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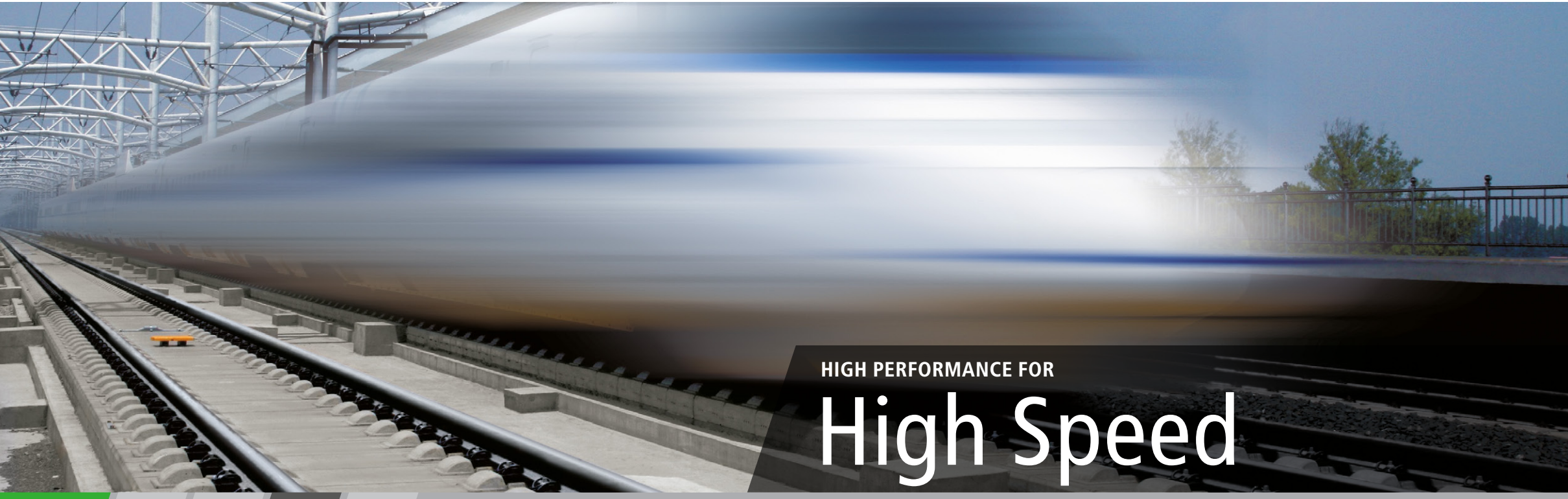


HIGH PERFORMANCE FOR

# High Speed

Vossloh rail fastening systems for
speeds of over 250 km/h

# Launching at high speed into a new era in rail transport

It has been almost 200 years since the railway set entirely new standards as a means of transportation. Now we are on the threshold of another global transformation. And no other means of transport is as well positioned for the necessary process of decarbonisation than rail. The expansion of high-speed lines worldwide is proceeding rapidly, making the service increasingly attractive – especially for metropolitan connections. With its highly refined rail fastening systems for every possible subsurface, Vossloh is leading the way as a driver of innovation and making a valuable contribution to the future of rail transportation in the high-speed segment.

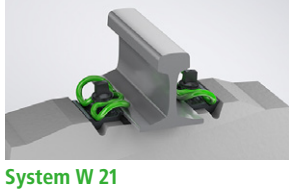
**Rail fastening systems for slab track**

System 300

System DFF 300

**Rail fastening systems for ballasted track**

System W 14



System W 21

# Maximum dynamics require a **highly elastic base**

The extreme speeds achieved by the latest high-speed trains represent a huge stress test for rail fasteners of all kinds. As speed increases, so do the forces placed on the track surface by fast changes of load and the influence of imbalanced wheels or unevenness on rail surfaces. An aggravating factor is the fact that high-speed lines are generally firmly compacted, which means that all forces generated have to be cushioned and offset first and foremost by the rail fasteners.

**Passing the stress test**

For high-speed rail traffic in excess of 250 km/h, Vossloh has developed fastening systems that are specifically designed for these specific loads. Whether it is for slab or ballasted track, our systems are perfectly prepared for a wide range of applications. For special requirements, we work closely with our customers to develop individual configurations and combine exactly the right components.

Technically optimised tension clamps, rail pads, and intermediate plates elastically cushion all forces acting on the rails. Our custom solutions ensure a comfortable ride experience and maximum safety. Vibration damping also helps extend service life of all components in the track bed structure, which ensures that cost-effectiveness is not left behind.

