FLEXIBLE RAIL FIXING EFFECTIVE NOISE AND VIBRATION REDUCTION IN URBAN ENVIRONMENTS

BUILDING TRUST

SIKA FLEXIBLE RAIL FIXING PRODUCT OVERVIEW

Sika® Icosit® KC 340 PRODUCTS are flexible two-component polyurethane, polymer resin grouts. They are insensitive to moisture and designed as vibration absorbing, load-bearing, flexible grouts for discrete fixation, continuous undersealing or embedding rails.

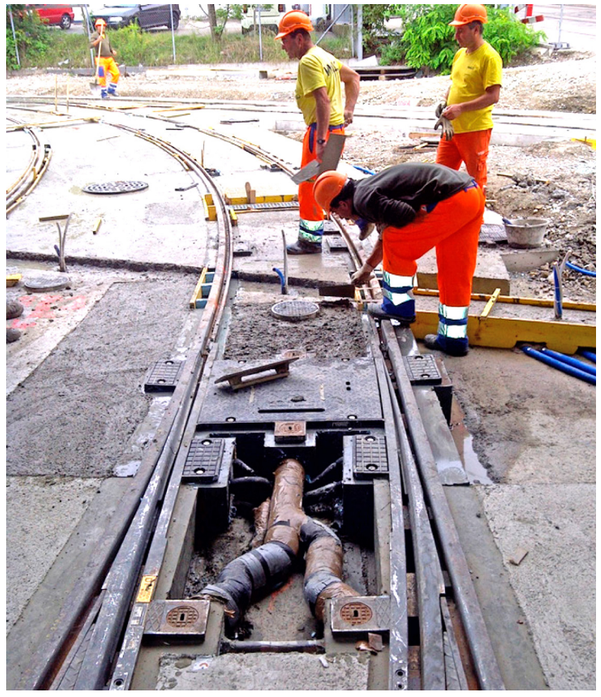
The Sika® Icosit® KC range has won worldwide renown for tailor made, long lasting direct fixation of rails to solid substrates, i.e. concrete and steel. They are incorporated in a variety of trackwork designs, in discrete, continuous undersealing, embedded rail system fixations, lawn track (GT), for railway, light rail, tram and crane track installations.

Sika provides technical support in each stage of project to consultants, operators and contractors for optimum and innovative trackwork solutions under a wide variety of conditions of exposure, for maximum axle loads up to 25 tonnes.

Product	Usage	Characteristics
Sika® Icosit® KC 250/80	Structural two-component PU adhesive	Rapid curing adhesive used for repair of spike and screw holes in railway sleepers, and repair of concrete and asphalt
Sika® Icosit® KC 340/35	Flexible PU grout for the continuous fixing of embedded grooved rails. Particularly suitable for embedded (floating) tram or light rail transit (LRT) track designs, and road crossings	Light axle loads and high deflection. Shore A Harness ~40
Sika® Icosit® KC 340/45	Elastic PU grout for continuous undersealing and embedded rail system with maximum product service load up to 2 MPa	For axle loads less than 120 kN and standard deflection. Shore A Hardness ~55
Sika® Icosit® KC 340/65	Elastic PU grout for continuous undersealing and embedded rail system with maximum product service load up to 4 MPa	For axle loads less than 250 kN and standard deflection. Shore A Hardness ~70
Sika® Icosit® KC 340/4	Elastic PU grout for discrete fixation with maximum product service load up to 3 MPa	For axle loads less than 120 kN and high deflection. Shore A Hardness ~65
Sika® Icosit® KC 340/7	Elastic PU grout for discrete fixation with maximum product service load up to 4 MPa. Can be used with different types of base plates	For axle loads less than 250 kN and standard deflection. Shore A Hardness ~75
Sika® Icosit® KC 330/10	Hard elastic PU grout for discrete fixation with maximum product service load up to 15 MPa. Can be used with different types of base plates	For the construction of tracks with very high axle loads (exceeding 250 kN) of gantry and container cranes. Shore D Hardness ~75
Sika AnchorFix®-3030	High performance anchoring adhesive for fixing threaded roads and reinforcing bars in both cracked and uncracked dry and damp concrete	For pressure and wear resistant lining of anchor bolts for base plates
Sikaflex®-406 KC	Elastic joint sealing between rails and adjacent .surfaces, i.e. asphalt	Elastic sealant used for joints between rails, adjacent surfaces and with Sika® Icosit® KC products.
Sikaflex®-406 KC Booster	Rapid and homogeneous curing throughout the entire sealant is achieved by the addition of this to Sikaflex®-406 KC	Booster for Sikaflex®-406 KC
Sikadur®-32+	May be used as a primer on concrete (dry and matt damp) and steel. As a coating, it provides electrical surface resistance. As an adhesive, it can also be used for setting vertical anchor bolts	Good adhesion on wet / green concrete and steel; electrical insulating
Sika® Icosit® KC 330	PU primer for Sika® Icosit® KC 330 / 340 Product Range. Adhesion promoter for dry concrete, steel and asphalt substrates	1-pack, ready to use, solvented, reaction-curing primer. Highly abrasion resistant, offers good penetration and substrate stabilisation, and provides long-term resistance against water, seawater and most detergents.
Sika® Icosit® KC 330 FK NEW	Adhesive material for fixing filling blocks with high initial adhesion	2- component PU adhesive

