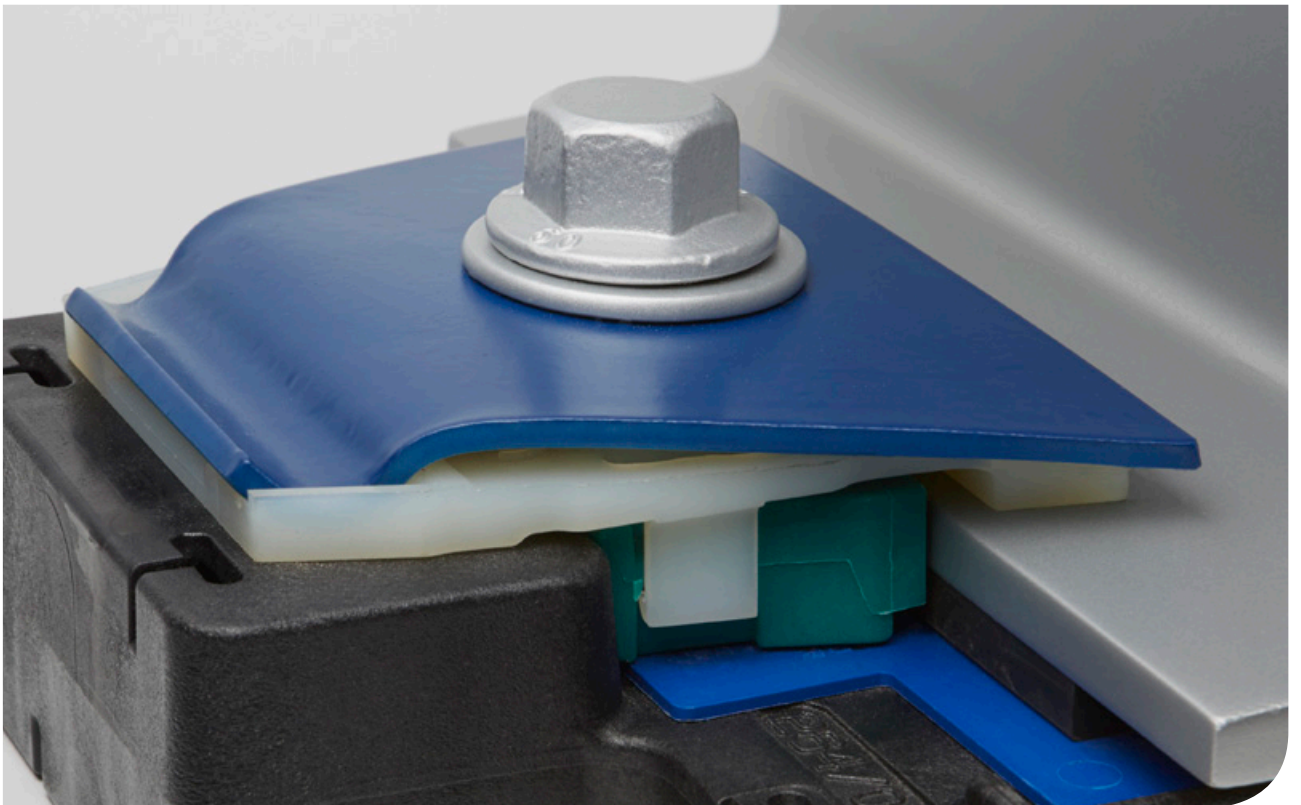


PANDROL

NABLA TRAM FASTENING SYSTEM



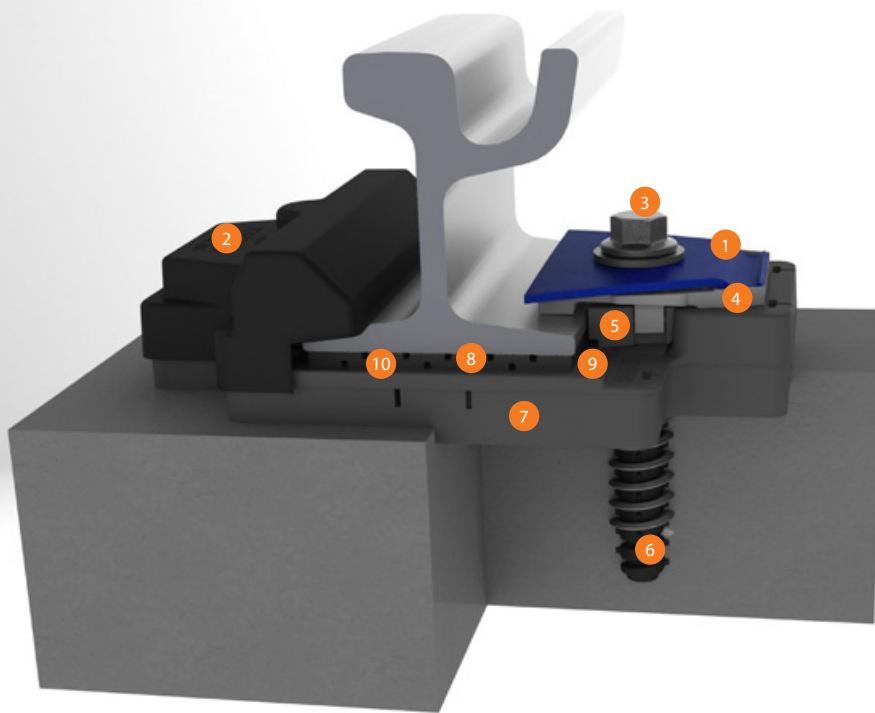
PRODUCT INFORMATION



PANDROL PRESENTS:

NABLA TRAM FASTENING SYSTEM

The NABLA TRAM FASTENING SYSTEM, compliant with EN standard 13481-5, is designed for use on state-of-the-art tramway tracks. Combining ease-of-application with high performance levels, it is compatible with several track-laying methods, whether Top Down/Bottom Up depending on the specific needs of each project.



This fastening system features a composite-material baseplate, NABLA blades are compliant with NF standard F 50-015, NABLA-Evolution stops, a rubber pad, a protective cover and a GS anchoring system.

Visit [Pandrol.com](https://www.pandrol.com) for more information about PANDROL FASTENING SYSTEMS
[LEARN MORE >](#)



The NABLA TRAM baseplate is designed to allow effective insertion into a dry mix of fresh concrete thanks to an air evacuation system consisting of blow holes and channels.

The plastic cover protects the fastening system components and has been designed to:

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

Components:

1. **NABLA blades: compliant with standard NF F 50-015**
2. **Protective covers**
3. **GS coach screw**
4. **Insulators**
5. **Lateral Insulators: NABLA evolution**
6. **GS anchoring systems: pre-assembled on the baseplate**
7. **Composite NABLA TRAM baseplate**
8. **Rail pad: Rubber/Polyurethane material depending on required stiffness/different choice of dynamic stiffness**
9. **Shims for vertical adjustment**



INSTALLATIONS



PARIS



LE HAVRE



LYON

FEATURES OF ASSEMBLY

LIGHTWEIGHT

The lightweight and compact nature of composite material baseplates supports a cost effective construction for Tram LRT Infrastructure.

ELECTRICAL INSULATION

