

System W 40 HH

Elastic rail fastening for heavy haul –
the durable solution for ballasted track with concrete sleepers

Vossloh fastening systems

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



Heavy Haul – Heavy loads are transported safely

Axle load of more than 26 t means extreme loads for the track. Resistant fastening systems provide safe and durable connections and simultaneously allow fast and easy maintenance.

W 40 HH – the durable solution for concrete sleepers on ballasted tracks

The combination of concrete sleepers on ballast is the most frequently used railway track structure all over the world. In the so-called W-track, sleeper shoulders provide stability for track and fastening system and allow the transfer of forces generated by traffic. The ballast bed, however, is flexible and transfers these loads homogeneously into the substructure. Furthermore, it absorbs noise and vibration caused by train movements. The W 40 HH system forms a complete optimum railway track for heavy haul traffic.

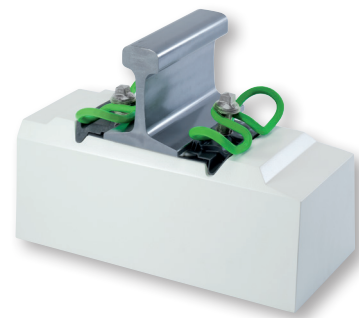
Rising to the challenges of heavy haul tracks

The W 40 HH is especially designed for extreme mechanical loads on heavy haul tracks and there, it is mainly used in narrow bends: Wider angled guide plates on the field side allow a higher load input; the tension clamp Skl 40 whose spring arms are bent in a new shape guaranteeing safe contact to the rail foot.

The high toe load improves the lateral and vertical holding forces while in the same time the high fatigue limits provide a long service life giving low whole-life costs.

The W 40 HH AP system includes an additional abrasion plate (AP) that sits between the rail seat and the rail pad to protect both of them. The plate made of glass-fibre reinforced polyamide is abrasion-resistant and can be loaded with high contact pressure. In addition, its special design avoids penetration of sand. This has been verified by constant load tests performed on the system in accordance with the US-directive AREMA chapter 30 - at changing temperatures and using a sand-water mixture.

W 40 HH has proved to be successful since its introduction on the heavy haul tracks in the USA in 2013. They have been installed there on approx. 300 km of track.



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).

System W 40 HH

Elastic. Safe. Resilient. Flexible.

The innovative shape of the tension clamp Skl 40 provides safety and durability

For meeting the required *creep resistance* two highly elastic, independently acting spring arms steadily hold the rail down; the middle bend is used 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. Due to the permanently acting tension, Skl and screw cannot loosen and therefore, they are *maintenance-free*.

Angled guide plates keep the rail in the track

The angled guide plates lead the forces introduced into the rail by train in the concrete. In this way, the screw-dowel combinations are not loaded by shearing and bending forces. *Wider angled guide plates on the field side* allow the input of higher loads, especially at extreme mechanical loads in bend areas. The design of the angled guide plates additionally supports the *tilting protection*. Different widths can *adjust the gauge*.

