

# GEOSYNTHETICS



**PRODUCT OUTLINE:** TenCate Bidim® AR 20, Track durability solution



Protective Fabrics  
Space Composites  
Aerospace Composites  
Advanced Armour

Geosynthetics  
Grass



# TenCate Bidim® AR 20, the tested and proved performance

## 20 years Abrasion Resistance

AR 20 is a continuous filament needle punched nonwoven incorporating an Abrasion Resistant additive and UV stabilizer. It represents a new generation of geosynthetics combining all the advantages of conventional geotextiles with much higher strength and abrasion resistance. Developed together with major European railway authorities, AR 20 was specially designed to meet the extreme requirements.

## Extended tracks structure working life

By virtue of the high abrasion resistance provided by special additives, AR 20 withstands abrasion forces over many million load cycles - long enough to provide a whole package of benefits pursuing one goal: to ensure the safety and extend the working life of the track.

- AR 20 minimizes the pollution of the ballast by fine clayey soil particles. Acting as a separator between the ballast and the filter blanket, AR 20 prevents ingress of slurry into the ballast. The ballast layer remains clean, and its interparticle friction properties are preserved. Ballast-cleaning activities can be reduced to a minimum.
- AR 20 reduces sleeper movement. As ballast particles are held firm in the geosynthetic layer, relative settlement of the ballast, particle displacement, and consequent track deflection are minimised. The need for ballast tamping is significantly reduced.
- AR 20 helps preventing destabilisation of the construction caused by water entering the system. Thanks to its long term optimum drainage characteristics, the product:
  - allows both free water circulation and the dissipation of pore-water pressure;
  - facilitates the evacuation of water coming from the subgrade.

## The challenge of rail-track stability

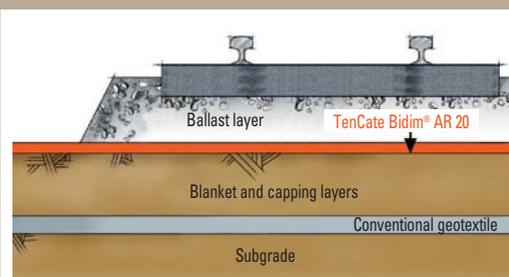
After years of traffic loading, railway structures built on cohesive subgrades frequently suffer from degradation affecting the stability and safety of the tracks:

- Water percolates through the ballast to the subgrade. Under the severe dynamic stresses generated by traffic loading, a slurry is formed at the subgrade/ballast interface, and gradually migrates upwards into the ballast. The resulting pollution of the ballast layer reduces inter-particle friction, leading to a decrease in bearing capacity and elasticity.
- Full rehabilitation blanket and capping layers is extremely time consuming especially in difficult access areas. It requires a lot of energy and creates many nuisances.
- Furthermore, works have to be done during traffic activities. It reduces the time dedicated to layers replacement. Quite often, the existing traffic can't be bypassed.
- AR 20 allows to keep optimum bearing capacities with a simple cleaning of the ballast. Total layers refurbishment can be avoided in many cases. A soft rehabilitation is sufficient for more than 20 years.

