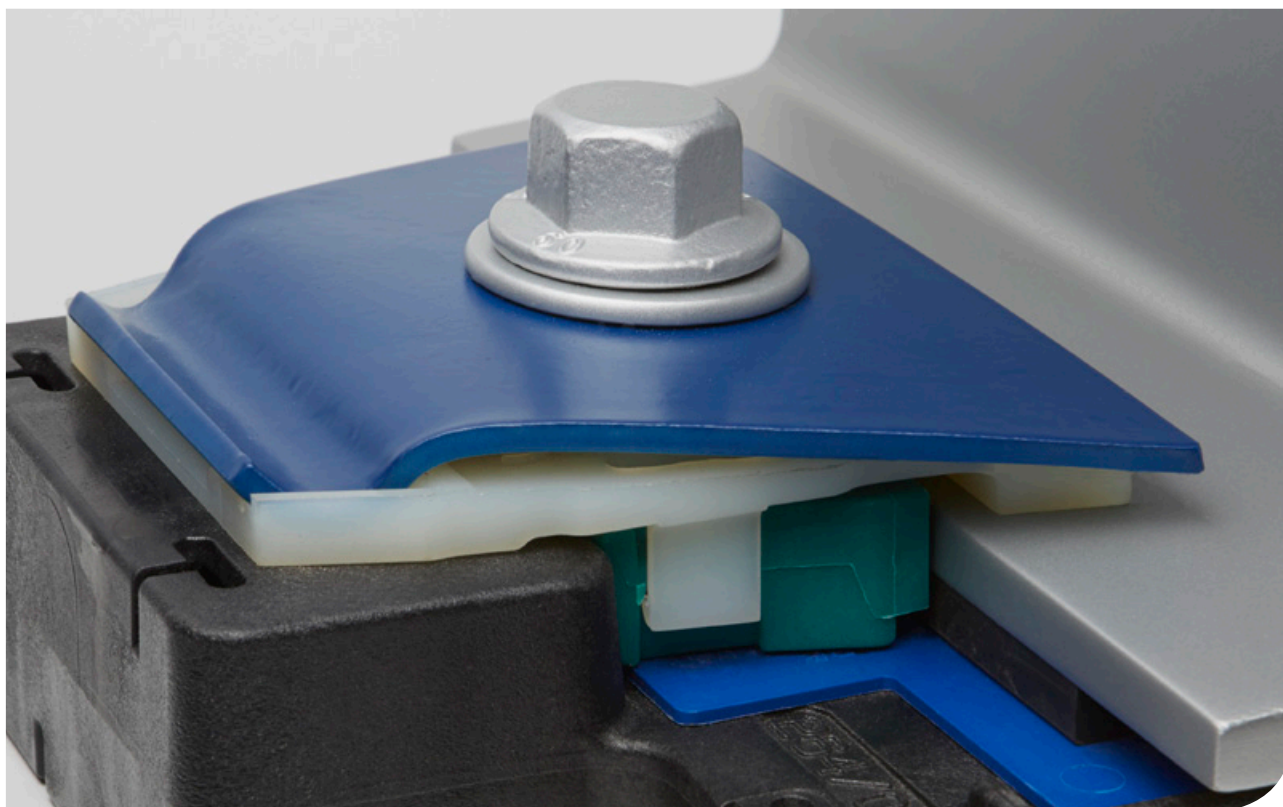


PANDROL

NABLA TRAM FASTENING SYSTEM



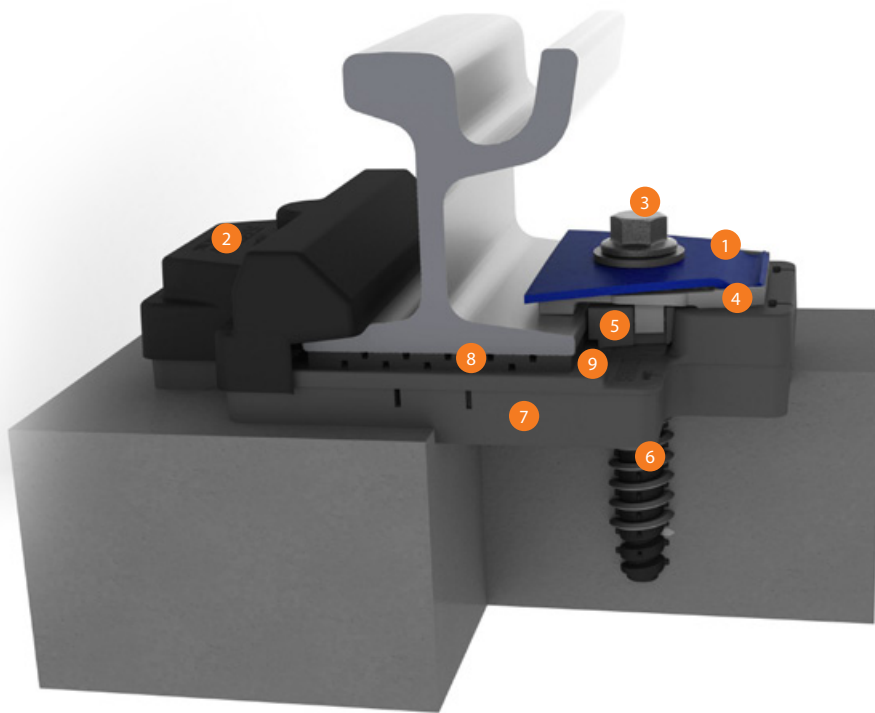
PRODUCT INFORMATION



RAIL FASTENING SYSTEM:

