



CONCRETE SIKA TECHNOLOGIES FOR TUNNELING & MINING

BUILDING TRUST





CHALLENGING THE LIMITS UNDERGROUND

For more than a century, Sika has been involved in the most challenging tunneling and mining projects around the globe. Looking back and profiting from this wealth of experience, best underground practices are implemented in many regions, bringing Sika underground construction excellence to the far corners of the globe. Today, Sika supplies tunneling and mining solutions for the largest and technically most complex projects everywhere in the world.

From the Atacama Desert in Chile, under which the large Chuquicamata block caving mine is under construction, to the Gotthard base tunnel 2'500 m below the surface of the Swiss Alps; these are both quite different examples of efficient underground construction master classes.

All projects below ground have their own challenges and special requirements. Together with our partners, we take on these challenges and implement tailored solutions for their specific technical requirements, environmental conditions and logistical hurdles.

Sika is at the forefront when it comes to efficiency improvements in tunneling and mining, reducing excavation times with faster shotcrete solutions and optimizing the cost performance of concrete in all underground operations. With a fully integrated and smart, high quality product portfolio, we have become your ideal business partner to continue forging ahead in underground construction.

CONTENT

04 Sika Technologies for Tunneling and Mining

06 Concrete Applications

08 Shotcrete Applications

10 Waterproofing

12 Injection and Rock Consolidation

14 TBM Solutions

16 Mine Backfilling

18 Grouting

19 Conveyor Belt Repair and Bonding

20 References

SIKA TECHNOLOGIES FOR TUNNELING AND MINING



CONCRETE

Over the past 100 years, Sika has made many notable contributions to the development of concrete as a durable and sustainable construction material. Sika meets complex concrete production and construction processes with proven and innovative solutions, to accommodate many challenging demands, such as those encountered in tunneling and mining.

Sika® ViscoCrete®

Superplasticizers

Sika® ViscoFlow®

Slump retainers

SikaRapid®

Accelerators

Sika® Stabilizer

Viscosity control agents

SikaPump®

Pumping aids

SikaPump® Start-1

Lubricant

SikaFume®

Silica fume

SikaFiber®

Micro & macro synthetic and steel fibers

SikaCare

Equipment protection



SHOTCRETE

Shotcrete is sprayed concrete and today this combines many aspects of concrete technology with admixture chemistry and modern methods of materials handling and delivery. Sika has proven expertise and experience mastering all of the technologies to meet the most demanding requirements. This includes the full range of capabilities using both wet and dry sprayed solutions.

Sika® ViscoCrete®

Superplasticizers

SikaTard®

Shotcrete retarders

SikaPump®

Pumping agents

FlexoDrain®

Water drainage system

Sigunit®

Accelerators

SikaFiber®

Micro & macro synthetic and steel fibers

Aliva®

Sprayed concrete machines

Sika® Shot

Ready mixed gunite



WATERPROOFING

Modern tunnel structures are designed for a life span of over 100 years. This puts equally high performance requirements on the waterproofing systems, not only in service, but also during the installation and overall construction phase.

Sikaplan® WT

TPO based sheet waterproofing membrane systems

Sikaplan® WP

PVC based membranes

Sika® WT/WP/Dilatec

Preformed, bonded tapes for waterproof connections and terminations

Sika® Waterbars

Joint waterproofing systems

SikaSwell® P

Hydrophilic swelling profile for joint sealing

SikaFuko®

Injectable hoses for joint sealing and secondary / back-up waterproofing

Sika® Injection

Resins for post-applied waterproofing by injection



INJECTION

Fast cycle times are obviously important for efficient tunneling and mining operations. The SikaFix® range provides effective and innovative injection solutions including cementitious and resin (polyurethane, silicate, and acrylic) based materials for all possible injection and ground stabilization problems.

SikaFix®

Fast, reactive injection products that expand with or without contact with water, mainly injected using a two-component pump. The SikaFix® range is designed for immediate water-stopping under high water flow and hydrostatic pressure conditions.



COMPREHENSIVE TBM SOLUTIONS

Sika provides an extensive range of cutting-edge TBM solutions, catering to all types of Tunnel Boring Machines available on the market and suitable for every geological condition.

Our specialized TBM portfolio is engineered to enhance TBM excavation cycle efficiency, supported by our expert on-site technical assistance to ensure optimal performance and productivity.

Soil Conditioners & Polymers

Optimized for EPB TBM excavation

Backfill Grout Solutions

Retarders, stabilizers, plasticizers, bentonites, and accelerators

Slurry TBM

Bentonite, polymers, and specialized additives for efficient excavation

Tail Sealant Greases

Ensuring superior sealing performance

Hard Rock TBM Solutions

Foaming agents and dust suppressors for enhanced excavation efficiency

Main Bearing Protection

Excluder greases and lubricants for main bearings



MINE BACKFILL ADMIXTURES

Sika admixtures for paste backfill operations are designed to optimize and significantly reduce the necessary binder consumption and cost. Additionally, these will also help to ensure the rheology and stability of the paste, thereby reducing the backfill line pressure that is required.

Sika®Stabilizer MBF

A complete range of paste backfill admixtures for the most cost effective solutions with the variations in tailings from all different types of geological deposits and ground conditions.



GROUTING

Heavy machinery such as mills, crushers and hoists are key components of large scale mining operations. Grouts play an important role in bedding these to successfully transfer vibration and heavy loads into their structural foundations. Sika solutions include the full range of cement and resin based grouting materials (epoxy, acrylic and polyurethane etc.).

SikaGrout®

Complete range of high-performance, cementitious grouting systems

Sikadur®

Complete range of epoxy grouting systems

Icosit® KC Range

Two-component, polyurethane resin grouts, especially designed for fixing rail tracks and heavy machinery to reduce vibration and noise transmission.