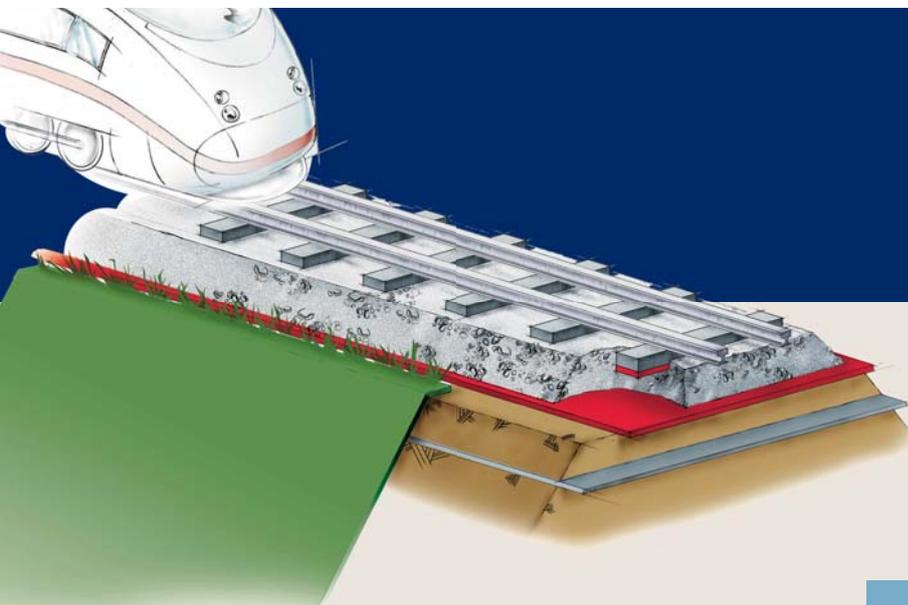
### Challenge of track stability



### TenCate Bidim® AR 20



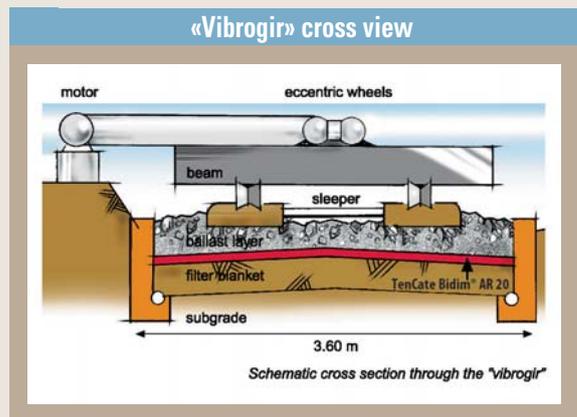
*With its separation filtration and drainage properties, AR 20 safeguards the function and the stability of the track construction, thus leading to considerable economies of time and cost.*



## AR 20 Tested Performance

To substantiate the long-term performance of AR 20, the «vibrogir» test (performed together with SNCF - French Railways) was used to simulate traffic and abrasion forces.

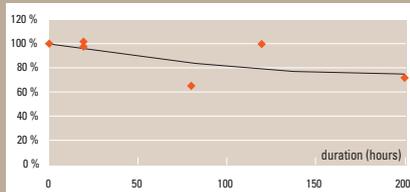
In this test, the product is installed between the ballast and the blanket layers; load is applied by a beam (20 tonnes) placed on the rail, eccentric wheels (frequency 50 Hz) create the dynamic effect. Under these conditions, 10 hours of «vibrogir» correspond to one year of real traffic with 100.000 load tons per day.



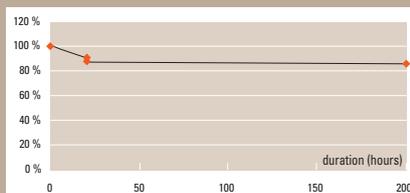
Several specimens were tested with «vibrogir» for different durations, the maximum being 200 hours. Pyramid-puncture tests (NF G 38 019) confirmed that no loss in puncture resistance occurred after the vibrogir test; furthermore, no major decrease in either permeability or flow rate was observed.

To estimate the total working life time of AR 20, an abrasion test in accordance with ASTM D - 3884 was carried out on specimens after «vibrogir» testing. This test impressively confirmed the strength of AR 20 under 100.000 tons of load per day, a maximum total life of up to 20 years can be expected.

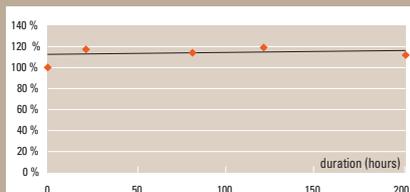
### Vertical permeability/Initial value



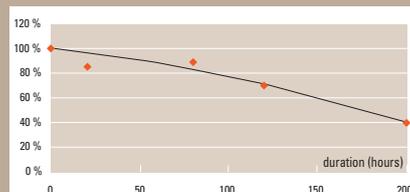
### Flow rate at 20 kPa/Initial value



### Puncture resistance/Initial value



### Resistance to abrasion / Initial value



Tests confirm even after 200 hours of «vibrogir», AR 20 retains its optimum drainage, filtration and separation characteristics. Vertical permeability flow rate and puncture resistance are only slightly reduced over time, ensuring the product's long term performance.

# GEOSYNTHETICS

## AR 20 Proved Performance Case Study: Sedan Station - France

### Reference Site

Application: Rail Track Ballast layer  
Location: Sedan (08), France  
Geosynthetic: TenCate Bidim® AR 20  
Date: August 2009  
Client: RFF  
Project Management: SNCF  
Construction Company: ETF

### Challenge

As part of a track upgrade at Sedan station, rails, tracks and ballast were replaced. Because of the marshy conditions present at the site location, the bearing capacity of the foundation soil was very low.

### Solution

Initially, SNCF has envisaged using a very thick sub-ballast layer. As an alternative to this excessively costly solution, SNCF decided to use a geotextile, to use TenCate Bidim® AR 20 solution, positioned directly between subgrade soil and the ballast.

