



# Urban Transport

Mobility in cities

# Many utility possibilities for all requirements



## 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).



### Greater quality of life in metropolises

The movement of individual automobile traffic on to rails can only occur in cities when the local transport system is comfortable, safe and reliable. The ideal superstructure for local rail and metro lines today is slab track, as the concrete bed guarantees a stable rail position and generates low maintenance costs. Also with many tramways, the traffic planners favour the slab track as an alternative to traditional ballasted track construction.

For every rail installation variant Vossloh offers an optional suitable fastening system. This is especially the case on concrete slab track where our solu with proven durability. For passengers this means an even soft ride without uncomfortable shocks. The elastic rail supports with permanently tight clamping reduce rail wear significantly, giving advantages for the operator.

# Challenges which we have mastered

## Continuous sustainability

We always plan our future-oriented solutions together with the traffic planners at site and cooperate at the same time with our sister companies within the Vossloh group. Vossloh's diversified range for rail-bound local transport permits tailored solutions on, under and alongside the urban street network. Because of the modular concept of our fastening solutions, for instance, we can target on strengthening the vibration damping in particularly critical areas such as underground metro tunnels. The Vossloh urban mobility solutions are economically sustainable especially because of greater installation efficiency and longer life with minimum maintenance requirement.



## Competence in urban mobility – properties and advantages:



### Property

Vibration damping prevents shocks ...

Highly elastic rail support ...

Stable and long-life fatigue strength components ...

Simple gauge and height regulation ...

The new premium coating Vossloh *protect...*

### Advantage

... and increases travel comfort.

... minimises disruptive structure-borne sound.

... protect the rail bed and superstructure from early wear.










... ensures flexible adaptation possibilities.

... withstands extreme conditions such as high temperature fluctuations, high humidity and industrial climate (acid rains).



The Vossloh experience covers 1,000 km of covered rail in the area of tramways and 1,500 km in the area of Metro. Also not to be forgotten are the transit routes which are spread over the urban traffic systems, which are shared with the conventional rail network.

## Rail fastening systems for urban transport – overview

| Function / criteria                                                                                                     | Vossloh W Tram                                                                     | Vossloh W 25 Tram                                                                   | Vossloh W 25 N                                                                      |
|-------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                                                                                                         |  |  |  |
|  ballasted track with concrete sleeper |   |  |  |
|  slab track                            |                                                                                    |                                                                                     |  |
| Maximum Axle Load (up to)                                                                                               | 13 t                                                                               | 13 t                                                                                | 13 t                                                                                |
| Minimum Curve Radius                                                                                                    | 40 m                                                                               | 40 m                                                                                | 40 m                                                                                |
| Maximum Speed (up to)                                                                                                   | 100 km/h                                                                           | 100 km/h                                                                            | 100 km/h                                                                            |
| Assembly Clip                                                                                                           | Skl 21                                                                             | Skl 25                                                                              | Skl 25                                                                              |
| Toe load / clamping force (per clip)                                                                                    | 10 kN                                                                              | 8 kN                                                                                | 8 kN                                                                                |
| Vertical fatigue strength (per clip)                                                                                    | 2.5 mm                                                                             | 2.0 mm                                                                              | 2.0 mm                                                                              |
| Track adjustment (range gauge adjustment)                                                                               | ± 10 mm                                                                            | ± 10 mm                                                                             | ± 10 mm                                                                             |
| Height adjustment                                                                                                       | + 20 mm                                                                            | + 16 mm                                                                             | –                                                                                   |
| Switch solution possible                                                                                                | ✓                                                                                  | ✓                                                                                   | ✗                                                                                   |
| Insulation (EN 13146)                                                                                                   | ≥ 10 kΩ                                                                            | ≥ 10 kΩ                                                                             | ≥ 5 kΩ                                                                              |
| Rail creep resistance (EN 13146)                                                                                        | ≥ 9 kN                                                                             | ≥ 9 kN                                                                              | ≥ 9 kN                                                                              |
| Static stiffness of the rail pad                                                                                        | > 30 kN/mm                                                                         | ≥ 60 kN/mm                                                                          | ≥ 60 kN/mm                                                                          |
| Tilting protection / tipping protection                                                                                 | ●                                                                                  | ●                                                                                   | ●                                                                                   |
| Maintenance intervals (frequency)                                                                                       | ●                                                                                  | ●                                                                                   | ●                                                                                   |
| Handling during track maintenance / destressing                                                                         | ●                                                                                  | ●                                                                                   | ●                                                                                   |
| Possibility and easiness to replace all fastening components (e.g. after train derailment)                              | ➤➤➤➤                                                                               | ➤➤➤➤                                                                                | ➤➤➤➤                                                                                |
| Prefabrication / pre-assembly level                                                                                     | ●                                                                                  | ●                                                                                   | ●                                                                                   |
| Easiness of construction steps and mechanized construction                                                              | ●                                                                                  | ●                                                                                   | ●                                                                                   |
| Flexibility in type of construction (bottom-up, top-down)                                                               | TD                                                                                 | TD                                                                                  | n. a.                                                                               |
| Compatibility with other systems                                                                                        | Skl 14, Skl 30                                                                     | –                                                                                   | Skl 14                                                                              |
| Rail foot adjustment                                                                                                    | ●                                                                                  | ●                                                                                   | ●                                                                                   |
| Riding comfort / vibration damping                                                                                      | ●                                                                                  | ●                                                                                   | ●                                                                                   |
| Use of <i>cellentic</i> possible                                                                                        | ✓                                                                                  | ✓                                                                                   | ✓                                                                                   |
| Resistance against temperature fluctuations                                                                             | ●                                                                                  | ●                                                                                   | ●                                                                                   |
| Stress for system (components)                                                                                          | ●                                                                                  | ●                                                                                   | ●                                                                                   |
| Maintenance-, service-, labor costs; costs for operating complications                                                  | ➤➤➤➤                                                                               | ➤➤➤➤                                                                                | ➤➤➤➤                                                                                |
| Life cycle / reuse (components and sleeper)                                                                             | ●                                                                                  | ●                                                                                   | ●                                                                                   |