CONVEYOR BELTS

Mining and tunneling are amongst the largest industrial sectors where rubber conveyor belt systems are widely used. The specially developed SikaBond® range of belt adhesives and repair systems provide excellent cost-performance options for these conveyor belts and many other industrial rubber components that are used for many different applications.

SikaBond® R&B-100

High performance, two-component elastomer for fast and durable conveyor belt repairs

SikaBond® R&B-200

Structural adhesive with a short open time for bonding rubber materials

SikaBond® R&B-210

Structural adhesive with a long open time for bonding rubber materials

CONCRETE REQUIREMENTS AND APPLICATIONS



CONCRETE LINING

Fast construction of safe and durable concrete structures is no longer a difficult task with Sika admixture technologies. Good pumpability, flow and compaction, followed by high early strength, then low permeability are the key characteristics for a good tunnel lining concrete.



HPC CONCRETE

Sika admixtures for high strength and abrasion resistance are used in tunneling for the associated concrete slabs and structures, plus in mining for the drawpoints, extraction levels, haulage drifts and ore pass linings.



SEGMENTS

In tunnel segment production, high early strengths for rapid demolding, followed by the highest requirements with regards to performance and durability have to be fulfilled.



SLIKLINE CONCRETE

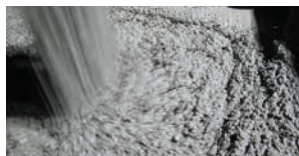
Sliklines are farthest from the concrete pump and immersed in the concrete for a lot of the time, so the mix design needs the right admixtures for the works to continue without segregation and blocking of the lines.

THE MAIN REQUIREMENTS FOR CONCRETE IN TUNNELING AND MINING



High early strengths achieved with SikaRapid® technology

In order to reduce cycle times in underground operations high early strengths are needed to ensure the elements can be demolded, moved or put under load as quickly as possible.



Extended workability times produced using Sika® ViscoCrete® & Sika® ViscoFlow® technology

In many situations, extending the workability time of the concrete is essential in tunneling and mining applications, especially for pumped concrete, where the transport distances and temperatures can be challenging factors in maintaining the required workability of the concrete.



Good pumpability with SikaPump®

This pumping agent reduces friction and resistance in the pipes, reduces the wear on the pump and the pipes, which therefore increases the volume output. Initially it is also used to produce a lubricant mix to coat the internal walls of the pipe with a high-fines layer and allow easy pumping, right from the start of the concreting operations.



In the hardened concrete, a high resistance to abrasion is achieved by using SikaFiber® in the mix.

For many areas of structural concrete the resistance against percussive or striking impact, plus the toughness and flexural strength of the concrete itself, can be very significantly improved by the use of these Sika structural fibers.



High flow and workability with Sika® ViscoCrete® technology

An efficient way of quickly and easily placing concrete is the use of so-called self-compacting concrete. With the right Sika mix design, this is able to flow under its own weight, completely filling formwork and achieving full compaction without vibration, even around heavily congested reinforcement.



SIKA PRODUCTS

Sika® ViscoCrete®

Superplasticizers with strong water reduction and extended workability times.

Sika® ViscoFlow®

Special designed admixture for extended workability times under demanding conditions.

SikaRapid®

Accelerators for precise, high early strength development.

Sika® Stabilizer

Admixtures to improve the cohesion of concrete mixes and compensate for the variations that occur in raw materials (sands and aggregates).

SikaPump®

Special concrete pumping aids to improve pumpability in difficult circumstances such as temperature variations and long transport distances.

SikaPump® Start-1

A start-up lubricant for the pipes, which also helps to reduce the wear and tear on the pumping equipment and increase the output.

SikaFume®

Fine silica fume, which is added to significantly improve the performance and extend the durability of the concrete.

SikaFiber®

Sika micro and macro fibers can significantly improve the ductility, impact resistance and the tensile strength of concrete.

SikaCare

An easily applied solution for the protection of metal equipment against rust and also to prevent concrete spills sticking to them.

SPRAYED CONCRETE – SHOTCRETE APPLICATIONS



SLOPE STABILIZATION

Shotcrete is ideal for slope stabilization, especially when dealing with steep slopes and pit wall angles, in order to protect men and machinery in portals, galleries and on ramps.



ROCK SUPPORT

Rapid early strength development of the shotcrete is critical in order to enable short cycle times and ensure efficient rates of progress in both mining and tunneling.



SHOTCRETE SITE ASSESSMENT

Sika can help you with shotcrete strengths development and quality assessments using most updated devices and instruments together with digital tools for efficient and detailed testing campaigns.



SIKA SERVICE

Sika provides support from pre-testing, right through with continuous on-site support, to the completion of operations, in order to realize ongoing efficiencies.

THE MAIN REQUIREMENTS & SIKA SOLUTIONS FOR SHOTCRETE



High early strengths achieved using Sigunit® accelerators

Early setting of the shotcrete lining is critical in order to enable rapid underground development with short cycle times.



Extended slump retention achieved with Sika® ViscoCrete® SC technology

Depending on the location and the complexity of the project, long haulage distances can require extended slump life of the concrete and in all manner of environmental conditions.



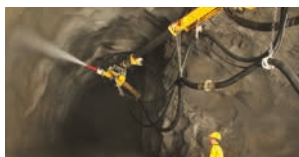
Laboratory testing

Sika has developed unique testing equipment known as “MiniShot” where local raw materials (e.g. different binders, accelerators, admixtures and additives etc.) can all be quickly and reliably tested locally and in an efficient way to optimize the shotcrete mix designs.



On site testing

After the pre-evaluation and mix selection of the shotcrete-system using the Sika MiniShot, the mix-design is tested under real conditions. The well trained Sika shotcrete teams will then implement the best cost performing solutions.