Less abrasion – higher durability

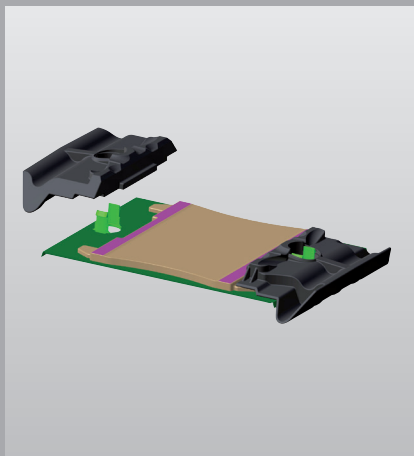
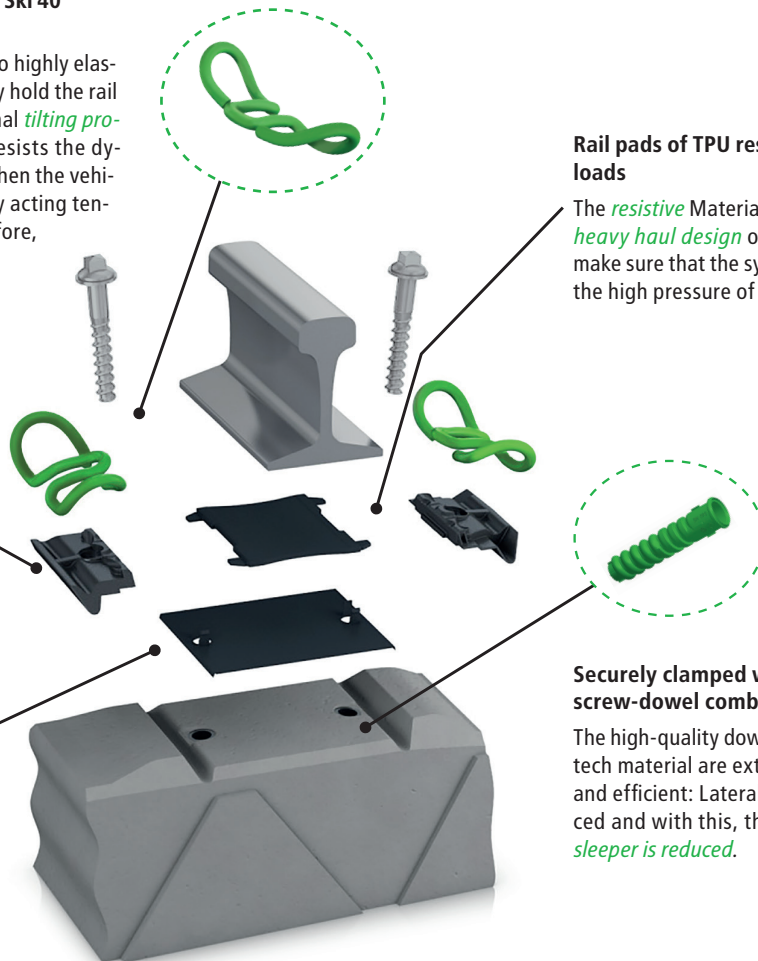
Abrasion Plate protects rail seat and rail pad and *impedes the penetration of sand*.

Rail pads of TPU resist high axle loads

The *resistive* Material and the special *heavy haul design* of the rail pad make sure that the system withstands the high pressure of the traffic loads.

Securely clamped with the screw-dowel combination NG

The high-quality dowels made of high-tech material are extremely strong and efficient: Lateral forces are reduced and with this, the *load on the sleeper is reduced*.



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

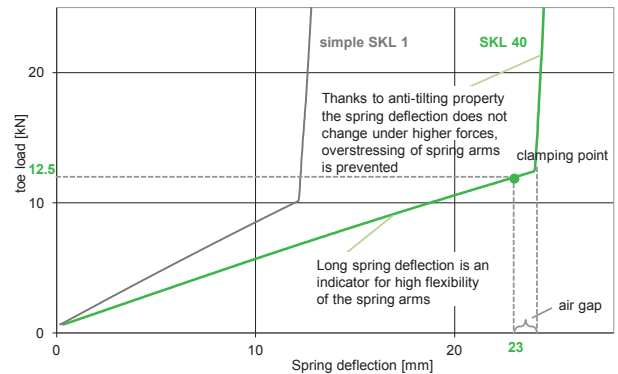
- All fastening components can be preassembled in the sleeper factory.
- At the construction site, it will only be required to lay the rail and clamp it. In this way, fastening components cannot get lost.
- Due to the innovative tool VosMat Rapid, an automated installation of the System is possible.
- For welding of the rail, no fastening elements have to be removed from the sleeper.
- All components, including dowels, can be replaced easily. Replacement of sleepers can be avoided.
- Optional preassembly of rail pad and angled guide plates on the abrasion plate for easy replacement in the track (Rail-Relay).

Safety. Comfort. Track protection.

Creep resistance and rail tilting protection

To allow optimum deflection for the rail, its fastening must respond in an elastic way. Therefore, the Skl 40 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. 23 mm and a toe load of approx. 12,5 kN. With this, also a high creep resistance is 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 required for operation. If the rail tilts excessively, e.g. in narrow bends, high forces are applied to the tension clamp. The Skl 40 is able to resist them: Rail movements are compensated by the middle bend after the gap has been overcome, and the spring arms are not overstretched.

Load-deflection-curve



Rail fastening system W 40 H with tension clamp Skl 40		
Typical field of application	Heavy haul; ballasted track with concrete sleepers	
Axle load	≤ 35 t	
Speed	≤ 160 km/h	
Curve radius	≥ 150 m	
Height adjustment	optional	
Gauge adjustment	± 10 mm	
Vertical fatigue strength of Skl 40	3.2 mm	
Static stiffness of rail pad	≥ 400 kN/mm	EN 13146-9: 2011
Toe load of Skl 40 (nominal)	12.5 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)	C5-L (1440 h stainless)	ISO 12944
System approval/homologation		EN 13481-2: 2012 AREMA Chap. 30

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 cause adaptations of the product.