TenCate Geosynthetics Austria GmbH  
Schachermayerstr. 18 - A-4021 Linz - Austria  
Tel. +43 (0)732 6983 0  
Fax +43 (0)732 6983 5353  
service.at@tencate.com

BeNeLux

Central Eastern Europe

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Tel. +31 546 544 811

Tel. +43 732 6983 0

Tel. +420 2 2425 1843

Tel. +33 1 34 23 53 63

Tel. +49 6074 37 51 61

Tel. +39 0362 34 58 11

Tel. +971 (0)4 8103296

Tel. +48 12 268 83 75

Tel. +43 732 6983

Tel. +43 732 6983 0

Tel. +46 767 80 16 90

Tel. +34 607 499 962

Tel. +33 1 34 23 53 63

Tel. +43 732 6983 0

Tel. +44 1962 588 066

service.nl@tencate.com

service.at@tencate.com

service.cz@tencate.com

service.fr@tencate.com

service.de@tencate.com

service.it@tencate.com

service.nme@tencate.com

service.pl@tencate.com

service.ru@tencate.com

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geonordics@tencate.com

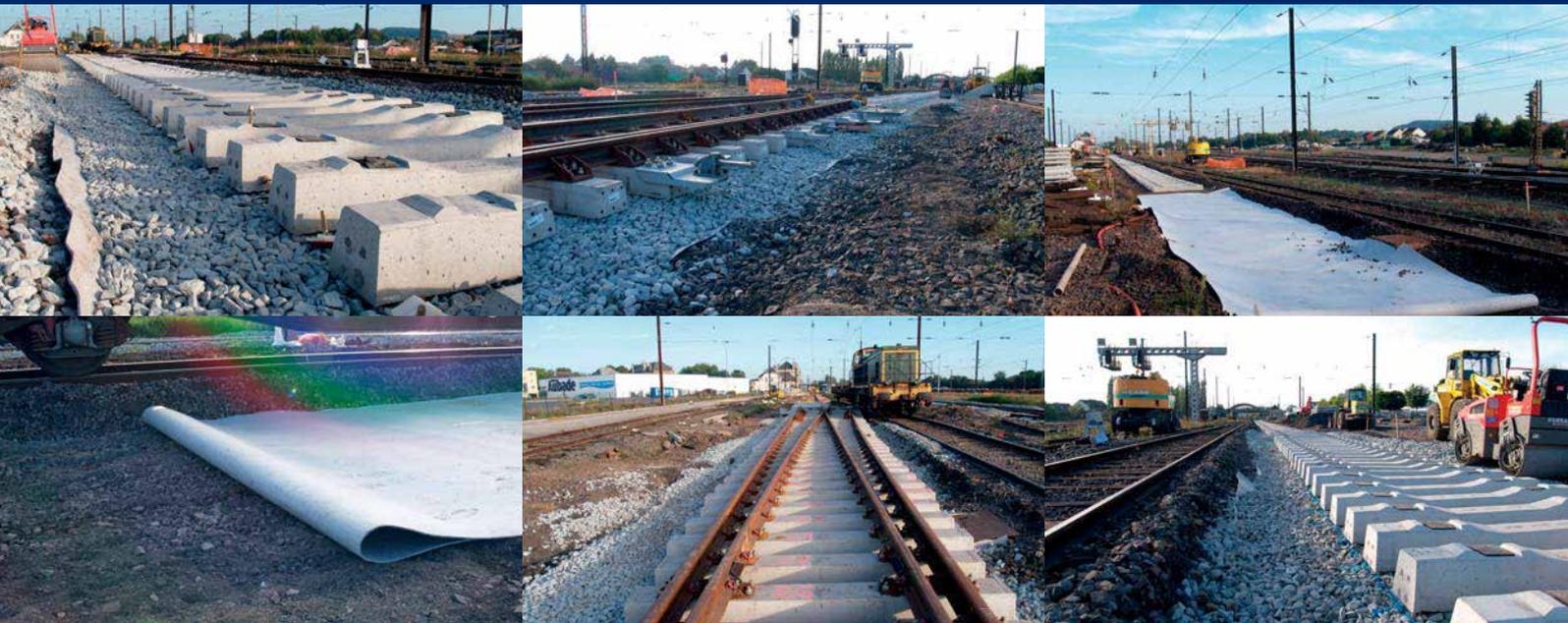
service.es@tencate.com

service.ch@tencate.com

service.uk@tencate.com

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