Trouble-free applications

Safe application, consistent speeds and uninterrupted spraying are critical factors for efficient in cycle shotcreting. This is achieved with Sika support to master the sprayed concrete operations with efficient equipment, mix designs, admixtures and skilled operators.



SIKA PRODUCTS

Sigunit®

Shotcrete accelerators for high early strength requirements. Sigunit® solutions are available as liquid and powder solutions to suit challenging logistics and different operational requirements.

Sika® ViscoCrete®

Superplasticizers for high water reduction and extended workability times.

SikaTard®

Slump retention admixtures, especially formulated for shotcrete, to control workability times in all different temperature conditions.

SikaFiber®

Sika micro and macro fibers significantly improve the ductility, impact resistance and the tensile strength of shotcrete.

SikaPump®

Special concrete pumping aid to improve pumpability under difficult circumstances such as temperature variations and long transport distances.

FlexoDrain®

An easy to use drainage system to channel water ingress underground.

SikaTell®

A shotcrete admixture designed to reduce rebound and improve the cohesion of the shotcrete.

Sika® Shot

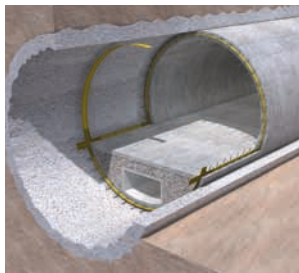
A pre-bagged, ready mixed gunite for dry spraying that is cement based and powerfully accelerated.

STRUCTURAL WATERPROOFING



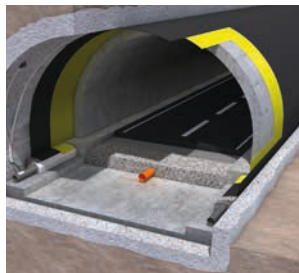
DRAINED

Used in drill and blast tunnels and hard rock TBM excavations where single shell shotcrete or a double shotcrete lining is installed. Liquid applied membranes and Sika FlexoDrain® form the waterproofing system.



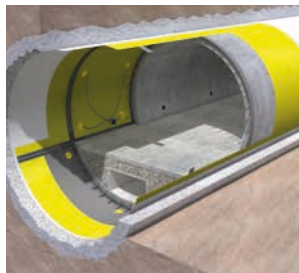
WATERTIGHT CONCRETE

For conventional excavations and Hard Rock TBM's, watertight concrete is used in a "white-box" concept, using engineered joint sealing solutions. For tunnels with limited water pressure resistance requirements.



UMBRELLA SYSTEM

For road and railway tunnels with high overburden. The "umbrella system" provides a cost effective solution, based on a full arch barrier in combination with a drainage system to keep the tunnel and its structure dry.



HYDROSTATIC BARRIER

Loose-laid membrane system, PVC or FPO based, including compartments and integrated injection back-up ports. The membrane is applied as a single or double layer system for the highest watertightness requirements (NEAT system).

SIKA HAS THE WIDEST RANGE OF WATERPROOFING SOLUTIONS



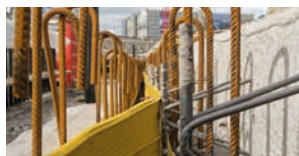
Loose-laid synthetic sheet membranes

For more than 50 years, Sika's loose-laid synthetic membranes have been the below ground waterproofing system of choice where high performance is required. This technology has been continually developed and the service life of Sika membranes remains unchallenged and their leading position is maintained by the most comprehensive materials testing.



Fully bonded sheet membranes

An alternative evolution of Sika's advanced polymeric sheet membranes are these systems designed to form a full surface bond with the structural concrete. These Sika systems also use the FPO materials that fulfil the highest durability as the loose-laid membranes.



Sika 'white box' concept with watertight concrete

The integral waterproofing of concrete structures makes this a very convenient and attractive approach for contractors with Sika concrete admixtures and jointing systems. However durability also depends on the groundwater, especially where this is salt water, or it contains other aggressive influences that can attack the concrete and its steel reinforcement.