# **Perfect protection** to resist even extreme conditions

Heat, temperature fluctuations, corrosive sea air, and acid rain from industry – railway lines need to function smoothly and last a long time, even under extreme environmental conditions. Our newly developed premium zinc coating, Vossloh *protect,* offers long-term protection for all steel components in our rail fastening systems. The top coating provides barrier protection from chemicals, while cathodic corrosion protection keeps them rust-free even in the event of damage. Vossloh *protect* also substantially reduces the risk of material fatigue.

**A number of high-tech materials ensure that our rail fastenings are highly weather-resistant and have a long service life:**

- **The premium coating Vossloh *protect*** comes with the highest protection class (C5-L) in accordance with ISO 12944 and contains no heavy metals, making it suitable for safe use worldwide.
- Specifically designed **Vossloh tension clamps** provide additional tilt protection and rail creep resistance even at maximum speed.
- ***cellentic* elastomers** reliably cushion vibrations and lose none of their rigidity or elasticity, even after years of constant stresses. They protect the track from wear and material fatigue.
- **Additional angle guide plates** keep the rails in the right position at all times.


**As well as supplying very special products, Vossloh also offers individual consulting for your specific tasks.**

# Planning the passenger transportation of the future means planning a **high-speed** rail system.

More and more countries are focusing on rail transportation with high-speed lines – and here at Vossloh we have a specific solution for every requirement.

**Our special fastening systems for high-speed lines are already ensuring fast and safe rail transportation on more than 8,000 kilometres of track in 13 countries. In addition to the proven solutions for ballasted track, our state-of-the-art systems for slab track are in great demand for high-speed lines.**

Using our systems keeps both labour and costs low – and that applies to new infrastructure as well as upgrades and maintenance. And if there are new requirements for a section of track during an upgrade – even individual parts of the fastening system down to a single dowel – they can be retrofitted quickly and at a reasonable cost. This means you can bring existing lines up to the latest standards quickly and without major expense.

Another point for greater cost-effectiveness: On request, the selected components can be pre-assembled for delivery ex-factory: for example, already attached to concrete sleepers. That saves a lot of time and significantly reduces the amount of work on-site.

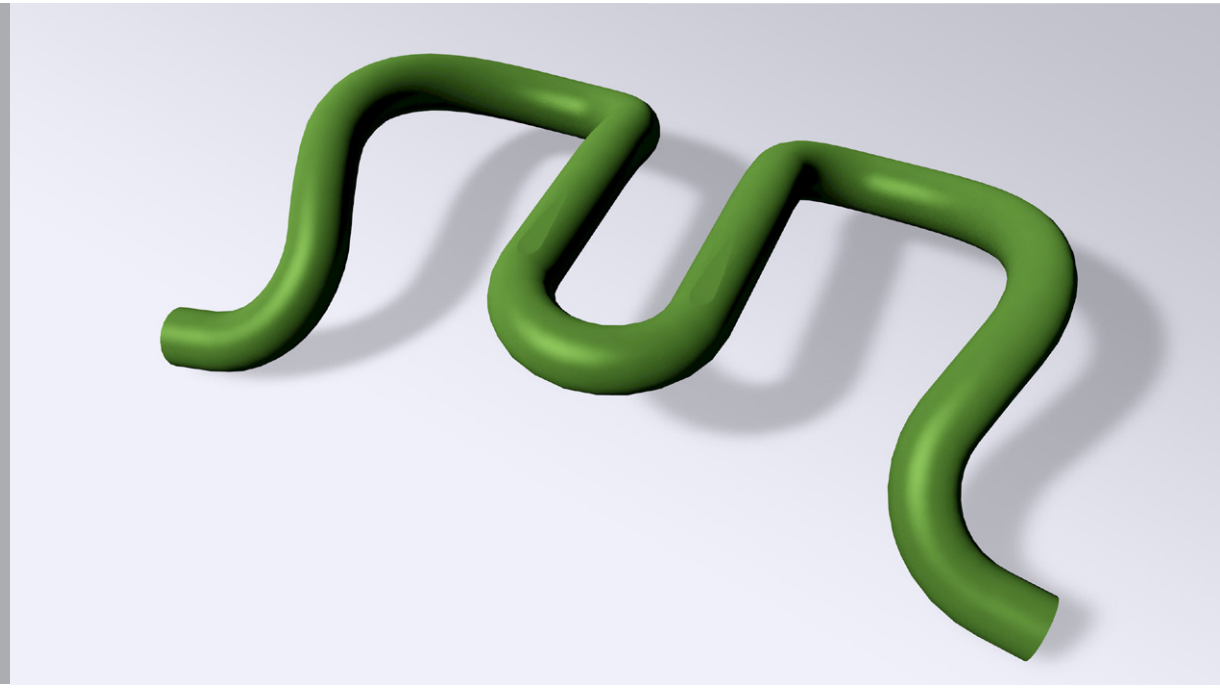
**Interested in in-depth consulting? Call us on +49 (0) 23 92 / 52-0**