BENEFITS OF ELASTIC POLYURETHANE GROUTS FOR TRACKWORK

ONE OF THE CENTRAL REQUIREMENTS OF TRACK CONSTRUCTION is reducing vibration and noise. Our innovative systems accomplish these reductions through flexibility and specific spring parameters. Electrical isolation prevents stray current corrosion, ensuring longevity of the trackway.



Urban planners are obliged to expand local public transport to cope with the rapid development of urban spaces. This trend requires a reduction in vibrations and noise in the rail fastening system, therefore the flexible and volume-compressible grouting materials become the effective, long lasting solution.

EFFECTIVE NOISE AND VIBRATION REDUCTION, INCREASE OF COMFORT AND SMOOTH EXPERIENCE ('SILENT TRACKS')

- Resilient intermediate layer for optimum reduction of noise and vibration transmission, (i.e. vibration dampening) cast-in-situ after alignment to eliminate voids under the rail and to ensure continuous and homogenous fixation.
- Increase comfort and smooth train operation ('silent tracks').
- Appropriate selected Shore A hardness for a given type of rolling stock ensures primary noise reduction by reducing vibrations and secondary noise; increasing the comfort and smooth running of the train ensures compliance with the noise standards requirements.
- Appropriate selected Shore A hardness for a given type of rolling stock ensures right level rail deflection, increasing the comfort and smooth running of the train ensuring compliance with the noise standards requirements.

LONG DURABILITY (SERVICE LIFE) AND EXTREMELY LOW (CLOSE TO ZERO) MAINTENANCE COSTS

- Load bearing – resistant to dynamic loads and permanent alignment of rails ensuring track stability.
- Levelling out inevitable tolerances between rail and concrete or steel substrate.
- Long-term resistant against water and most detergents allows the long life service of applied solution in wash train stations.
- Short-term (at least 3 days) resistant against: mineral oils, diesel fuel, vegetable and animal fat allows the long life service of applied solution in the case of a track integrated with the road surface.

SAFETY AND LOW RISK

- Added safety and maximum performance due to the excellent parameters of Sika® Icosit® KC products and long historical use.
- Highly efficient electrical resistivity for prevention of stray current leakage as a safeguarding against signalling malfunction.

VERSATILITY

- Suitable for any kind of rails (e.g. 60R1, 60R2, 49E1, etc.).
- Has selected versions of materials for concrete and steel substrates, depending on the application (tram, train, underground and overhead, etc.).

EASY APPLICATION

- Manually apply.
- Machine apply – highly ecological and economical solution due to reduced wastage and less application time needed.

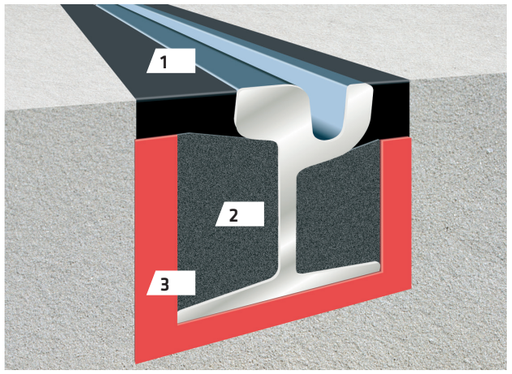
PROVEN IN-FIELD SERVICE
CONTINUOUS BEDDING OF RAILS

STRONG ENGINES AND REGENERATIVE BRAKING SYSTEMS, modern rail vehicles are becoming more comfortable and faster. However, they also have a high return current which increases the risk of stray current corrosion and signal interference.

