vossloh
enabling green mobility

HIGH-ELASTICITY RAIL FASTENING

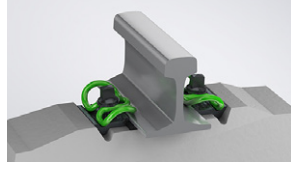
System W 21

The professional solution for conventional rail, high-speed services, turnouts and crossings

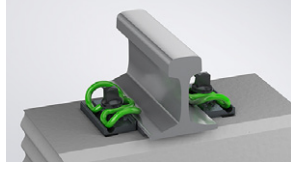
System W 21 – Success all down the line

System W 21 has been in use since 2008, and has been adapted to suit new demands and applications in the intervening years. A highly elastic solution for conventional rail and high-speed applications, it is the modern solution for ballasted track with concrete sleepers. It is a unique solution for turnouts and crossings, with or without inclination. Vossloh has developed an inclined plate especially for this application, which can be used to replace expensive fastening systems with ribbed or base plates.

See the following pages to discover the application and configuration options, as well as interesting details on construction and materials.



Conventional rail, high-speed



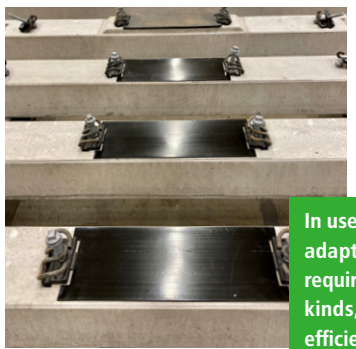
Turnouts and crossings:
Conventional rail, high-speed

Rail fastening systems for ballasted track with concrete sleepers without inclination.

Old designation	New designation
System W 21	System W 21 – Conventional rail, high-speed configuration
System W 21 T	System W 21 – Turnouts and crossings: Conventional rail, high-speed

Maximum grip – minimal vibration

The combination of concrete sleepers and ballasted track is very popular and widely used. The sleeper shoulders provide grip for the track and the fastening, and ensure the forces generated by the trains are deflected, while the ballast layer is flexible and transmits the stresses evenly to the substructure. This minimises both noise and vibration caused by train movements. The degree of elasticity can be flexibly adjusted to suit either ballasted track with concrete sleepers or turnouts and crossings, with or without inclination. The result is maximum rail deflection with overloading the rail.



In use since 2008, adaptable for requirements of all kinds, and cost-efficient to assemble: System W 21.

The system can be variably adapted to suit the application, and its cost-effective assembly is a winner in all situations: All fastening components can be supplied preassembled. The only thing left to do at the installation site is to fit and tension the rails. That means there is no need to remove any fastening components from the sleeper in order to weld the rail, which reduces the effort involved. In addition, all components, including the dowels, are easy to replace. The sleepers therefore do not have to be replaced, which saves both material and time.

SYSTEM W 21

Rail fastening for concrete sleepers and ballast

System W 21 is as flexible as the requirements of the track. In the version for conventional rail and high-speed services, the Skl 21 tension clamp offers high rail creep resistance and therefore maximum safety. The special design ensures the spring arms are not overstretched. The result is a high level of track availability with low maintenance overhead. The fastening offers a highly elastic response in order to enable optimum rail deflection. The cellentic rail pad that is used absorbs vertical forces, damps vibration, minimises structure-borne-noise, and is also extremely reliable in tight curves.

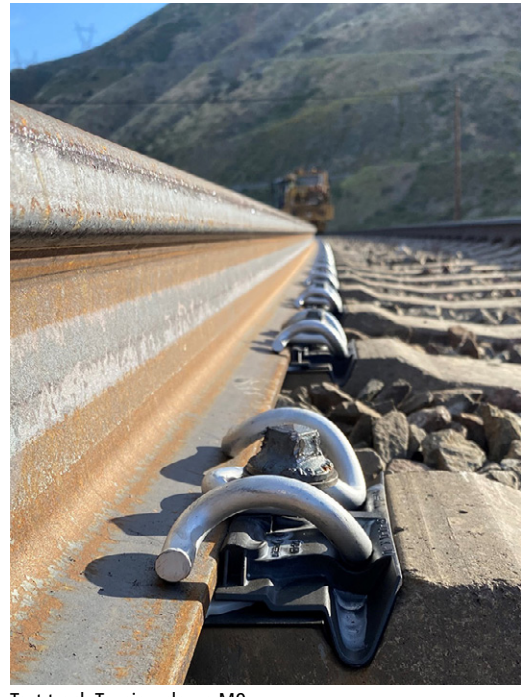
Adaptable elasticity for **conventional rail and high-speed systems**