Encapsulation of the baseplates by plastic covers provides a high level of electrical insulation. Covers are compatible with most roadway linings, pavement, concrete turf, etc.

CONSTRUCTION

Baseplates can be installed by innovative slab track construction techniques into fresh dry concrete. NABLA TRAM is also suitable for Top Down wet pour method. Special air evacuation system avoids air getting trapped under the baseplate.

HIGH PERFORMANCE DOWEL

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

TIGHTENING TO REFUSAL

Large range of acceptable torque between 250 and 400 Nm allows coachscrew to be tightened to refusal. Toe load is achieved automatically once screw is tightened to refusal.

OPTIONAL STIFFNESS

Optional static stiffness between 35 MN/mm to 150 MN/mm, based on choice of rail pad. Measurements as per CEN 13481-5: 2012 and CEN 13146-9 Cat A.

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NABLA TRAM FASTENING SYSTEM

- Suitable for use on non-ballasted tracks (slab tracks)
- Suitable for Top Down construction
- Suitable for 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 an innovator and designer of bespoke rail fastenings. The data shown above is indicative of typical performance, but is naturally dependant on external factors. Should you have different requirements, please contact us to discuss tailoring products to suit local operating conditions. The technical information given in this brochure was correct at the time of printing, however the company undertakes a continuing programme of research and development and improvements may since have been introduced.

ISSUE 1 2014

PANDROL TRACK SYSTEMS

205, rue de Sin le Noble
59500 Douai,
France

Telephone: **+33 (0) 3 27 99 64 00**
e-Mail: **info@pandrol.com**
Website: **www.pandrol.com**

