



## System W 41 U

Highly elastic rail fastening for conventional rail and high speed – the universal solution for ballasted track with grooveless concrete sleepers

# Vossloh fastening systems

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



## High Speed on an elastic base

High speed means high dynamic forces – a test of stamina for the rail fastening system. Vossloh tension clamps for high speed traffic with more than 250 km/h ensure safe tensioning. Highly elastic components compensate acting forces in an outstanding way.



## Conventional Rail – Safety on standard routes

Safety and comfort are decisive for rail traffic. Our tension clamps provide a stable fastening solution for types of track with a permissible axle load of up to 26 t. The highly elastic components additionally ensure a comfortable journey.



## W 41 U – the universal 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 rolling trains. The W 41 U system completes this railway track perfectly because its elastomer rail pad made of *cellentic* optimizes the elasticity and with this, it contributes to the protection of the track bed.

## One sleeper design for different types of rail

The W 41 U was developed as a fastening system that – with the same sleeper design and the same track gauge – can be used for three different rail types: 60E1 (rail foot 150 mm), 50E6 (rail foot 140 mm), 46E2 (rail foot 134 mm). These universal application possibilities provide the most possible flexibility, for example to the train operators and the sleeper manufacturers.

The special feature of the W 41 U is that different rail types are possible only by using of different guide plates. As tension clamp, always the especially developed Skl 41 U can be used.

The W 41 U has been developed in cooperation with the French train operator SNFC as a system for grooveless sleepers. However, it is also possible to use them with other types of sleeper.

### 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. Components made of *cellentic* optimize the elasticity for a reduction of vibrations and the protection of track.

# System W 41 U

Elastic. Safe. Resilient. Flexible.

## **cellentic rail pad for high elasticity**

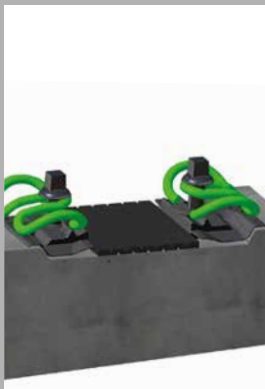
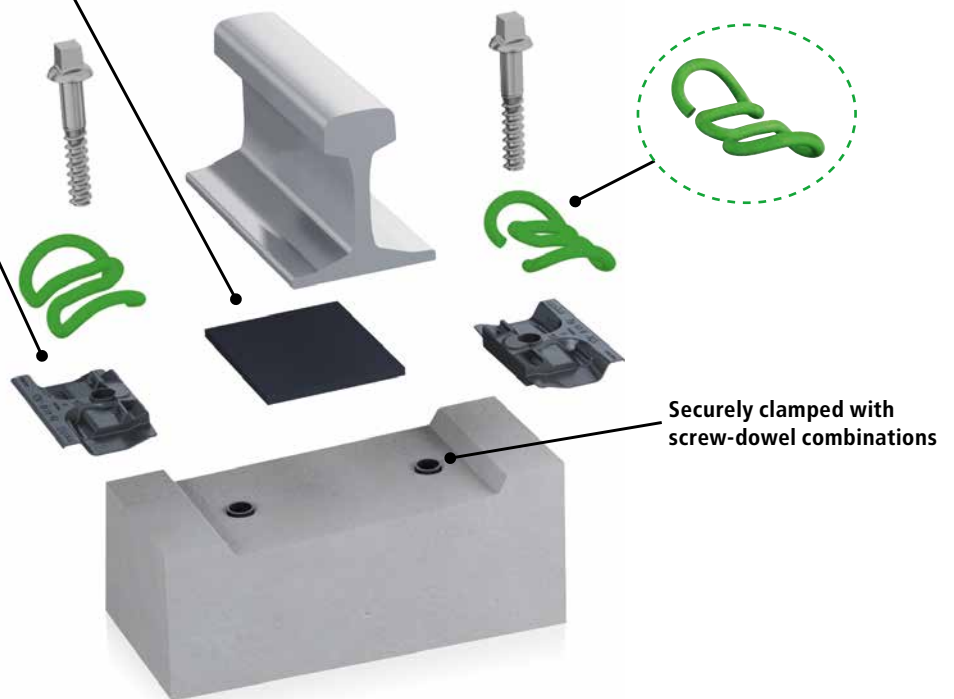
The elasticity of the particular *cellentic* material ensures the compensation of vertical forces and with this, stable rail deflection; it also damps vibrations and *minimizes the structure-borne noise*.