### 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.

| Comparison                               | Vossloh 300 UTS    | Vossloh DFF 300 UTS | Vossloh DFF 336 NG | Vossloh 336 | Comparison                                     |
|------------------------------------------|--------------------|---------------------|--------------------|-------------|------------------------------------------------|
| Standard tram system with clamping plate |                    |                     |                    |             | Standard base plate system with screwless clip |
|                                          |                    |                     |                    |             |                                                |
| 13 t                                     | 18 t               | 18 t                | 18 t               | 18 t        | 18 t                                           |
| 40 m                                     | 80 m               | 80 m                | 80 m               | 80 m        | 80 m                                           |
| 100 km/h                                 | 140 km/h           | 140 km/h            | 140 km/h           | 140 km/h    | 140 km/h                                       |
| clamping plate                           | Skl 21             | Skl 21              | Skl 1 K            | Skl 24      | Clip                                           |
| 10 kN                                    | 10 kN              | 10 kN               | 10 kN              | 9 kN        | 10 kN                                          |
| 0.5 mm                                   | 2.5 mm             | 2.5 mm              | 1.4 mm             | 2.5 mm      | 1.8 mm                                         |
| ± 7.5 mm                                 | ± 10 mm            | ± 10 mm             | ± 10 mm            | ± 10 mm     | ± 20 mm                                        |
| ± 2 mm                                   | + 30 mm            | + 30 mm             | + 20 mm            | + 20 mm     | + 36 mm                                        |
| ✓                                        | ✓                  | ✓                   | ✗                  | ✓           | ✓                                              |
| ≥ 5 kΩ                                   | ≥ 5 kΩ             | ≥ 10 kΩ             | ≥ 5 kΩ             | ≥ 5 kΩ      | ≥ 5 kΩ                                         |
| ≥ 9 kN                                   | ≥ 9 kN             | ≥ 9 kN              | ≥ 9 kN             | ≥ 9 kN      | ≥ 9 kN                                         |
| ≥ 80 kN/mm                               | ≥ 16 kN/mm         | ≥ 16 kN/mm          | ≥ 8 kN/mm          | > 8 kN/mm   | ≥ 17 kN/mm                                     |
| ○                                        | ●                  | ●                   | ◐                  | ◐           | ◑                                              |
| ◑                                        | ●                  | ●                   | ●                  | ●           | ◐                                              |
| ◐                                        | ●                  | ●                   | ◐                  | ◐           | ◐                                              |
| ▶▶▶▶                                     | ▶▶▶▶               | ▶▶▶▶                | ▶▶▶▶               | ▶▶▶▶        | ▶▶▶▶                                           |
| ◑                                        | ●                  | ◐                   | ◐                  | ◐           | ◑                                              |
| ◐                                        | ●                  | ●                   | ◐                  | ◐           | ◐                                              |
| n. a.                                    | TD                 | TD                  | TD/BU              | TD/BU       | n. a.                                          |
| clamping plate                           | Skl 40, B 40, 41 U | Skl 40, B 40, 41 U  | –                  | Skl 12, 3   | –                                              |
| ◑                                        | ◐                  | ◐                   | ●                  | ◐           | ●                                              |
| ◐                                        | ●                  | ●                   | ●                  | ●           | ◐                                              |
| ✗                                        | ✓                  | ✓                   | ✓                  | ✓           | ✗                                              |
| ◐                                        | ◐                  | ◐                   | ◐                  | ◐           | ◐                                              |
| ◐                                        | ●                  | ●                   | ●                  | ●           | ◐                                              |
| ▶▶▶▶                                     | ▶▶▶▶               | ▶▶▶▶                | ▶▶▶▶               | ▶▶▶▶        | ▶▶▶▶                                           |
| ◑                                        | ◐                  | ◐                   | ◐                  | ◑           | ◑                                              |

