



Ballast stabilisation for tracks and points



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Very low in emissions, efficient and sustainable:
the ballast-bonding system AgriTec® EWR-Winter.

Located in Hünxe, Germany, Gremmler Bauchemie GmbH has been producing the epoxy resin system AgriTec® EWR-Winter for many years to bond ballast and gravel used in road and track construction. Having signed an exclusive co-operation agreement with Gremmler Bauchemie GmbH, Goldschmidt Thermit Railservice GmbH is the sole operator of this system. Its high functionality, in connection with an excellent environmental compatibility, has been confirmed in extensive test series carried out by several acknowledged institutions. For nearly 20 years our epoxy resin system AgriTec® EWR-Winter has been used successfully in national and international road and track construction.

The epoxy resin based system

Gremmler Bauchemie produces and distributes its own authorised brand AgriTec® EWR-Winter. AgriTec® EWR-Winter is a high-quality product approved by the German Federal Railway Authority. Using the hot-moulding method, the product is mixed on-site in a special two-component system and is then applied onto the surfaces to be bonded.

Outstanding processing properties

In contrast to other available ballast-bonding resins based on a two-component polyurethane resin, our AgriTec® EWR-Winter ballast-bonding resin is particularly suited for an outdoor application. That means, AgriTec® EWR-Winter ballast-bonding resin is characterised by both its good stability under moist conditions, e.g. when bonding moist stones, as well as in wet weather (slight rain). It can be applied at temperatures of above 2°C. The hot-casting method provides our ballast-bonding resin with very good flow properties which - depending on the ballast size - ensure a uniform bonding even up to depths of 60 cm. Processing times of more than 30 minutes are very user-friendly; curing takes between 3-6 hours.

Goldschmidt Thermit
Railservice



Ballast stabilisation

Higher cruising speeds and axle loads have increased the demands on railway tracks. Stabilising the ballast with our special sustainable EP resin AgriTec® EWR-Winter improves the railway track stability and thus the travel comfort at the same time. This bonding method is today's standard when it comes to bonding sets of points, fishplates, isolated joints and transitions. If sleepers have to be replaced, the bond can be restored selectively.

Long-lasting and cost efficient

Endurance tests performed by the Central Office of the German national railways company Deutsche Bahn AG and the University of Technology Munich confirmed the extreme carrying capacity of the tracks which had been stabilised by the bonding system. There is no movement of ballast that would lead to loose ballast below the sleepers or to the exposure of the head. In addition, the extreme long-term stability leads to a considerable prolongation of the refill intervals. For these reasons, bonding considerably contributes to a reduction of the maintenance costs. Of course it is possible to refill, re-use and re-bond the ballast.

Very good drainage characteristics

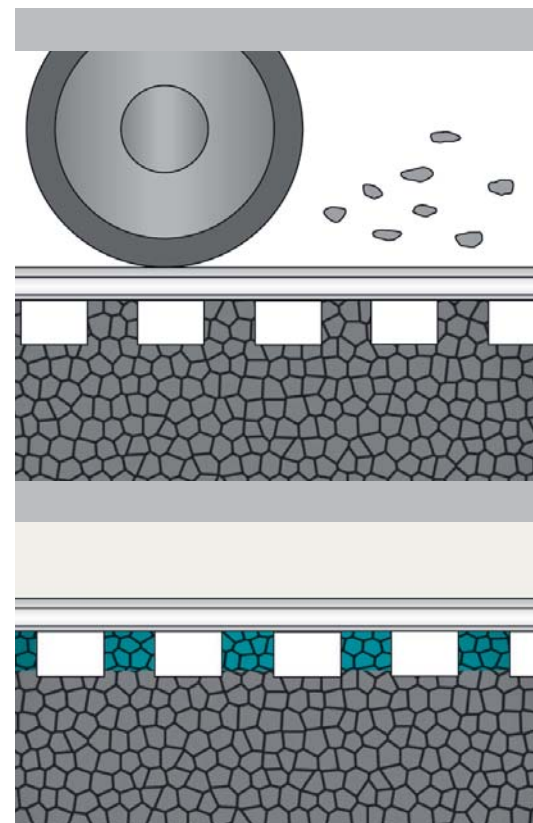
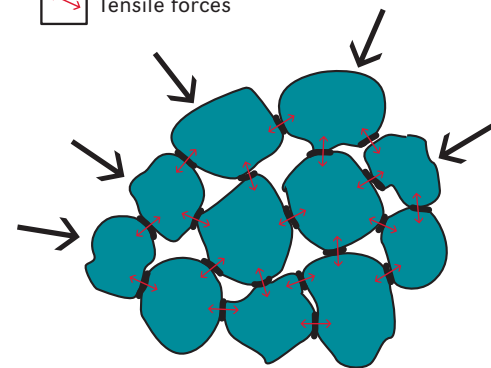
Due to the selective bonding the drainage capacity of the ballast track will be fully maintained. Even during heavy rainfall there is no risk of erosion thanks to the drainage capacity.