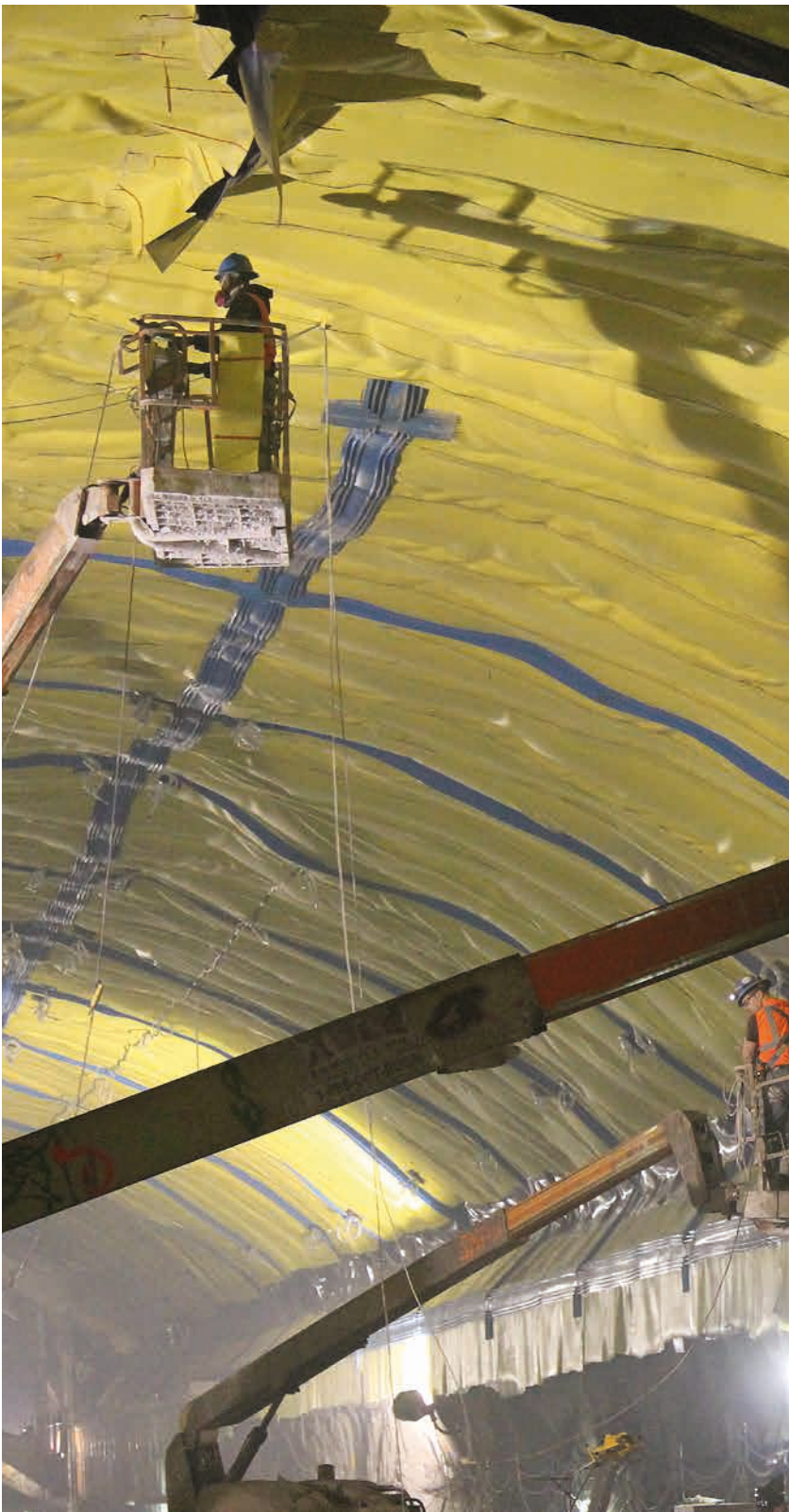
Waterproofing mortars

Sika waterproofing mortars are easy to use to protect both large and small areas of concrete surfaces, and can be applied by hand or spray. These can provide good durability and a long service life in contact with fresh water, however with increasing salt and chemical content this can be reduced and additional protection may be required.



Liquid applied membranes (LAM) based on reactive resins (PUR/PUA)

Sika provides a complete range of liquid applied membranes, primarily designed for spray application, but they can also be hand applied, which is useful for complex detailing solutions. Sika LAM are therefore ideal for waterproofing surfaces with a lot of penetrations and/or difficult access for the application works.



SIKA PRODUCTS

Sikaplan® WP

Homogeneous, plasticized PVC sheet membranes for waterproofing tunnels, plus cut and cover structures.

Sikaplan® WT

Glass fabric reinforced, FPO sheet membranes for waterproofing tunnels and other structures, particularly against salt water and aggressive ground conditions.

Sika Waterbar WP/WT

External waterstops, heat welded to the installed Sikaplan® membranes to form compartment systems.

Sikaplan® WP/WT Tapes & Sika Dilatec ER/E Tapes

Adhesive sealing tapes based on PVC or FPO, bonded with Sikadur®-31 CF or other adhesives for sealing details and perimeter terminations.

SikaProof® A

Pre-applied FPO sheet waterproofing membrane system, applied below base slabs and on formwork for poured-walls.

SikaProof® P

Post applied in-situ adhered FPO sheet waterproofing membrane, specially designed for roof slabs and walls.

Sikalastic® LAM

Highly flexible, fast curing, two component (PUR / PUA) spray applied, membranes for concrete surfaces.

Sika® WT 100/200

Pore blocking and active crystalline concrete admixtures for producing watertight concrete. The utmost in waterproofing technology for concrete mix design.

GROUND INJECTION AND ROCK CONSOLIDATION



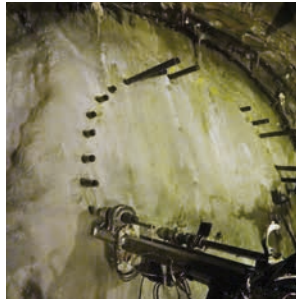
STOPPING WATER

Uncontrolled water intrusions in tunnels and mines represent major hazards often responsible for long downtimes and expensive pumping campaigns. The SikaFix® injection range includes powerful solutions to stop and then block this water, to regain hydrological control.



VOID FILLING

Cavity and void filling is used as and when necessary to consolidate fractured strata and to stabilize the ground, therefore ensuring a faster and safer excavation process.



GROUND STABILIZATION

An efficient way to stabilize unconsolidated geological perimeters, fractured rock-strata or permeable soils is by injecting them with specially formulated grouts (normally cementitious).



INJECTIONS FOR TBM'S

Water bearing fault and shear zones can represent a major risk for TBM's. These risks can be managed by using Sika pre-injection systems to consolidate and stabilize the ground ahead of the TBM.



Sika Injection expertise

Site inspection for selection of the appropriate concept, as well as the correct material and application method, is critical for a successful injection approach. Sika experts provide assistance on site and in the laboratory to select the most suitable and cost-effective materials and methods. We also provide the necessary detailed documentation and training for successful product application.