Level of performance (0 – 4):

0=▶▶▶▶ 1=▶▶▶▶▶ 2=▶▶▶▶▶▶ 3=▶▶▶▶▶▶▶ 4=▶▶▶▶▶▶▶▶

0=○ 1=◑ 2=◐ 3=◐ 4=●

# In service around the world



## Vossloh as One-Stop Shop for the Tram in Suzhou

In 2015 the million-people metropolis will open the first low-floor tramway in China. Vossloh is equipping the 18 km double rail route with fastening systems and turnouts. The route is being built as embedded grass and asphalt track.

## Budapest Metro

The traffic planners of the Hungarian capital place great value on the prevention of structure borne sound. This is the reason that they voted for a special vibration-reducing rail fastening from Vossloh for the construction of the M4 Metro line. The core component of the system solution is the *cellentic* high-tech material – a micro-cellular elastomer that has the property of absorbing low frequency vibrations in the range between 1 and 30 Hertz. Thus our solution hinders the

drumming bass frequencies of the Metro tunnel from being transmitted via the foundations to the neighboring buildings. At the same time *cellentic* is very resistant and stable – which in Budapest, despite the axle loads of up to 12.5 tons, guarantees a long life and a low-maintenance operation of the new route.

## Metro Santo Domingo – completely tunnelled


This route of Line 2 runs completely below ground and was equipped in 2011 with Vossloh fastenings over a track length of 11 km. At peak times the trains run in 3 min. intervals and daily transport up to 200,000 passengers at a speed of 80 km/h.

## Elevated track Bangkok

Since 1994 Vossloh provides fastening solutions for the light rail systems in Bangkok, by now more than 500,000 of Vossloh's fastening systems are installed in Thailand's capital. For the new extension of the elevated railway Bangkok Skytrain Vossloh developed a specifically anticorrosive coating for the tension clamps of the fastening systems and with our construction and technology partners an easy to assemble and cost-efficient track system.





 Urban transport systems at a glance



System W Tram



System W 25 Tram



System W 25 N



System 300 UTS



System DFF 336 NG



System 336



System DFF MC / CT



System DFF 300 UTS



Vossloh Fastening Systems GmbH  
Vosslohstraße 4  
D-58791 Werdohl

Phone +49 (0) 23 92 52-0  
Fax +49 (0) 23 92 52-448  
E-Mail [info.corecomponents@vossloh.com](mailto:info.corecomponents@vossloh.com)

[www.vossloh.com](http://www.vossloh.com)

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