CALENBERG

Product catalogue

MASS-SPRING SYSTEMS

A LISEGA Group Company

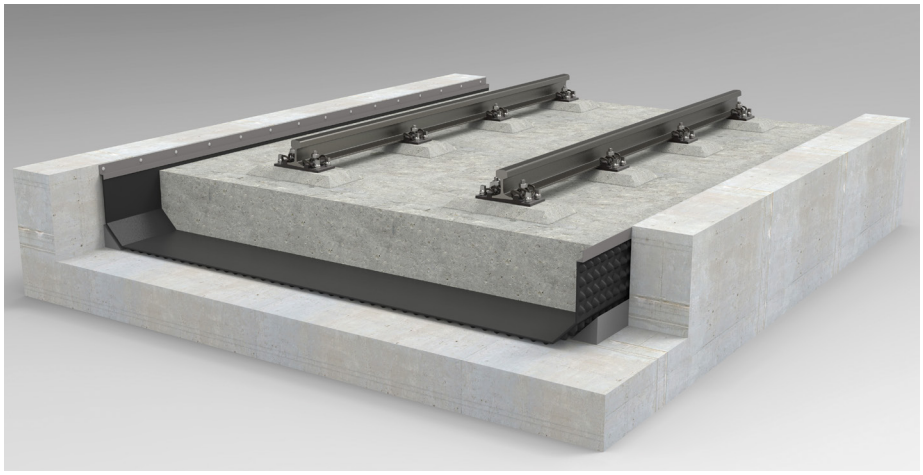
Mass-Spring Systems
Product Portfolio

Vibration protection and durability

During the operation of a railway, vibrations, structure-borne noise and secondary airborne noise arise due to wheel out-of-roundness, flat spots in the wheels, ribbing in the rails, track positioning errors, switch complexes or irregularities in the subsoil. If the effective protection people living near railway lines from these immissions gives rise to increased requirements in terms of vibration and structure-borne noise prevention, mass-spring systems (MSS) can be made use of.

If an MSS is used, the track's mass and rigidity (ballast bed or ballastless track) must be precisely matched with the elastomer element spring rigidity to ensure vibration decoupling between the track system and the surrounding area. The elastic support of an MSS can be full-surface, strip or point-shaped, depending on its construction or design.
An MSS is used where increased requirements exist for structure-borne sound insulation or in the case of low construction heights.

All the elastic track components provided by Calenberg are designed so that their service life corresponds to that of the superstructure.

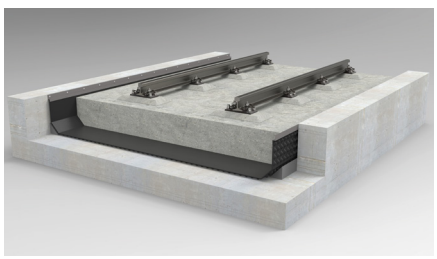


Enhanced ride comfort

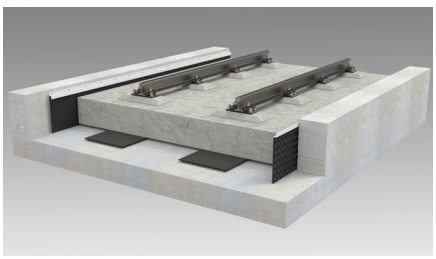
- Reduction of vibrations, structure-borne noise and secondary airborne noise
- Greater quality of life for residents in surrounding areas
- Protection of superstructure components
- Greater travelling comfort
- Stable track positioning
- Long service life and low maintenance
- Protection of adjacent vibration-sensitive structures and buildings
- Permanent quality assurance and monitoring
- Reduction of ribbing on rails