## **Guide plates keep the rail in the track**

The guide plates lead the forces introduced into the rail by train in the base-plate. In this way, the screw-dowel combinations are not loaded by shearing and bending forces. The design of the guide plates additionally supports the *tilting protection*. Different widths can *regulate the gauge*. Different designs of the guide plates allow the *application of different rail sections*.

## **The innovative design of the tension clamp SKl 41 U provides safety and flexibility**

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*. The design of the SKl allows the application of *rail foot widths of 134 mm to 150 mm*.



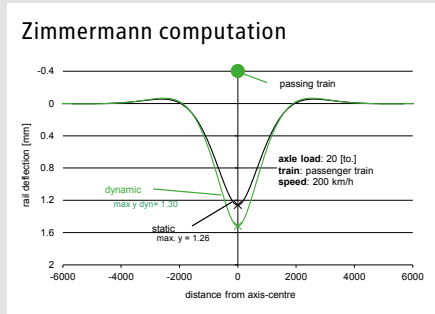
## **Easy handling for installation and rail maintenance due to preassembly and exchangeability**

- 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. Replacement of sleepers can be avoided.

# Safety. Comfort. Track protection.

## Travel comfort through optimum rail deflection

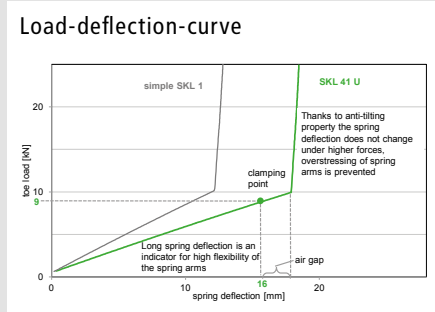
Der railway track must be elastic to compensate forces caused by trains rolling over. In this case, the highly elastic *cellentic* components of the fastening system take over this job in addition to the ballast. The W 41 U system with *cellentic* rail pad allows rail deflection and can optimally distribute occurring vertical forces. The result: Protection of track. In this way, 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 track and wheels; structure-borne track vibration is minimized in this way. The result: high travel comfort, high safety through smooth running of wheels, as well as long lifetime of track components and vehicles.



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 resonate in an elastic way. Therefore, the Skl 41 U has a long spring deflection: When force is applied by a train, its spring arms remain in contact with the rail foot in each situation, also when the rail deflects. For this purpose, the rail is continuously clamped in a force-fitted way by the two spring arms with a spring deflection of approx. 16 mm and a toe load of approx. 9 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 41 U 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.



Rail fastening system 41 U with tension clamp Skl 41 U		
Typical field of application	High speed / Conventional rail; ballasted track with concrete sleepers	
Axle load	≤ 26 t	
Speed	≥ 250 km/h	
Curve radius	≥ 400 m	
Height adjustment	optional	
Gauge adjustment	± 10 mm	
Vertical fatigue strength of Skl 41 U	2.6 mm	
Static stiffness of <i>cellentic</i> rail pad	≥ 30 kN/mm	EN 13146-9:2011
Relation of dyn./stat. stiffness of <i>cellentic</i> rail pad	1.1	EN 13146-9:2011
Toe load of Skl 41 U (nominal)	9 kN	EN 13146-7: 2012
Electrical resistance	≥ 20 kΩ	EN 13146-5: 2003
Rail creep resistance	≥ 9 kN	EN 13146-1: 2012
System approval/homologation		EN 13481-2: 2012

## Remark

Contents, figures and technical data in this brochure display exemplarily 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.

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