NABLA TRAM

PANDROL NABLA TRAM, is a rail fastening system that is compliant with EN Standard 13481-5 and designed for state-of-the-art tramway tracks. Combining ease of application and high performance, NABLA TRAM is compatible with various track-laying methods including top-down and bottom-up.



Over 250,000 Nabla Tram systems have been installed across Europe including installations in Paris, France and Nottingham, UK.

Find more
information about
PANDROL fastening
systems at
Pandrol.com

[LEARN MORE >](#)



The NABLA TRAM baseplate is designed for effective insertion into a dry mix of fresh concrete, enabled by the PANDROL air evacuation system of blow holes and channels.

Fastening system components are protected by a plastic cover designed to:

- Avoid concrete contamination
- Improve electrical resistance to 22 kΩ
- Allow for passage of road traffic thanks to
- Provide high mechanical and thermal resistance that allows passage of road traffic

Components:

1. **NABLA blades compliant with the NF F 50-015 standard**
2. **Protective covers**
3. **GS coach screw**
4. **Insulators**
5. **NABLA Evolution lateral insulators:**
6. **GS anchoring systems (pre-assembled on the baseplate)**
7. **Composite NABLA TRAM baseplate**
8. **Rubber or polyurethane rail pad.
Material dependent on stiffness and dynamic stiffness requirements**
9. **Shims for vertical adjustment**



INSTALLATIONS



PARIS



LYON



LE HAVRE



NOTTINGHAM

FEATURES OF ASSEMBLY

LIGHTWEIGHT

Compact baseplates made from lightweight composite material support cost-effective construction for tram LRT Infrastructure.

ELECTRICAL INSULATION

NABLA TRAM baseplates are encased in plastic to provide a high level of electrical insulation. Covers are compatible with most roadway linings including pavement, concrete, turf and others.

INSTALLATION OPTIONS

NABLA TRAM baseplates can take advantage of innovative slab track construction techniques, including installation into fresh dry concrete. NABLA TRAM can also be installed using the top-down wet pour method. The NABLA air evacuation system prevents trapped air under the baseplate.

HIGH PERFORMANCE DOWEL

The NABLA GS dowel is suitable for insertion into fresh concrete and transfers loads to the concrete efficiently.

TIGHTENS TO REFUSAL

The NABLA coach screw provides a large acceptable torque range of between 250 and 400 Nm. Toe load is achieved automatically once the screw is tightened to refusal.

STIFFNESS OPTIONS

NABLA TRAM provides static stiffness of between 35 kN/mm to 150 kN/mm, depending on choice of rail pad. Measurements are as per CEN 13481-5: 2012 and CEN 13146-9 Cat A.

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NABLA TRAM FASTENING SYSTEM

- For use on non-ballasted tracks (slab tracks)
- Suitable for top-down construction and bottom-up automatic construction

Application data (Standard products – special variants may differ)

Rail inclination	Provided in the concrete as required
Pad type	Rubber or polyurethane material, depending on stiffness requirements
Typical applications	Tram/LRT, for plain lines, depot/washing plan sections
Typical rail sections	50E6, 54E1, 41GP13, 41GPU, 54G2 (options available for 60E1 and R155N)
Clip type	NABLA C1 according to NFF 50-015
Anchor type	High performing GS plastic dowel suitable for insertion into fresh concrete type B30
EN13481-5 track category	Cat A
Maximum axle load*	130 kN
Minimum curve radius*	40 m

Typical performance data*

	Cat A	Test Method	Test Method
Assembly static stiffness	35 mN/mm - 150 mN/mm	EN13146-9 Cat A	Dependent on choice of pad
Electrical insulation	>22 kΩ	EN13146-5	
Lateral adjustment	+/-7.5 mm per rail with an increment of 1.25 mm		
Vertical adjustment	-2/+3 mm (optional +/- 4 mm)		

* For special applications consult PANDROL.

COMPLIANCE WITH STANDARDS:

The NABLA TRAM fastening system complies with the EN 13481-5 standard.

NOTE:

PANDROL is a provider of innovative custom rail fastenings. Data in this document indicates typical performance. Actual performance is dependent on a range of external factors. Please contact us to discuss how PANDROL can tailor products to suit local operating conditions and specific requirements. Technical information in this document was correct at time of printing. Improvements may since have been introduced as a result of our continuous research and development programmes.

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