RAIL FIXING GROUTS

Sika® Icosit® KC 340 Products fulfil the latest regulations as per EN 50122-2 regarding insulation against electrical current leakage. Application of Sika® Icosit® KC 340 is largely independent of weather conditions as it can also tolerate matt damp substrates.

- Sika® Icosit® KC 340/45 is used for continuous undersealing or embedding rails with maximum product service load up to 2 MPa.
- Sika® Icosit® KC 340/65 is used for continuous undersealing or embedding rails with maximum product service load up to 4 MPa.



Continuous grooved rail storage with cavity filling.

1. Joint sealing by Sikaflex®-406 KC with primers
2. Filler block elements adhered by Sika® Icosit® KC 330 FK NEW
3. Two-component polyurethane material Sika® Icosit® KC 340

BENEFITS OF Sika® Icosit® KC 340 PRODUCTS

- Saves installation time due to short cure time
- Saves money due to shorter path interruption, faster installation, long-term maintenance cost reductions, etc.
- Successful in-field service for 30 years

ADVANTAGES

- Flexible, elastic, dimensions tolerance-compensating
- Dampening and vibration mitigation
- Moisture resistant, no water absorption, frost resistant which ensures watertight track structure
- Product electrical insulation ensures the protection against stray current corrosion
- Permanent fixation of rail to concrete or steel substrate
- A correct Shore A Hardness results in proper deflection level of the rail which ensures a reduction of mechanical wear on vehicles and rail
- Permanent rail alignment results in track geometry stability
- More uniform load distribution on the ground
- Efficient Life Cycle Costs (LCC) of the track superstructure is ensured by long durability, and a low maintenance cost

ACCESSORIES

ELASTIC JOINT SEALING BETWEEN RAILS, ADJACENT SURFACES

- Sikaflex®-406 KC is one component, self-levelling booster accelerated elastic joint sealant with high mechanical and chemical resistance, especially designed for joints between rails, adjacent surfaces (asphalt) and on Sika® Icosit® KC products
- Sikadur®-32+ primer for concrete (dry and matt damp concrete substrates) and steel. Sikadur®-32+ is two-component, based on a combination of epoxy resins and special fillers, moisture tolerant, designed for use at temperatures between +10°C and +30°C. The surface resistance of the Sikadur®-32®+ coating (4,335 GΩ) meets the requirements of the EN 50122-2 standard (0,8 – 8,8 GΩ)
- Sika® Icosit® KC 330, a one-component ready to use primer for dry concrete and steel substrates

ADHESIVE MATERIALS FOR FIXING FILLER BLOCKS

- Sika® Icosit® KC 330 FK NEW, a fast setting two-component thixotropic (sag-resistant) flexible polymer based on polyurethane material
- SikaBond®-139 Filler Block applied with the application dispenser

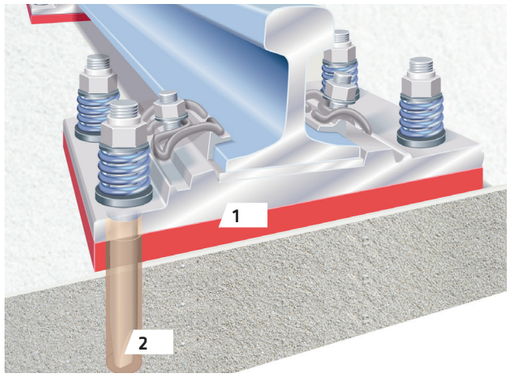
DISCRETE/DIRECT FIXATION OF RAILS

THE VARIOUS GRADES OF the Sika® Icosit® KC 340 series are in-field service-proven for more than three decades. Maximum adhesion between concrete and steel ensures a high additional safety margin.

RAIL FIXING GROUTS

Regardless of the type and size of the baseplates, the pourable, flexible grouts can be adapted to all situations of direct fixation, for all ballastless track types, particularly for special trackwork, in tunnels and on bridges, under certain circumstances even without anchor bolts.

