



System DFF 336 NG

Highly elastic rail fastening for metro – the lightweight plastic 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 DFF 336 *NG* – the innovative, highly elastic solution 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 DFF 336 *NG*, a highly elastic elastomer-intermediate plate made of *cellentic* is used in order to achieve that result. A newly developed installation plate made from glass fiberreinforced plastics ensure a stable connection to the concrete subgrade and the stability of the rail due to the ribs on the downward facing side.

System DFF 336 *NG* – the new light-weight version of the ribbed plate solution 336

Due to its plastic system frame, the DFF 336 *NG* system is a light-weight alternative to the classic 336 steel ribbed plate solution. The high proportion of durable plastic in the system generates weight reductions of up to 60 % versus systems based on steel plates. This also results in logistics advantages, corrosion protection, and easier handling during installation.

The use of plastic components also provides high insulation resistance, which is beneficial especially in DC-powered urban railways.

A closed-cell, highly elastic *cellentic* elastomer located between the installation plate and system frame ensures the required rail deflection and vibration damping. The system is fastened on slab tracks with a screw-dowel combination. Eccentric insulating bushes support accurate gauge adjustments in the rail.

The DFF 336 *NG* system has already been installed in test tracks in Central America.



Vossloh protect:

The new coating for tension clamps, sleeper screws and T-head bolts (incl. nuts ans wahsers) – 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).

vcellentic

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 DFF 336 NG

Elastic. Safe. Resilient. Flexible.

The W-shape of the Skl 1K 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.

Dual gauge adjustment -

based on the use of eccentric insulating bushes and gauge shims. Use of various rail types is possible by changing the gauge shims.

Adjustable height _

By the lateral insertion of height adjustment plates, the height of the system can be adjusted within 20 mm without loosening or lifting the system.

Highly elastic system support

The system frame is mounted on a highly elastic *cellentic* elastomer (\geq 8 kN/mm) with outstanding properties concerning *rail deflection and vibration damping*. *The latter minimizes structure-borne sound*.

Securely fastened The fastening system is securely fixed by hexagon nuts. Inclination plate for adjusting the desired rail inclination. Eccentric insulating bushes allow a fast and easy correction of the gauge. One system frame for various configurations, e.g. various rail types. Installation plate for a reliable and secure connection to the concrete slab.



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 with screw-dowel-combination for gauge side and field side.
- 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.

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 DFF 336 *NG* 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.

Creep resistance and rail tilting protection

To allow optimum deflection for the rail, its fastening must respond in an elastic way. 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 1 K 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.

7immermann	computation
Zmmuchmunn	computation



Simplified demonstration: of an axle on a twin-axle bogie

Load-deflection-curve



Rail fastening system DFF 336 <i>NG</i> with tension clamp Skl 1 K		
Typical field of application	Urban transport/Transit, slab track	
Axle load	≤ 18 t	
Speed	≤ 140 km/h	
Curve radius	≥ 80 m	
Hight adjustment	+ 20 mm	
Gauge adjustment	± 12 mm	
Vertical fatigue strength of Skl 1 K	1,4 mm	
Static stiffness of cellentic intermediate plate	≥ 8 kN/mm	EN 13146-9: 2011
Relation of dyn./stat. stiffness of cellentic intermediate plate	1,1	EN 13146-9: 2011
Toe load of Skl 1 K (nominal)	10 kN	EN 13146-7: 2012
Electrical resistance	\geq 5 k Ω	EN 13146-5: 2003
Rail creep resistance	\geq 9 kN	EN 13146-1: 2012
Corrosion protection category (Skl)	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.



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