Injection Material	Clay	Silt	Sand			Gravel	Pre-injections	Water stopping	Ground consolidation
			fine	medium	coarse				
Cement					days		X		X
Micro-cement					hours		X		X
SikaFix®-110 (PU)					45 seconds		X	X	
SikaFix®-210 (PU)					10 seconds			X	
SikaFix®-501 (Silicate)					15 seconds		X	X	X
SikaFix®-601 (Silicate)					40 seconds		X		X
SikaFix®-301 (Acrylate)					2 - 15 minutes		X	X	X
Grain size (in mm)	0.001	0.01	0.1	1	1.5	10			
Permeability K (m/s)	10 ⁻⁷	10 ⁻⁶	10 ⁻⁵	10 ⁻⁴	10 ⁻³				

This table: Different Sika injection technologies for use based on substrate permeability and reaction times required.



SIKA PRODUCTS

SikaFix®-110
Polyurethane foam injection resin designed to foam with or without water.

SikaFix®-210
Rigid polyurethane injection resin hardens to form a tough material that is used to seal high water intrusions.

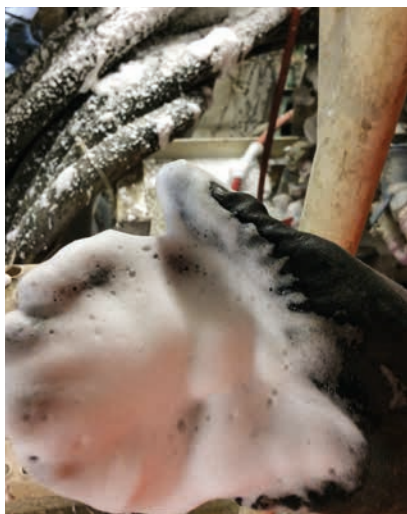
SikaFix®-301
Acrylate resin based with low viscosity – similar to water – but hardens to form a rigid, hydrophilic and water repelling compound. Ideal for injection to low permeability soils.

SikaFix®-501
Silicate resin based, designed to expand to a rigid material by foaming. Its high foam expansion factor makes it ideal for filling large voids.

SikaFix®-601
Silicate resin based, non-foaming, rigid injection material that has excellent adhesion to damp surfaces. It is used for demanding rock consolidation to stabilize damp and wet geological fault zones.

SikaFix®-800 series
Cementitious grout range, modified using organic polymers. During hydration of the cement, the grouts will harden to a rigid material as required.

SOLUTIONS FOR TBMS



FOAMING AGENTS FOR EPB TBM

The effective application of foaming agents enhances the efficiency and cost-effectiveness of TBM excavation, ensuring optimal soil conditioning and backlog analysis. Sika's foaming agent solutions are designed to adapt to all ground conditions—from straightforward excavations in Open Mode without groundwater to the most challenging environments with highly variable soils and high groundwater pressures.

Sika® Stabilizer-1118 & 1113 TBM
Ideal for granular soils with variable permeability, enhancing excavation efficiency.

Sika® Stabilizer-1215 & 1219 TBM
A new generation foaming agent with superior drainage stability for improved performance.

Sika® Stabilizer-1111 TBM
Specifically formulated for abrasive granular soils, providing enhanced lubrication and wear reduction.

Sika® Stabilizer-1518 & 1514 TBM
Designed for clayey, cohesive soils with varying plasticity, effectively minimizing clogging risks.



POLYMERS FOR EPB TBM

When foaming agents alone are insufficient for effective soil conditioning, Sika provides a comprehensive range of high-performance polymer solutions tailored to diverse ground conditions.

Sika® Stabilizer-3710 TBM
Super water-absorbing polymer designed to restructure heterogeneous soils with poor grading and low fines content.

Sika® Stabilizer-3750 TBM
A muck viscosity modifier for EPB TBM operations in saline water environments.

Sika® Stabilizer-3212, 3214 & 3215 TBM
Specialized anti-clay polymers, preventing clogging and improving soil flow characteristics.

Sika® Stabilizer-3001 TBM
Water-control polymer for optimized soil conditioning and improved TBM performance.



POLYMERS FOR HARD ROCK

In Hard Rock TBM projects, cutting tool replacement and downtime are critical factors impacting efficiency and overall project costs. Sika's advanced solutions are designed to extend cutter life and enhance the working environment within the tunnel.

Sika® Stabilizer-1513 & 1516 TBM
High-performance foaming agents that minimize abrasive wear on cutting tools, reducing maintenance and replacement frequency. Effectively suppress dust formation, improving air quality and safety within the tunnel.

SLURRY PORTFOLIO

Sika's Slurry TBM portfolio is engineered to tackle complex mix ground conditions, high water pressures, and variable soil compositions. Our bentonites, polymers, and additives optimize slurry properties, ensuring stability, safety, efficient excavation. With tailored solutions, we enhance TBM performance, reduce downtime, and improve overall tunneling efficiency.

Designed with safety in mind, our solutions improve working conditions by minimizing operational risks. They also enhance mud cake formation, reducing permeability and preventing excessive bentonite losses.

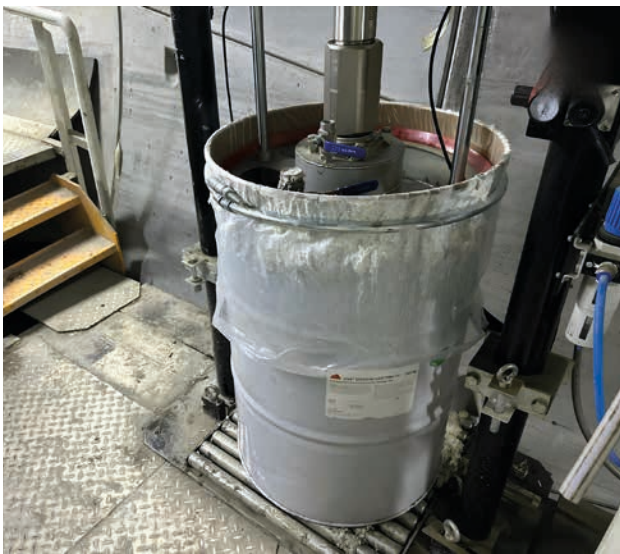


Additionally, filter loss control ensures optimal pressure balance, while flocculants enable efficient solid-liquid separation, improving waste management and environmental sustainability.

