470	2110	940	95

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