Protection against flying ballast

Both the vortex caused by high-speed trains, and icicles dropping down when rail vehicles enter a tunnel cause flying ballast. This could damage the rails, the trains themselves and the installations of the adjacent tracks. Bonding the ballast with AgriTec® EWR-Winter protects the ballast against any turbulence.

Long-life surface bonding

Thanks to the extremely durable bonding of AgriTec® EWR-Winter, flying ballast is prevented, even in the long term. The cost-efficient application method and long-term stable solidification means that the installation costs are recovered in a very short time.





Stabilisation of transition areas between ballast track and solid track

Transition areas between ballast tracks and solid tracks are characterised by varying degrees of composition and compaction of the track superstructure and base layer, as well as by varying elasticity values and settling processes. Maintaining safety and travel comfort generally requires a high degree of maintenance which is clearly reduced when the ballast is bonded.

No moving ballast

Bonding the individual crushed ballast stones with our AgriTec® EWR-Winter system fixes the stones exactly in position and prevents them from moving. The attritional wear of the stones caused by dynamic loads is considerably reduced or even negated for a considerable time.



Pattern bonding, complete and partial bonding

Conventional sandwich construction proved to fail in practice and has been replaced by pattern bonding. This means that 1/3 is bonded completely, and 2/3 are bonded in parts. The bonding of the adjacent area runs out in steps. The total length of the transition zone depends on the intensity of usage and the travelling speed and thus varies for each transition zone.

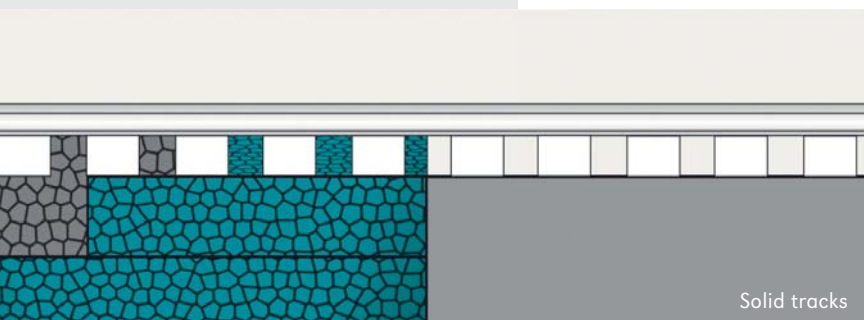
- **Ballast base plate**
- **Bonding** in the refill area
- **Sleeper spacings and shoulders**
- **Transition zone** between ballast track and solid track

Increase of the resistance to lateral shift

Insufficient ballast in front of the sleeper head can lead to track shifts particularly in tight bends, in front of signals, points and platforms. Bonding the ballast with AgriTec® EWR-Winter prevents ballast from moving and increases the resistance to lateral shift because of the stabilisation at deeper levels.

Permanent fixation of the ballast at the sleeper head with AgriTec® EWR-Winter

Due to the permanent bonding with AgriTec® EWR-Winter there is no risk of the sleeper head becoming exposed. The stabilisation even at deeper levels increases the resistance to lateral shift and, simultaneously, the safety of the track. However, if it is impossible for constructional reasons to place 0.4–0.5 m ballast along the sleeper heads, bonding with AgriTec® EWR-Winter will nonetheless lead to an increased resistance to lateral shift.





Stabilisation of the ballast shoulder during track bed improvement on the adjacent track.