TAIL SEALANT GREASES

Tail sealant greases are injected into the brush chambers between the tail shield and the segment lining to create a reliable barrier, preventing the ingress of water, soil, and backfill grout into the TBM. Sika's tail sealant grease range is expertly formulated to be compatible with all TBM types and brands, ensuring optimal performance and protection.

- Sika® Stabilizer-2132 TBM**
Old generation first-fill.
- Sika® Stabilizer-2232 TBM**
Old generation pumping grade.
- Sika® Stabilizer-2131 TBM**
New generation first-fill.
- Sika® Stabilizer-2231 TBM**
New generation pumping grade.

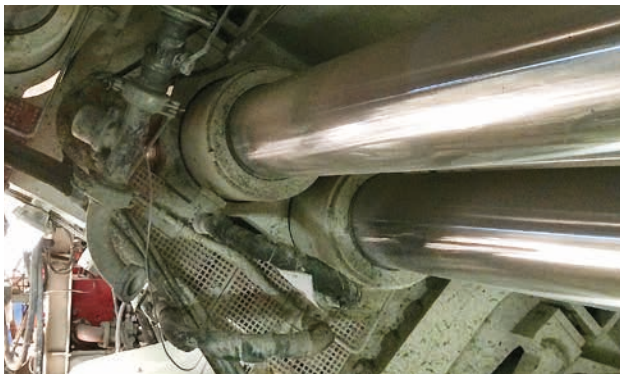


TWO COMPONENT GROUTS

Backfill grouts play a crucial role in TBM tunneling by filling the annulus space that naturally forms behind the segments as the TBM advances.

Primary Objective:
Prevent ground settlements caused by the creation of the annulus space.

- Secondary Benefits:**
- Ensure a controlled transfer of radial and longitudinal stresses from the ground to the tunnel segments.
 - Prevent segment displacement or floating during installation.
 - Act as a waterproofing barrier, protecting the tunnel from water ingress.



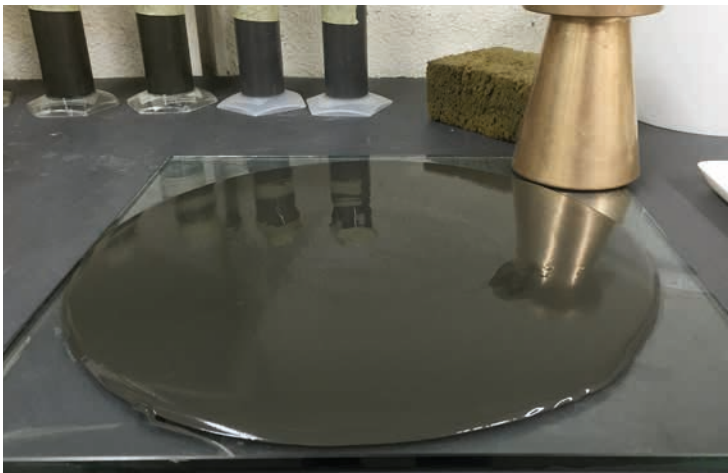
With extensive expertise in Single-Component and Two-Component Grouts, Pea Gravels, and low CO₂ grouts, Sika delivers innovative, high-performance solutions. Our global network of specialized laboratories ensures cutting-edge technology and tailored formulations for every project need.

MINE BACKFILLING

PASTE WITH NO ADMIXTURE



THE SAME MIX WITH Sika® Stabilizer MBF



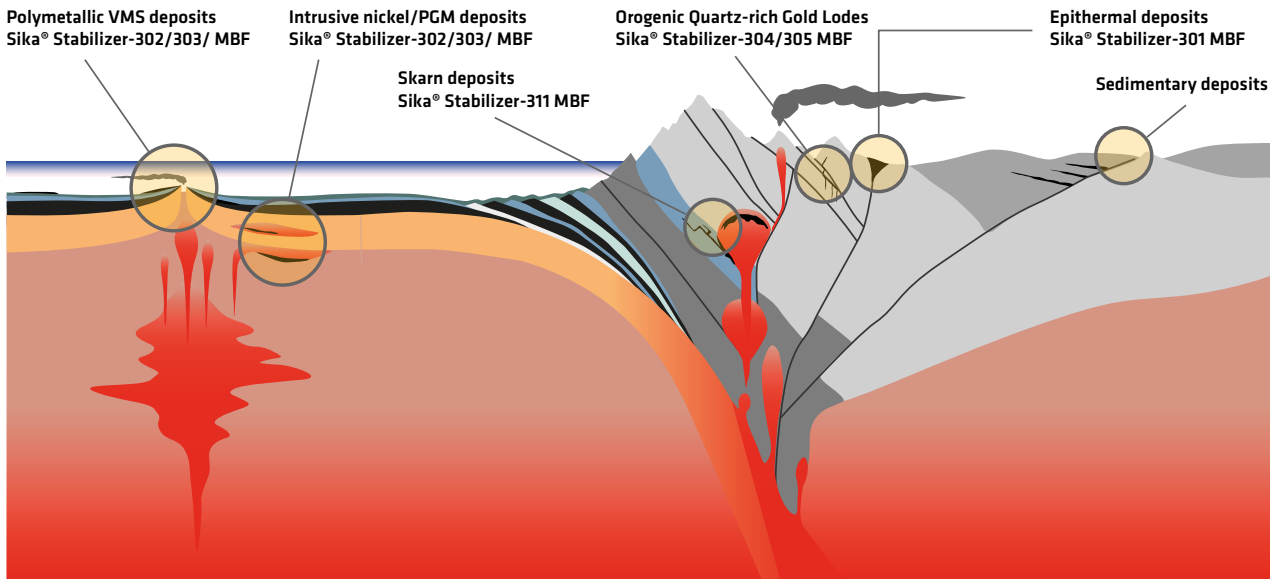
Paste-mix design without admixtures (left side), and with Sika® Stabilizer MBF admixture (right side), note the very significant increase in slump.