System components and specifications

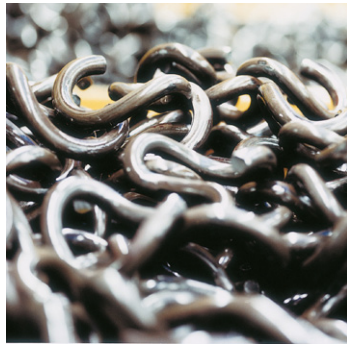
Tension clamps: Generational change for improved resistance

Climate-friendly passenger transportation, reliable goods transportation, efficient logistics: Rail traffic is becoming increasingly important, and this places new demands on the rail network. The new generation of clamps was specifically developed to respond to the growing burden on rails and fasteners. The new M generation of Vossloh tension clamps is more robust and therefore guarantees safety on the track into the future, regardless of growing demands and higher loads. The tension clamps are manufactured using state-of-the-art processes at the new production facility in Werdohl. That is also where its more compact and lighter design was created, which both reduces logistical costs and saves resources.

Test track Tension clamp M7



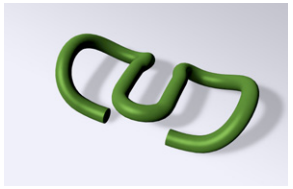
Test track Tension clamp M9



Safety and track availability for all generations

The factor linking all tension clamps is their force-deflecting design: On all stretches of track, including on tight curves, the track remains in position while the trains accelerate and brake. The track bed does not move, while noise and vibration are contained. As a result, the tension clamps ensure maximum safety and track availability.

Old generation



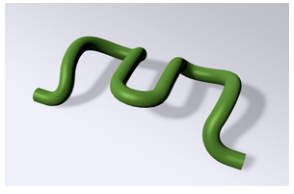
Tension clamp Skl 21

- Fatigue strength 2.5 mm
- Spring deflection 14.5 mm through two spring arms
- Toe load 10 kN
- Frequency approx. 650 Hz

New generation

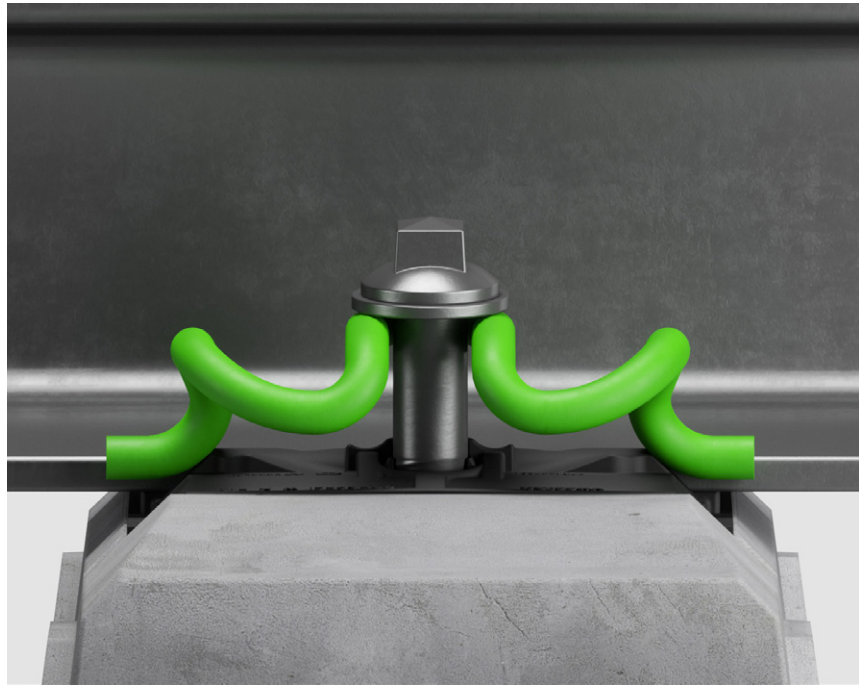
Tension clamp M7

- Fatigue strength > 2.5 mm
- Spring deflection > 16 mm through two spring arms
- Toe load > 10 kN
- Frequency > 1,000 Hz



Tension clamp M9

- Fatigue strength up to 3.2 mm
- Spring deflection > 20 mm through two spring arms
- Toe load > 11.5 kN
- Frequency > 1,000 Hz



Tension clamps M7 and M9 can replace the previous generation of tension clamps and are optimised for a number of requirements. The M9 clamp is especially well suited for narrow curve radii, for example.

The new M generation clamps are currently in the development stage. The values shown here are based on laboratory results, and the assessment following the initial operational trials is positive.

Comprehensive protection with **Vossloh *protect***

High humidity levels and high salt content in the ambient air are just two examples of environmental impacts that will attack some components in rail fastening systems. That is why all tension clamps and sleeper screws and T-head bolts can be coated with Vossloh *protect* for optimal protection. This innovative coating provides traditional barrier and cathodic corrosion protection that prevents damage from loose ballast, among other things. This is an important factor when it comes to reducing lifecycle costs. The coated components are also protected from aggressive industrial climates like acid rain, major temperature fluctuations, and other extreme conditions.