When an adjacent track bed of a multi-rail track is improved, the floor level is approximately 1–1.5 m below the top edge of the rail. Passing trains and compacting machines may trigger the ballast to move particularly at the sleeper heads which affects the lateral stability of the track in operation. This can be prevented by bonding the surface with AgriTec® EWR-Winter.

AgriTec® EWR-Winter, an extremely cost-efficient alternative

The high-stability surface bonding is achieved by applying AgriTec® EWR-Winter. In many cases, this procedure replaces the conventional sheeting and is an extremely cost-effective alternative, although it does not replace static sheeting. Furthermore, the bonded ballast may be refilled or re-used or, if needed, it may be rebonded.

Excellent cleanability of the ballast surface

Particularly at train stations, the ballast is often heavily soiled. Cleaning it is difficult because ballast stones are taken up by the cleaning machine and damage can occur to the filters and screens. On the other hand, the use of high-pressure cleaners leads to moving ballast. Only a surface bonding with AgriTec® EWR-Winter allows for an optimum cleaning procedure.

Unlimited drainage capacity despite bonding

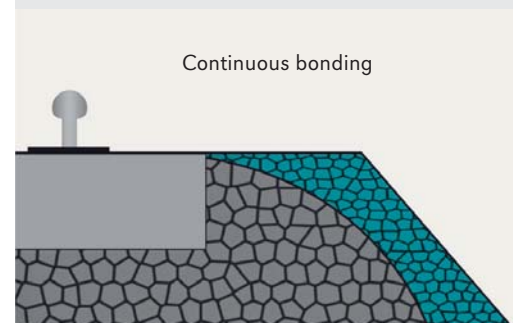
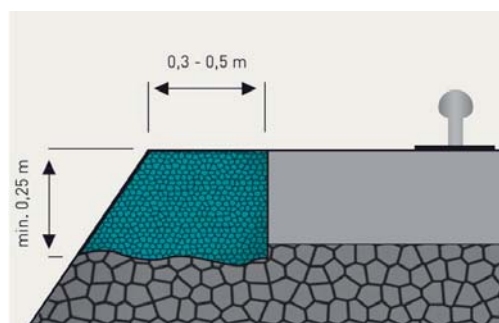
Bonded ballast surfaces may be cleaned particularly effectively and economically by the above mentioned methods. Due to the selective bonding of the stones the drainage capacity of the ballast track will be fully maintained, so that even during heavy rainfall or cleaning work with high-pressure cleaners, there is no risk of displacement or erosion of the ballast.

Bonded stone chippings: the decorative option

Train stations where the hollow spaces on the surface of the ballast are filled and bonded with stone chippings (grain size e.g. 8–12 mm) are particularly attractive. Of course this also ensures optimum long-term drainage capacity and cleanability.

Additional safety aspects

One beneficial side-effect results from the excellent accessibility of bonded ballast surfaces. For this reason emergency paths are often built with stone chippings which are bonded with AgriTec® EWR-Winter.



Performance records from laboratories and practice

for the ballast-bonding technique AgriTec® EWR-Winter.



The applied ballast bonding method with AgriTec® EWR-Winter was refined during many installations. It is now, a fully developed stabilising method which has proven its value in comprehensive testing and long-term practical application. The corresponding test records prove the advantages of this method.

Long-term reliability under toughest demands in rail traffic

The results of numerous laboratory tests and field trials on a broad range of practical aspects confirm the high functionality and permanent reliability of the ballast bonding with AgriTec® EWR-Winter.

Some examples

- the resistance to lateral shift is increased by 8–10 times compared to a normal ballast track with the same amount of ballast at the sleeper head.
- a simulation of 125 million loading tons which the bonding survived without any damage has proven the long-term durability. This simulation corresponds to an average train frequency of 7 years per track.
- on the basis of the experience of laboratory and field trials in Austria around 60 transitions were built between concrete tracks and bonded ballast tracks, which are still intact undamaged, even after a service life of 10 years.
- the efficient protection against flying ballast was confirmed in investigations carried out by the DB (Germany), SNCF (France) and JR (Japan).
- the testing office for the construction of over-land traffic routes of the University of Technology Munich analysed the loading capacity of the bonded ballast under authentic practical conditions. The bonding withstood even the highest loads, e.g. of the displacement trials carried out with a hydraulic 90 kN press. After having finished the trials only minimum settling was found. The elastic deflection (displacement between top and bottom load) amounted to around 0.1 mm, which corresponds to the elasticity value of a track after around 1–1.5 operating years.
- In 2007, in co-operation with the Department of Civil Engineering of the City of Freiburg, an approx. 100 m² sized path was built with AgriTec® EWR-Winter in the Freiburg Japanese Garden which still resists all loads. Furthermore, on the premises of the kitchen manufacturer Rational Küchen a drainage surface was built with AgriTec® EWR-Winter, 11/16 ballast and a granite drain cover (23,000 m²) in the first half of 2008.