Elastic support options provided by MSS

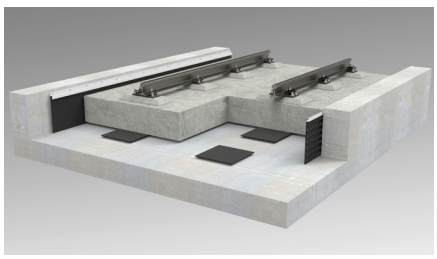
Full-surface elastic support



Strip-shaped elastic support



Point-shaped elastic support



With the ballastless track system, there are several ways to execute the mass-spring system. Depending on the type of construction (precast or in-situ concrete), vibration protection requirements (tuning frequency, insertion insulation, rail countersinking) and economic factors, a full-surface, strip or point-shaped design may be appropriate. The elastic layer can be installed in one or two layers.
Calenberg will be happy to assist you with the dimensioning of vibration protection.

Quality assurance according to standards

Calenberg quality management is carried out in accordance with recognised procedures that meet the quality requirements of established standard regulations. The profiled sub-ballast mat (USM) types have been extensively tested in accordance with DIN 45673-5/-7 by renowned testing institutes (BAM Berlin, TU Munich, TU Berlin, TU Dresden, MPA University Stuttgart and Müller-BBM). The sub-ballast mats are characterised by durable weather resistance, high electrical insulation resistance, low water absorption and high mechanical load capacity. All test reports are available upon customer request.

Mass-Spring Systems

With their unique shape, these specially designed sub-ballast mat types are made of synthetic and natural rubber and are available in various designs and with different stiffnesses for applications involving axle loads of up to 250 kN and for all traction speeds. These mats produce an effective reduction in vibration and tremor emissions from railway traffic. The conical stud mats are used to meet the respective vibration engineering requirements for the efficient isolation of structure-borne sound and vibrations in mass-spring systems.

The USM models are manufactured using high-grade rubber blends. They have a high mechanical load capacity and are permanently weather-resistant. The mats absorb virtually no water, excel thanks to their high electrical insulation resistance and provide drainage on the mat level.

The USM series is suitable for both ballasted and ballastless track systems. Types with greater stiffness are also used as so-called transition mats to adjust the stiffness of different adjacent track sections.

The product types on offer

USM 1000 W		
Static bedding modulus	Load range 0.02 - 0.10 N/mm^2	0.016 N/mm^3
Dynamic bedding modulus (bei 40 Hz)	Preload 0.030 N/mm^2	0.013 N/mm^3
	Preload 0.060 N/mm^2	0.023 N/mm^3
	Preload 0.100 N/mm^2	0.041 N/mm^3
Thickness	approx. 30 mm	

USM 2020		
Static bedding modulus	Load range 0.02 - 0.10 N/mm²	0.020 N/mm³
Dynamic bedding modulus (bei 40 Hz)	Preload 0.030 N/mm²	0.020 N/mm³
	Preload 0.060 N/mm²	0.037 N/mm³
	Preload 0.100 N/mm²	0.042 N/mm³
Thickness	approx. 27 mm	

USM 2025		
Static bedding modulus	Load range 0.02 - 0.10 N/mm²	0.025 N/mm³
Dynamic bedding modulus (bei 40 Hz)	Preload 0.030 N/mm²	0.027 N/mm³
	Preload 0.060 N/mm²	0.034 N/mm³
	Preload 0.100 N/mm²	0.052 N/mm³
Thickness	approx. 27 mm	

USM 2030		
Static bedding modulus	Load range 0.02 - 0.10 N/mm²	0.030 N/mm³
Dynamic bedding modulus (bei 40 Hz)	Preload 0.030 N/mm²	0.048 N/mm³
	Preload 0.060 N/mm²	0.054 N/mm³
	Preload 0.100 N/mm²	0.071 N/mm³
Thickness	approx. 27 mm	

USM 3000		
Static bedding modulus	Load range 0.02 - 0.10 N/mm²	0.040 N/mm³
Dynamic bedding modulus (bei 40 Hz)	Preload 0.030 N/mm²	0.059 N/mm³
	Preload 0.060 N/mm²	0.067 N/mm³
	Preload 0.100 N/mm²	0.075 N/mm³
Thickness	approx. 27 mm	