More information is available on our Web site:

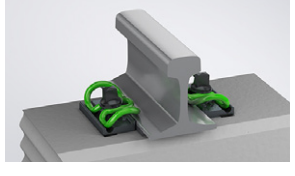
Extraordinary elasticity provided by *cellentic* rail pads

In these systems, *cellentic* rail pads help protect the tracks so they will require less frequent maintenance. The EPDM elastomer developed by Vossloh provides optimal elasticity and rigidity in every application to ensure that loads are ideally distributed and vibration cushioned. It remains resistant to chemical substances, temperature fluctuations, and weathering even under challenging environmental conditions.

System W 21

Configurations for your applications

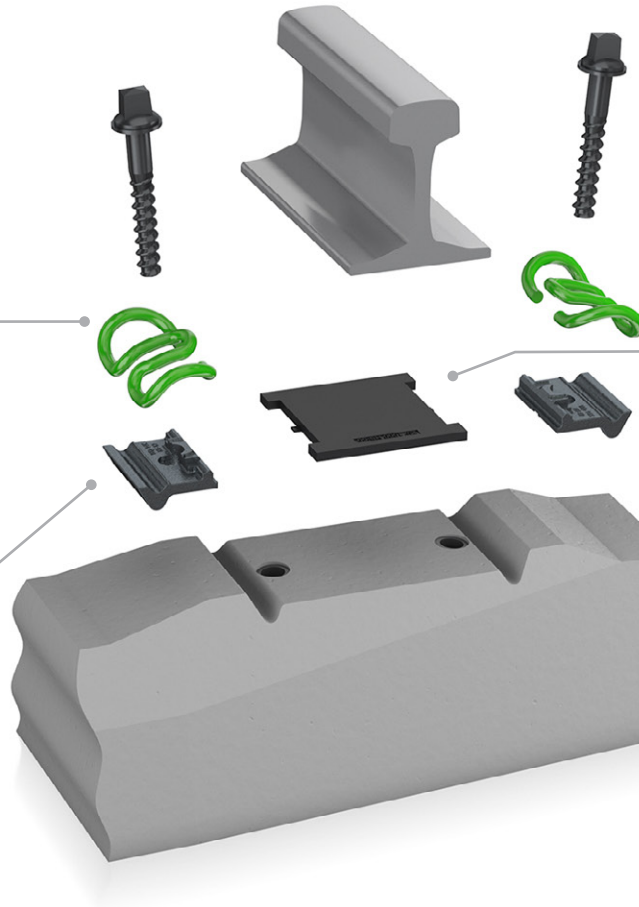
Conventional rail, high-speed



Turnouts and crossings:
Conventional rail, high-speed

SYSTEM W 21

Compensating forces for conventional rail and high-speed systems



Skl 21
- Maximum safety
- Optimised rail creep resistance and tilt protection
- Resistant to dynamic vertical movements
- Maintenance-free system

Angle guide plates
- No stresses from shearing or bending forces
- Keep rails in the track
- Tilt protection
- Gauge adjustment possible

Height adjustment plates (optional)
- Various heights
- System height can be adjusted
- Adaptable to suit any application

Rail pad
- High elasticity
- Minimises vibration and structure-borne noise
- Stable rail deflection
- Tilt protection