- Sika® Icosit® KC 340/4 is used for discrete fixation with maximum product service load up to 3 MPa.
- Sika® Icosit® KC 340/7 is used for discrete fixation with maximum product service load up to 4 MPa. The versatility of this product allows its use for any kind of steel baseplates, anchor bolts and rails.



On the discrete fixation of rails the single fixations will be fixed by anchor bolts and stored on Sika® Icosit® KC.

1. Two-component polyurethane Material Sika® Icosit® KC 340
2. Sika chemical anchoring products

BENEFITS OF Sika® Icosit® KC 340 PRODUCTS

- Saves installation time due to short cure time
- Saves money due to shorter path interruption, faster installation, long-term maintenance cost reductions, etc.
- Successful in-field service for 30 years

ADVANTAGES

- Flexible, elastic, dimensions tolerance-compensating
- Dampening and vibration mitigation
- Moisture resistant, no water absorption, frost resistant which ensures watertight track structure
- Product's electrical insulation ensures the protection against stray current corrosion
- Permanent fixation of the baseplate with the rail to the concrete or steel substrate
- A correct Shore A Hardness results in proper deflection level of the rail which ensures a reduction of mechanical wear on vehicles and rail
- Permanent rail alignment results in track geometry stability
- More uniform load distribution on the ground by water penetration
- More uniform load distribution on the ground
- Efficient Life Cycle Costs (LCC) of the track superstructure is ensured by long durability, and a low maintenance cost

PRODUCTS FOR ANCHORS IN DISCRETE FIXATIONS

Since the system is based on chemical and mechanical compounds, no pre-loading stress is imparted to the substrate as it is with expansive mechanical anchors; they are ideally suited for high load applications, especially in case of discrete fixation. Sika provides two options of chemical anchoring materials:

- Pourable – Sikadur® 32+ (dry and matt damp concrete substrates)
- Sika AnchorFix®-3030 applied with the application dispenser (dry and matt damp concrete substrates)

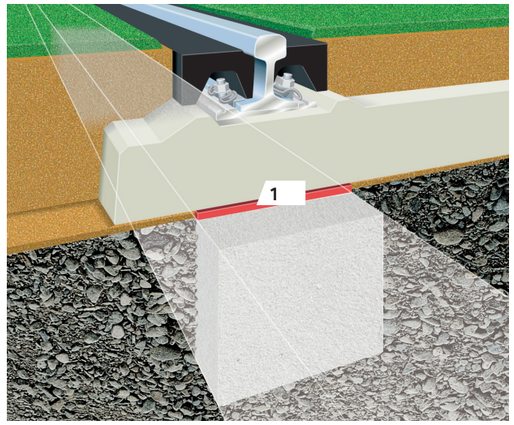
LAWN TRACK (GT) DESIGNS AND CUSTOM APPLICATIONS

LAWN TRACK DESIGNS – THE “GREEN ALTERNATIVE”

Town planners prefer to segregate rail from road traffic to shorten transit times and to reduce the risk of accidents. To reduce the environmental impact of the trackwork, lawn track designs have become very popular. Ecological, lawn track designs with Sika® Icosit® KC 340 Products reduce vibration, primary and secondary noise while still maintaining efficient insulation against stray currents. These designs ensure long durability (service life) and extremely low (close to zero) maintenance costs.

BENEFITS:
The sustainable solution for ecological construction

THE LAWN TRACK ADVANTAGES:
- Less emission of airborne sound
- Aesthetically pleasing design
- Ecological and sustainable
- Protection against stray current corrosion
- Efficient Life Cycle Costs (LCC) of the track superstructure is ensured by long durability, and a low maintenance cost



Bremer green track.

1. 2-component polyurethane material Sika® Icosit® KC 340.

CUSTOM APPLICATIONS

Tracks for heavy gantry cranes can be exposed to extremely high wheel loads of more than 100 tonnes per wheel with the maximum pressure in the product equal to, or lower than, 15 MPa (service load). The tough-elastic grades of the Sika® Icosit® KC Products (Sika® Icosit® KC 330/10) used for these applications has enough resistance against dynamic loads combined with such high wheel loads to avoid damage.