Using backfill admixtures allows engineers to adjust and modify the many variables of backfilling materials. The following parameters can all be modified in order to obtain the required properties and cost performance from the backfill:

- Reducing the binder content
- Increasing the strengths
- Increasing the solids content of the paste mix and hence increase fill efficiencies
- Improving the rheological properties of the cement based fill during the mixing, pumping and backfilling process
- Reducing yield stress whilst enhancing workability

- Reducing pumping pressures
- Reducing wear and tear on machinery and equipment
- Minimizing segregation and bleed
- Improving consistency of fill rates and compressive strengths
- Reducing the risk of line blockages
- Preventing liquefaction

Sika has developed a powerful range of mine backfilling admixtures to modify the paste mixes from all of the main ore deposit types. The most suitable admixtures can be selected on each individual project for maximum cost efficiency.



Sika backfill admixture range for different deposit types.



SIKA PRODUCTS

Sika® Stabilizer-301 MBF
Paste backfill admixture for Epithermal, polymetallic deposits.

Sika® Stabilizer-302 /-303 MBF
Paste backfill admixture for polymetallic volcanic hosted massive sulphide deposits (VMS).

Sika® Stabilizer-303 /-302 MBF
Paste backfill admixture for intrusive hosted nickel/PGM deposits.

Sika® Stabilizer-304 /-305 MBF
Paste backfill admixture for orogenic, greenstone hosted quartz-gold lodes.

Sika® Stabilizer-311 MBF
Paste backfill admixture for intrusion related skarn deposits.

Sika® Stabilizer-306 /-311 MBF
Admixture for limestone replacement deposits, carlin-style or skarn deposits.

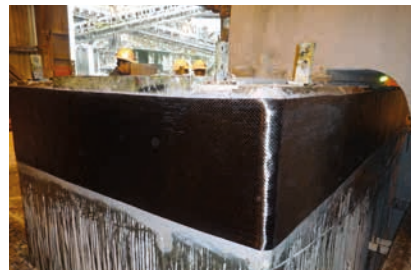
Sika® Stabilizer-401 MBF
A special admixture to prevent high water bleeding.

GROUTING



Sikadur® EPOXY BASED GROUTS

Sika's epoxy resin based grouts are widely used for load bearing plate and direct equipment fixing, especially those under dynamic load and subject to vibration, such as generators, crushers, rolling mills and other special machinery. The correct application of these products is critical to ensure a durable outcome. Sika provides extensive guidance and assistance, including onsite support for complex grouting procedures.



Sikadur®-42 Range

Pre-batched, epoxy resin based, chemically resistant, high flow grouts for precision grouting of structural components and machinery.

Sikadur®-42 HE

Proven effective as the crusher backing mortar for gyratory crushers.

SikaTop® Armatec® EpoCem®

For use in highly corrosive environments in combination with all Sika repair systems.

SikaWrap®/ Sika Carbodur®

Carbon based, structural strengthening material for concrete.



SikaGrout® CEMENTITIOUS BASED GROUTS

Sika is a market leader in high quality cement based grouts. These cementitious SikaGrout's are available all over the globe and widely used within the tunneling and mining industry for many different applications and requirements. From high strength concrete repairs through to grouting structural columns, base plates and heavy equipment – The SikaGrout® range covers it all.



SikaGrout®-200 series

The standard cement based, multi-purpose grouting products for many different applications. These grouts are pourable and self-leveling. They are compensated against shrinkage and quickly develop high compressive strengths of 50 – 60 MPa.

SikaGrout®-300 series

The advanced, cement based, multi-purpose grouting products for grouting applications that require large thicknesses. These grouts are all pourable and self-leveling, compensated against shrinkage and rapidly develop compressive strengths up to 80 MPa.



Sika® REPAIR MORTARS

Refurbishing deteriorated or damaged concrete structures and upgrading them for the future is one of Sika's core competencies. Our extensive product range provides a system or product as the ideal solution for every concrete repair job you will ever encounter anywhere in the world!



Sika MonoTop® Range

Pre-bagged, one component, polymer modified, cement based, concrete repair mortars for many applications.

Sika MonoTop®-610

Primer for reinforcement protection and also a bonding bridge for the MonoTop® concrete repair mortars to steel and concrete surfaces.

Sika Gunite®

Dry spray mortar for large volume repairs using Aliva® spray equipment.

Sikacrete® SCC

Pre-bagged, silica-fume enhanced, self-compacting concrete mix.

CONVEYOR BELT REPAIR AND BONDING

THE TUNNELING AND MINING INDUSTRY are amongst the largest industrial sectors where rubber conveyor belt systems are widely used. Sika's expertise can provide superior cost-performance for the bonding and repair of rubber belts and associated components for many different applications.

BELT REPAIRS

SikaBond® R&B-100

This two-component, high-performance, elastomeric, synthetic resin based system is specially designed for the repair of textile and steel reinforced rubber conveyor belts. The material is primarily used to repair typical non-structural damages such as holes, cuts and ripped edges that are part of normal wear and tear. These durable repairs can then significantly extend the service-life of the conveyor belt. The SikaBond® R&B-100 system develops outstanding mechanical properties and is ideal for fast repairs and a rapid return to service.