Special machine technology for the processing and application of AgriTec® EWR-Winter

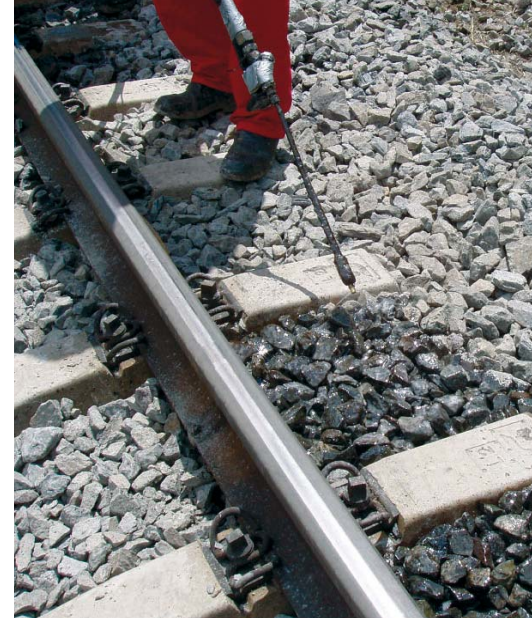
The ballast bonding is carried out with mobile 2-component mixing units (so-called hot-moulding machines). Due to its flexible fields of application in combination with a high work capacity, this machine technology allows for a particularly flexible process.

Temperature controlled on-site bonding

The 2-component hot-moulding machine is a closed system which mixes the epoxy resin and the curing agent (amine) homogeneously in a mixer to obtain the end product. Inside the machine, resin and curing agent are heated to a constant temperature which facilitates the mixing of resin and curing agent. For this reason, processing and application are very cost-efficient even at low air and ground temperatures. The ready-mixed product is applied via various nozzles suited for the respective application.

Machines

For operations in mainland Europe there are currently three different 2-component hot-moulding machines in use, two self-propelled machines with an output of approx. 25 kg/min, and one smaller, self-propelled machine with an output of around 15 kg/min, whilst in the UK there are two machines that have been programmed to accommodate the particular requirements of UK practise.



Goldschmidt Thermit Railservice GmbH is a member of Goldschmidt-Thermit Group.
Goldschmidt-Thermit Group has been specialising in applied rail welding and grinding technologies for many decades.

La société Goldschmidt Thermit Railservice GmbH est membre du groupe Goldschmidt-Thermit. Depuis de nombreuses décennies, le groupe Goldschmidt Thermit est le spécialiste de la technologie de soudage des rails et de rectification.

La compañía Goldschmidt Thermit Railservice GmbH forma parte del grupo empresarial Goldschmidt-Thermit. El grupo empresarial Goldschmidt-Thermit lleva muchas décadas siendo especialista en técnica aplicada en soldadura y amolado de carriles.

Die Goldschmidt Thermit Railservice GmbH ist Mitglied der Goldschmidt-Thermit-Gruppe. Die Goldschmidt-Thermit-Gruppe ist seit vielen Jahrzehnten Spezialist für angewandte Schienenschweiß- und Schienenschleiftechnik.

Goldschmidt Thermit Railservice GmbH

Branch office Germany

Rotthausen Straße 142

D-45309 Essen

GERMANY

Phone: +49 201 747 96-0

Fax: +49 201 747 96-62

info@goldschmidt-thermit.com

www.gt-railservice.com

Goldschmidt Thermit Railservice GmbH

Augustusplatz 9

D-04109 Leipzig

GERMANY

Phone: +49 341 355 918-0

Fax: +49 341 355 918-99