BENEFITS:
Safe and continous operation

THE PRODUCT ADVANTAGES:
- For extremely heavy loads
- Insensitive to shock loads

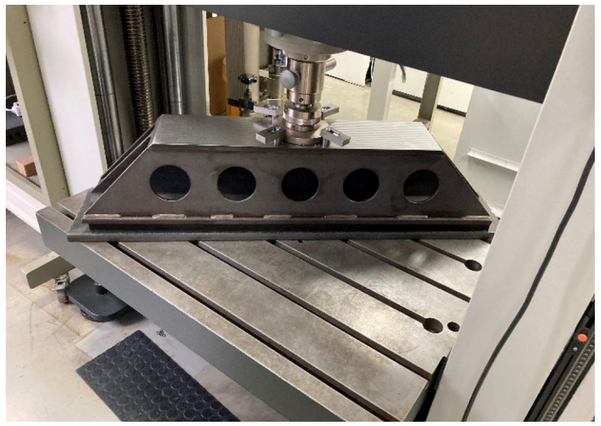
CERTIFIED QUALITY PROVIDES SECURITY

Before being released, the products of the Sika® Icosit® KC series have to undergo extensive in-house testing using sophisticated equipment under realistic conditions. In addition to that, large-scale field tests are complemented by independent third party testing facilities such as The Technical University of Munich, The University of Calgary/ Canada, Technical University of Krakow, AEA Rail Technology in the UK, the University of Louvain/Belgium, Technical University of Desden, the University of Gyor/Hungary and many others. German Railways (DB) rank Sika as “Q1” = top quality supplier. Many other railway authorities also rely on the approved track fixing designs with flexible grouts of the Sika® Icosit® KC series.

One particularly strong example of the product quality:
A perfectly intact 28 year old discrete/direct fixation with Sika® Icosit® KC grout was removed from Heinrichsheim bridge in Bavaria. The Technical University of Munich subsequently produced a load deflection (spring) diagram. Comparison with the corresponding diagram from the quality control at the time of installation in 1971 only showed a loss of flexibility of 6% (+/-10% production tolerance) after 28 years – proof of outstanding longevity!

TRUSTFUL SYSTEMS CAN STAND THE TEST

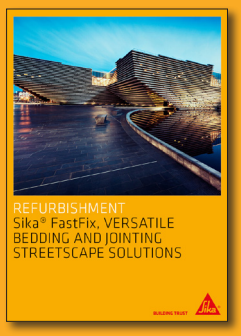
Research report of TU Munich.

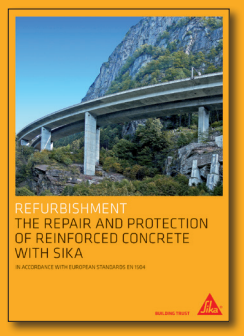


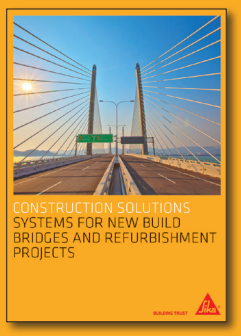
Tensile test.

Discrete/Direct fixation test.

ALSO AVAILABLE FROM SIKA







FOR MORE INFORMATION ON SIKA STREETSCAPE SYSTEMS AND SOLUTIONS:

WHO WE ARE

Sika Limited and Sika Ireland Limited are part of the global Sika Group, specialising in the manufacture and supply of chemical based products. Sika has a leading position in the development and production of systems and products for bonding, sealing, damping, reinforcing, and protecting in the building sector and the motor vehicle industry. Sika has subsidiaries in 101 countries around the world and manufactures in over 300 factories. With more than 27,000 employees Sika generates annual sales of CHF 9.3 billion (£7.54 bn). We are also committed to providing quality, service, safety and environmental care.

In the UK and Ireland, we provide market-leading solutions for concrete, waterproofing, roofing, flooring, refurbishment, sealing & bonding, and industry, and have manufacturing sites in Welwyn Garden City, Preston, Leeds, Wishaw and Dublin with more than 1000 employees and a turnover of more than £360 million.

SIKA LIMITED
Head Office
Watchmead
Welwyn Garden City
Hertfordshire, AL7 1BQ
United Kingdom

Contact
Phone 0800 112 3865
Fax 0800 112 3863
E-Mail scs.technical@uk.sika.com
www.sika.co.uk
@SikaLimited

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