USM 4010		
Static bedding modulus	Load range 0.02 - 0.10 N/mm²	0.100 N/mm³
Dynamic bedding modulus (bei 40 Hz)	Preload 0.030 N/mm²	0.130 N/mm³
	Preload 0.060 N/mm²	0.175 N/mm³
	Preload 0.100 N/mm²	0.226 N/mm³
Thickness	approx. 14 mm	

USM 4015		
Static bedding modulus	Load range 0.02 - 0.10 N/mm²	0.150 N/mm³
Dynamic bedding modulus (bei 40 Hz)	Preload 0.030 N/mm²	0.280 N/mm³
	Preload 0.060 N/mm²	0.350 N/mm³
	Preload 0.100 N/mm²	0.420 N/mm³
Thickness	approx. 14 mm	

Accessories

Available from Calenberg upon request:

- Z profile, corner wedges
- EPDM cover strips
- Cutting equipment (for hire)

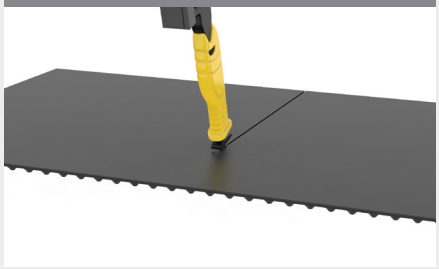
Delivery

Depending on requirements, the mass-spring systems are supplied either in rolls of up to 120 m, packed on pallets, or cut to size. In the case of transverse installations, the lateral insulations can also be made from one piece. For longitudinal installations, the Civerso product we provide is suitable for vertical vibration protection.

Installation of the mass-spring systems

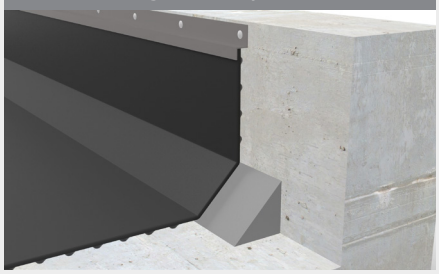
1. Loose laying on the substrate

2. Cutting to size on-site



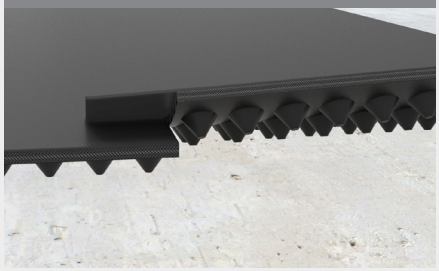
Mass-spring systems made of elastomeric mats can be laid either longitudinally or transversely to the track axis. Cuts can be made on-site using commercially available cutting equipment, e.g. electric reciprocating saw or a special belt cutter. If required, either of these devices can also be borrowed from Calenberg

3. Insert wedge and Z profile

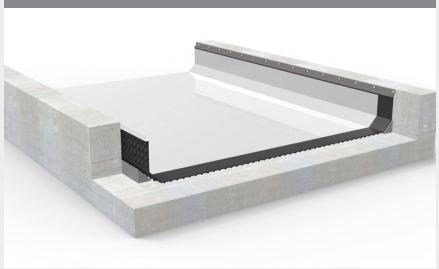


When laying transversely to the direction of travel, insert wedges and Z profiles are suitable for fastening.

4. Jointing with overlap strips



5. Covering with construction foil



To prevent concrete slurry from penetrating (sound bridge), the MSS is first fixed to the adjacent strip by means of an overlap strip using a stapler. Alternatively, covering with PE foils would also be possible.
More detailed installation instructions are available on request.

Reference projects

Visit our website to find out more about worldwide projects in the railway sector and to convince yourself of our industry-specific know-how and customer-oriented solutions.

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