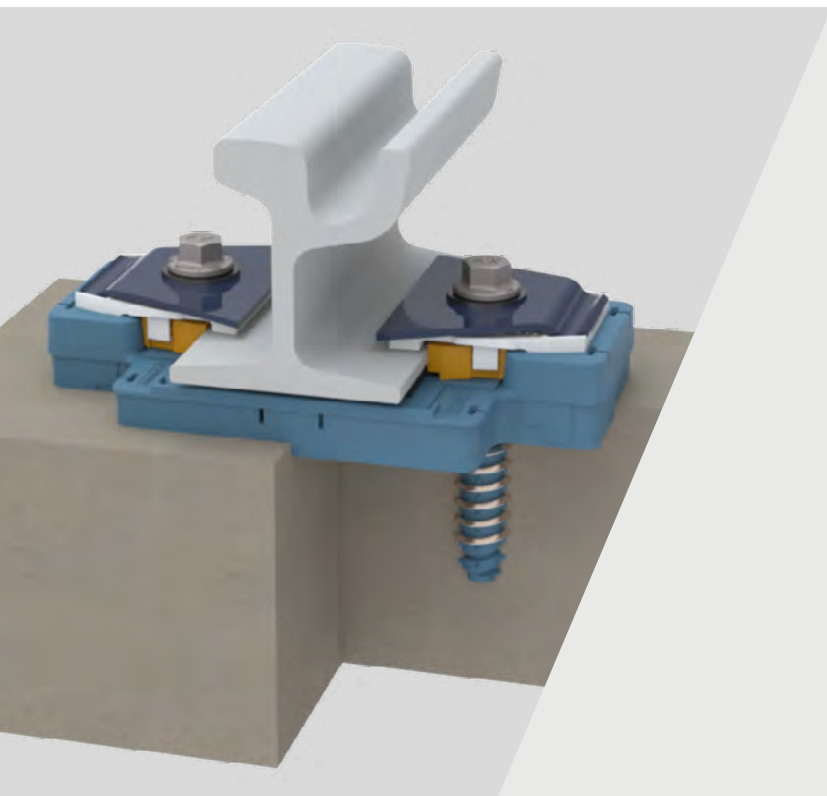


# Nabla Tram

## Fastening Systems

### Adding Value

The Nabla Tram baseplate design allows for effective insertion into a dry mix or fresh concrete.



Nabla Tram is a cost-effective fastening system for trams and light rail systems that is comprised of a lightweight plastic baseplate and Nabla Evolution components.

Combining ease of application with high-performance levels, Nabla Tram is compatible with both top-down and bottom-up construction methods, depending on the project's requirements. The baseplate is designed to allow effective insertion into a dry mix or fresh concrete, thanks to an air evacuation system consisting of blowholes and channels.

The Nabla Tram fastening system is designed for use on state-of-the-art tramway track, conforming with EN Standard 13481-5. Over 450,000 Nabla Tram systems have been installed across Europe.

## → TECHNICAL FEATURES

### Embedded baseplate

The plastic baseplate is partially embedded in the concrete to withstand the lateral and longitudinal loading. It is engineered to allow trapped air and water to escape, ensuring a solid fill of concrete under the rail seat.

### Direct fastening

Nabla Tram is a direct fastening system. The rail is attached to the baseplate and the baseplate to the supporting base structure using the same method.

### Automatic installation

The baseplate system has been optimised for automatic machine installation on slip paved fresh concrete. Its shapes, dimensions and weight allow for easy,

economical installation.

### Protective cover

The fastening system comes with a plastic cover designed to prevent concrete contamination, and improve electrical, mechanical and thermal resistance, allowing for road traffic.

### Air evacuation

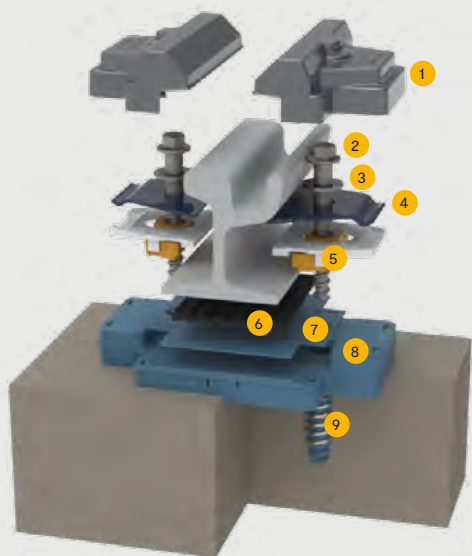
The Nabla air evacuation system prevents trapped air getting under the baseplate.

### Electrical insulation

Nabla Tram provides electrical insulation higher than 20 K Ohms (EN13146-5:2012), providing safety from stray currents.

## → ADVANTAGES

- Nabla Tram has been designed for ease of installation using either bottom-up or top-down construction methods, into either a dry mix or fresh concrete.
- Covers are compatible with grass, pavement, concrete and bitumen surfaces. They increase the insulation and protect the fastening system from concrete contamination.
- The baseplate allows trapped air and water to escape, increasing the system's reliability.
- Nabla Tram's GS anchorage provides pull-out resistance of 90 kN and higher, allowing a good transfer of loads towards the concrete slab.
- The system can be adjusted to provide a wide range of stiffnesses (from 35 MN/m up to 150 MN/m) and vibration attenuation better than -10dB.
- Nabla Tram is suitable for use in conjunction with Pandrol's FTrack sustainable resilient system for embedded rail.



## → COMPONENTS

1. Clip cover
2. Coach screw
3. Flat washer
4. Nabla blade
5. Nabla Evolution insulator
6. Rail pad
7. Vertical adjustment shim
8. Composite baseplate
9. GS dowel

## → SPECIFICATIONS

### Assembly performance data

Recommended category	A
Type of track	Slab
Rail inclination	No inclination
System type	Nabla Evolution
Static stiffness	35 MN/m - 150 MN/m
Vertical adjustment	-2/+3 mm (optional $\pm 4$ mm)
Gauge adjustment	$\pm 15$ mm
Electrical insulation	22 k $\Omega$

For any other configuration, please contact us.

### Standard compliance

- EN 13481
- EN 13146

## → LEARN MORE



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