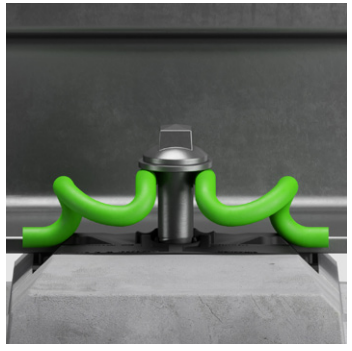
# The perfect system combines **quality and cost-effectiveness**

Decades of experience mean that rail fastenings from Vossloh are well-designed system solutions that can be custom-configured for all conceivable applications, and they are available quickly and at a reasonable price in large or small quantities.

# A wealth of experience behind the **new generation**

As a successor to the "high-tension spring washer" patented by Karl Vossloh in 1927, the tension clamp for rail fastening was introduced by Professor Hermann Meier in 1967. Following successful tests, Vossloh took over the general licence to manufacture the clamps. The basic principle proved extremely adaptable and allowed constant progress to be made over the years. The billionth tension clamp was manufactured on 22 July 2020, with no end to production in sight: The next generation of tension clamps is already in progress.





**Allow us to introduce … our latest generation of Vossloh tension clamps!**

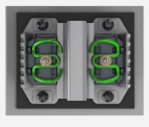
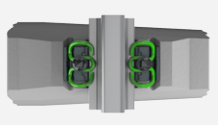
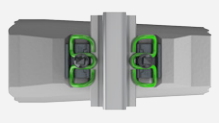
Thanks to growing demand and increasing loads in rail transportation, we have made the new M-generation clamps more robust to help to ensure that tracks remain safe into the future. This new development is being produced in Werdohl, Germany, using state-of-the-art process technology.

**Benefits offered by the new generation:**

- More compact, lighter design
- More robust thanks to a higher natural frequency
- Ultramodern production facility
- Reduced logistical costs
- Easier on resources

# Fastening systems for high-speed rail traffic: **Specifications** at a glance

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

| | Rail fastening systems for slab track | | Rail fastening systems for ballasted track | |
|---|---|---|---|---|
| |  |  |  |  |
| **Product** | **System 300** | **System DFF 300** | **System W 14** | **System W 21** |
| Axle load | ≤ 26 t | ≤ 26 t | ≤ 26 t | ≤ 26 t |
| Speed | ≥ 250 km/h* | ≥ 250 km/h* | ≥ 250 km/h* | ≥ 250 km/h* |
| Curve radius | ≥ 400 m* | ≥ 400 m* | ≥ 400 m* | ≥ 400 m* |
| Height adjustment | – 4 mm/+ 76 mm | – 4 mm/+ 56 mm | Optional | Optional |
| Gauge adjustment | ± 16 mm | ± 46 mm | ± 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.

*Requirements according to EN 13481 for rail fastening systems, category D: High Speed. System also homologated for category C – Conventional Rail – (speed ≤ 250 km/h, curve radius ≥ 150 m).

# On the move **worldwide** – setting new performance records

China has ambitious expansion goals for its high-speed rail traffic. A good example is the world's longest high-speed route covering 1,318 kilometres between the country's capital of Beijing and its economic centre in Shanghai. Thanks to our System 300 fasteners, travel speeds in excess of 350 km/h are the norm on this route. A speed of 486 km/h was even achieved during test runs. Another prime example of the engineer's art is the rail bridge over the Yachi River, part of the high-speed line between Chengdu and Guiyang in the country's southwest.

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

**Top speed in the tunnel**

Special fastening systems from Vossloh are expanding the range of possibilities not only above ground but also below it: for example, the record for the world's fastest measured speed in tunnels was set by an ETR-500 high-speed train under Monte Bibele between Bologna and Florence at an amazing 362 km/h.

**Hurtling through the desert**

Desert areas, sandstorms, temperatures from -5° to 50° Celsius – tough conditions like these on the high-speed line between Mecca and Medina require a specially perfected fastening system. Today pilgrims and tourists can cover the 450-km route in as little as two hours at speeds of over 300 km/h.

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enabling green mobility

# 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**

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