

## System 336

Highly elastic rail fastening for metro –  
the ribbed base plate solution for slab track

# Vossloh fastening systems

Based on our experience we are setting standards of the future.



## Urban Transport – Always smooth with stop and go

Frequent starting and stoppings at many stops within the shortest time characterize urban transport. In this case, highly elastic components provide for comfortable travelling at high operating safety and reduced noise – at axle loads of up to 18 t (Metro) / 13 t (Tram).

### System 336 – the ribbed base plate solutions for urban transport

Slab track systems must meet special requirements to deflect forces generated by a rolling train into the ground in a smoothly and material-saving way: The highly elastic components of the rail fastening systems must replicate the original elasticity of the ballasted track. For system 336, a highly elastic elastomer-intermediate plate made of *cellentic* is used in order to achieve that result. Ribbed steel base plates form the connection to the concrete subgrade, their ribs ensure track security and the stability of the rail. Furthermore, they transfer dynamic forces in the substructure.

### System 336 – highly elastic solution in urban transport for more than 40 years

The highly elastic *cellentic*-elastomer ( $\geq 8$  kN/mm) offers excellent characteristics in terms of rail deflection, noise and vibration damping: this makes it very well suitable mainly for metros. As a ribbed base plate system, the 336 is also a popular rail fastening system for turnouts.

It is usually fixed on the slab track by anchor bolts. Furthermore, the 336 SD version allows the fixation via screw-dowel-combinations. The rail fastening system 336 has been installed for more than 40 years. It is used on 1,100 km of track in more than 30 countries.

The 336 Duo has been developed for the urban transport in China: It is compatible with local track solutions and – due to excellent performance in damping – can absorb up to 8 decibel more than common local systems. The 336 Duo is already installed in several metro tracks in China, among others in the turnouts of Beijing's Metro line 7.



### Vossloh protect:

The new coating for tension clamps, sleeper screws and T-head bolts (incl. nuts and washers) – for a consistent and high coating quality.

### Advantages

- Conventional barrier protection **plus** cathodic corrosion protection, preventing the base material from corroding in the event of damages, e.g. caused by flying ballast.
- Withstands extreme conditions such as high temperature fluctuations, high humidity and industrial climate (acid rains).



*cellentic* is an elastomer made of EPDM that ensures high stability against many types of chemical attacks. The advantage: the material provides excellent resistance to temperature, aging, and weather conditions as well as it is very stable under permanent load. *cellentic* components optimize the elasticity for a reduction of vibrations and the protection of track.

# System 336

Elastic. Safe. Resilient. Flexible.

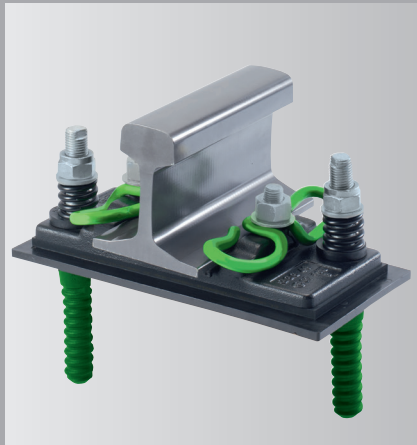
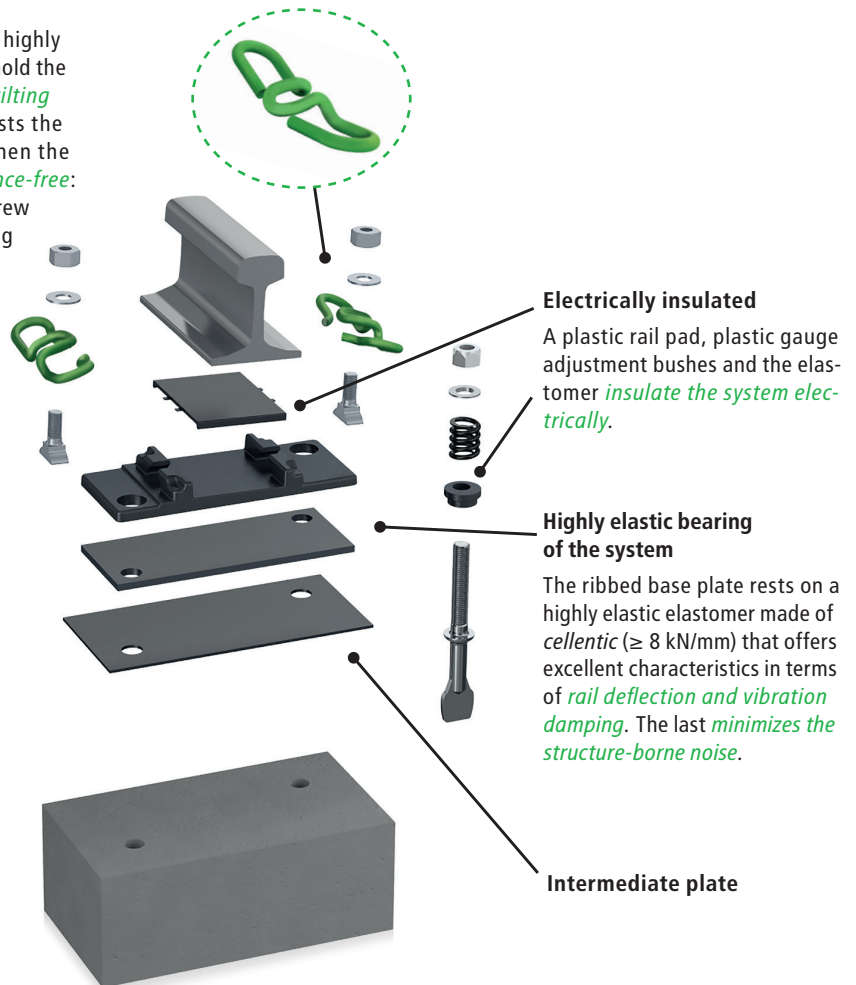
## The W-shape of the Skl 24 provides safety