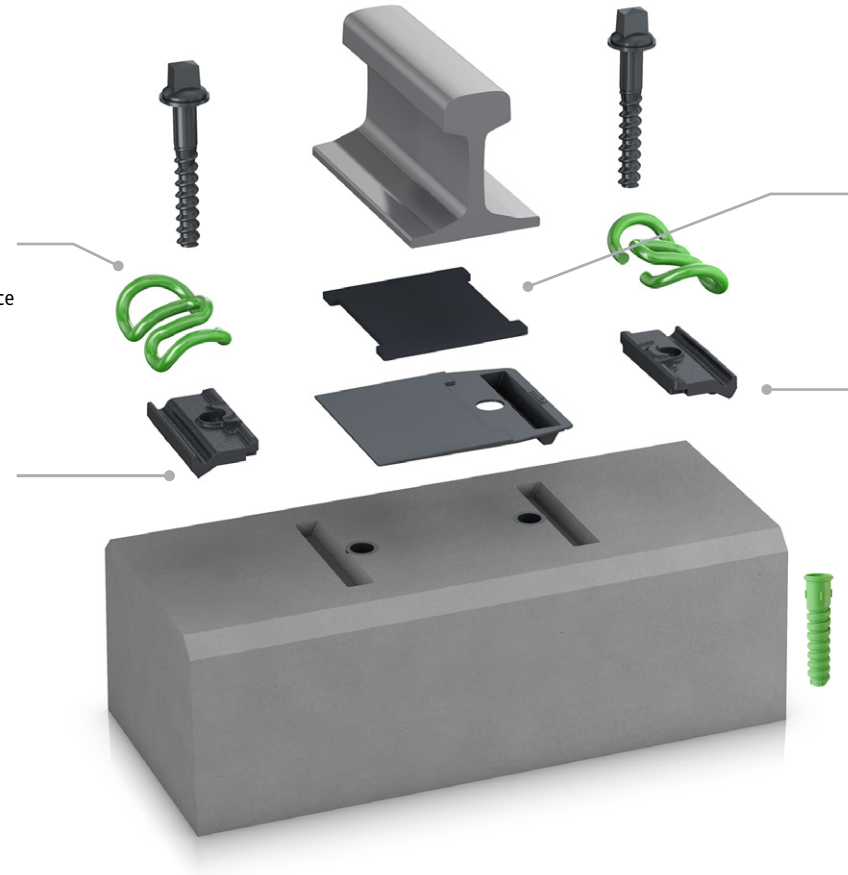
Screw-dowel combination
- Secure tensioning with a high load capacity
- Cost-effective and resilient thanks to the use of high-tech materials

SYSTEM W 21

Allows rail inclination – conventional rail and high-speed systems

Skl 21
- Maximum safety
- Optimised rail creep resistance and tilt protection
- Resistant to dynamic vertical movements
- Maintenance-free system

Angle guide plates
- No stresses from shearing or bending forces
- Keep rails in the track
- Tilt protection
- Gauge adjustment possible



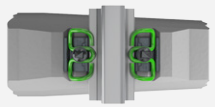
Rail pad
- High elasticity
- Minimises vibration and structure-borne noise
- Stable rail deflection
- Tilt protection

Inclined plates (optional)
- Allow rail inclinations of 1:20 or 1:40
- Inclined plates can be used to replace expensive fastening systems with ribbed or base plates

Screw-dowel combination
- Secure tensioning with a high load capacity
- Cost-effective and resilient thanks to the use of high-tech materials

System W 21: **Specifications** at a glance

You can also use our Product Finder on our Web site:

	System W 21 Ballasted track with concrete sleeper	
		
Field of application	**Conventional rail High-speed trains**	**Conventional rail High-speed trains**
Axle load	≤ 26 t	≤ 26 t
Speed	CR: ≤ 250 km/h HS: ≥ 250 km/h	CR: ≤ 250 km/h HS: ≥ 250 km/h
Curve radius	CR: ≥ 150 m HS: ≥ 400 m	CR: ≥ 150 m HS: ≥ 400 m
Height adjustment	optional	optional
Gauge adjustment	± 10 mm	± 10 mm

Note: Content, figures and specifications in this brochure reflect the performance of the fastening system under ideal conditions, but this will always depend on external factors and influences. Contact us so we can work with you to develop a solution tailored to your project and your requirements. The information in this document represents the state of technical development at the time of publication; the product may have been updated since as a result of ongoing research and development work at Vossloh.

In worldwide demand

System W 21 is used worldwide: To expand the high-speed line from Ankara to Sivas in Turkey, to upgrade the German high-speed line between Hanover and Würzburg, or along a track across Romania covering a distance of more than 1,122 km. Since 2008 it has been installed on a total of about 3,000 km of track in 30 countries, including lines in Algeria, Argentina, Azerbaijan, Bulgaria, the Czech Republic, Finland, Germany, Kyrgyzstan, Lithuania and Slovakia. Thanks to state-of-the-art technology, even the most difficult conditions are easy to overcome. The proven fastening has been optimised for use with concrete sleepers for turnouts and crossings, for example. Inclined plates thus allow rail inclinations of 1:20 or 1:40. About 350,000 fastening points have been fitted to date.

Want to know more about our references? Drop us a line:

Uruguay

- Ferrocarril Central project
- Upgrades to railway bridges and stations
- 273 km railway line connects Montevideo to Paso de los Toros
- Project start date: 2020
- Precise layout to suit local requirements protects concrete sleepers and track bed structure

Egypt

- High-speed network with three lines
- "Suez Canal on rails", 660 km long, connects port cities on the Red Sea and Mediterranean
- 1,100 km between the metropolis of Cairo and the upcoming economic centre of Abu Simbel
- 225 km between Luxor and Hurghada on the Red Sea

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Interested in more products in the Vossloh portfolio for your rail infrastructure?

Take a look at our Product Finder, where you'll quickly find the solution that's right for you!

Click here to directly access the Product Finder

Published: 09.2022

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