For meeting the required *rail creep resistance* two highly elastic, independently acting spring arms steadily hold the rail down; the middle bend acts as an additional *tilting protection*. With its high fatigue strength, it resists the dynamic vertical movements that are caused when the vehicle rolls over the rail. The system is *maintenance-free*: Due to the permanently acting tension, Skl and screw cannot loosen, the middle bend prevents the spring arms from plastic deformation.

**Helical springs for low pretension of elastomer**

### Safely tied

By means of T-headed bolts, the Skl are safely mounted to the ribbed base plate. The ribbed base plate itself is fixed in the concrete track with anchor bolts. (Alternative anchoring: screw-dowel-combination).



## Easy handling for installation and rail maintenance due to preassembly and exchangeability

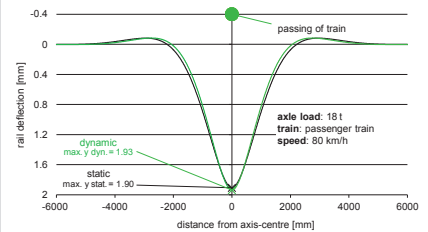
- Flexibly applicable as single support point: no special shoulders (e.g. for concrete sleepers) required.
- Installation is possible both with top-down and with bottom-up method.
- Anchorage possible by anchor bolts, weld studs as well as with screw-dowel-combination – with two or four anchors/dowels each.
- For welding of the rail, no fastening elements have to be removed from the support point.
- The single support point can be delivered as preassembled component.
- All components can be replaced.
- Optionally applicable in turnouts.

# Safety. Comfort. Track protection.

## Travel comfort through optimum rail deflection

The railway track must be elastic to compensate forces caused by running trains. Because ballast is not used for slab tracks, the highly elastic *cellentic* components of the rail fastening system are designed to undertake this job. The 336 system with *cellentic* intermediate plate allows rail deflection and can optimally distribute occurring vertical forces. The result: Protection of track. Its elasticity is adapted to the traffic load to achieve optimum rail deflection: load distribution is at the maximum without overloading the rail. Furthermore, the *cellentic* component damps the vibrations caused by the unevenness of the track and the wheels; structure-borne track vibration is minimized. The result: travel comfort, safety through smooth running, as well as increased lifetime of track components and vehicles.

Zimmermann computation

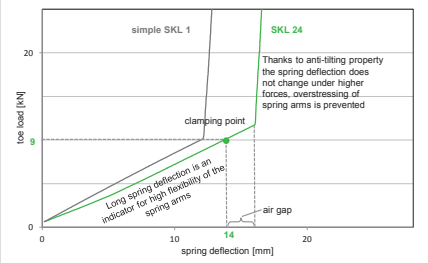


Simplified demonstration: one axle of a two axle bogie

## Creep resistance and rail tilting protection

To allow optimum deflection for the rail, its fastening must respond in an elastic way. Therefore, the Skl 24 has a long spring deflection: When forces are applied by a train, its spring arms remain in contact with the rail foot in each situation. For this purpose, the rail is continuously clamped in a force-fitted way by the two spring arms with a spring deflection of approx. 14 mm and a toe load of approx. 9 kN. With this, a high creep resistance is also achieved: When the trains accelerate/decelerate, the rails remain in position, dangerous open fracture gaps due to broken rails are avoided. Simultaneously, a small gap between the middle bend and the rail foot of the rail has exactly the play that is required for operation. If the rail tilts excessively, e. g. in narrow curves, high forces are applied to the tension clamp. The Skl 24 is able to resist them: Rail movements are limited by the middle bend after the air gap has been overcome, and the spring arms are not overstretched.

Load-deflection-curve



Rail fastening system 336 with tension clamp Skl 24		
Typical field of application	Urban transport / Transit; slab track with ribbed base plates	
Axle load	≤ 18 t	
Speed	≤ 140 km/h	
Curve radius	≥ 80 m	
Height adjustment	+ 20 mm	
Gauge adjustment	± 10 mm	
Vertical fatigue strength of Skl 24	2.5 mm	
Static stiffness of <i>cellentic</i> intermediate plate	≥ 8 kN/mm	EN 13146-9: 2011
Relation of dyn. / stat. stiffness of <i>cellentic</i> intermediate plate	1.1	EN 13146-9: 2011
Toe load of Skl 24 (nominal)	9 kN	EN 13146-7: 2012
Electrical resistance	≥ 5 kΩ	EN 13146-5: 2003
Rail creep resistance	≥ 9 kN	EN 13146-1: 2012
Corrosion protection category (Skl,Ss,Hs)	C5-L (1440 h stainless)	ISO 12944
System approval/homologation		EN 13481-5: 2012

**Remark:** Contents, figures and technical data in this brochure display the performance of the fastening system, however, they always depend on external conditions. Please contact us to enable us to develop a solution for you that will be customized to your requirements. The information presented corresponds to the technical state at the time of printing; in the meantime, continuous research and development programmes at Vossloh could have caused adaptations of the product.