BONDING RUBBER COMPONENTS

SikaBond® R&B-200/210

The vulcanization of rubber is always time-consuming and expensive with a lot of hardware and special know-how involved. Therefore, Sika has developed unique, patented solutions for "cold-splicing" rubber components in a very simple, fast and safe way without the use of power and heavy equipment. SikaBond® R&B-200/210 are fast curing, flexible adhesive systems, designed to replace mechanical fixings, such as rivets and screws, or welding as well as hot vulcanizing itself.



TUNNELING AND MINING

Project references



THE GOTTHARD BASE TUNNEL, SWITZERLAND

At the heart of the new transalpine rail route in Switzerland is the Gotthard Base Tunnel and with a length of 57 km it is the world's longest and also the deepest rail tunnel. It opened to traffic and became operational at the end of 2016 after more than 15 years of design and construction works. Sika was involved in this project from the beginning, providing assistance to the project team from their global expertise and experience, including many previous tunneling projects in the Alpine regions of Europe. Sika's support was particularly valuable in developing all of the concrete and sprayed concrete systems, as well as for the complete waterproofing concept.

Sika Solutions:	
Sika® ViscoCrete®	Superplasticizers
Sigunit®	Shotcrete accelerators
SikaTard®	Set retarders
Sika®-PM	Shotcrete spraying systems
Aliva®	TBM Spray robots
Sikaplan®	Tunnel waterproofing system



THE KIRUNA MINE

Since 2008 Sika has been the main supplier of concrete admixtures and underground concrete construction technologies at Kiruna. Located in Swedish Lapland, north of the Arctic Circle, the challenges in terms of concrete production and logistics are manifold. Sika, together with its partner LKAB took on these challenges and today the LKAB operations are a showcase of 'Mining Best Practice' for other large, block cave mining projects around the world. Kiruna is also now one of the world's largest underground sub-level block cave operations. Fast mining-cycle times are the key to maintain high productivity and ore throughput rates. Hence, an efficient in-cycle shotcrete set-up is required, providing fast re-entry times into the blasted areas once their perimeters are secured.

Sika Solutions:			
Sikament®	Superplasticizers (HRWR)	Sigunit® AF	Shotcrete accelerator
SikaTard®	Consistency stabilizers	Sika FastMix	HRWR (powder)
Sika Aer®	Air entrainers	Sika Intrapast-A	Expansion aid
Sika Retarder	Retarders	Sika Antifreeze S	Antifreeze
SikaRapid®	Concrete accelerators	Sika NeatCrete	Concrete remover
		Sika Control®-50	Shrinkage reducer
		Sika Crackstop	12 mm Fibers w
		SikaFix®	2-comp. injections



THE EMISOR ORIENTE TUNNEL, MEXICO

Mexico City, and its metropolitan area has developed and expanded over the years in an area that was once an area of swamp and lakes. As the city grew, more and more construction took place on the ancient swampland, the city was faced with increased risk of flooding. At present, a 62 km drainage tunnel is under construction, with 24 shafts and an output capacity of 150 cubic meters of water per second, making this a landmark in the Latin America infrastructure landscape. Sika has been involved with the project design and construction since the beginning, providing concrete admixture technologies for the precast segments to build the tunnel by TBM techniques. Sika also supplies many other materials to support the TBM's progress.

Sika Solutions:	
Sika® ViscoFlow®	Superplasticizers
SikaFoam TBM	Foaming agent for EPB - TBM excavation
Sigunit®	Shotcrete accelerators
Sika®Separol	Mould release agents

TUNNELING AND MINING

Project references



THE GRASBERG MINE, INDONESIA

The Grasberg mine, operated by Freeport McMoRan and jointly owned by Freeport and Rio Tinto, is one of the largest mining clusters on the globe. The mine is located in the very remote highlands of the Sudirman mountain range in the province of Papua, Indonesia. Freeport McMoRan and its main contractors are long standing partners of Sika.

Sika supplies large quantities of materials to the Grasberg operation including concrete admixtures for self-compacting, shaft lining concrete and shotcrete, plus shotcrete accelerators, injection resins and additional concrete refurbishment products. For example, to ensure rapid underground progress, the high performing Sika Sigunit® AF shotcrete accelerators are used to achieve high early strength of the shotcrete that allows cost efficient, short cycle times.

Sika Solutions:			
Sika® ViscoCrete®	Superplasticizers	Sikacrete®	High performance, dry sprayed gunite
Sika ViscoFlow®	Slump retainers	Sikafloor®	Industrial floors
Sigunit®	Shotcrete accelerators	SikaFix®	2-comp. injections
SikaTard®	Consistency stabilizers		



THE METRO IN DOHA, QATAR

An extensive metro system is under construction in Doha, Qatar, with a total length of 358 km. The Doha Metro system will be one of the most extensive metro systems in the region. Phase 1, to be completed in 2018, comprises tunnels with a total length of 49 km, excavated using EPB-TBM machines. Elevated and at grade sections feature for approximately 30 km of this length.

Sika is the main supplier of concrete admixtures to produce the fire resistant precast concrete segments with a design life of at least 120 years. Sika is also supplying Sika membrane waterproofing solutions for all of the cross passages, plus concrete hardening accelerators and synthetic macrofibers, as well as Aliva wet spray machines, for the sprayed concrete lining. Elevated sections are assembled using the same SikaDur® structural adhesive as originally developed for the equally demanding requirements of segmental bridge construction.

Sika Solutions:			
Sika® ViscoCrete®	Superplastizisers	Sika®Separol	Mould release agents
SikaFoam TBM	Foaming agent for EPB – TBM excavation	Aliva®	Shotcrete machines
SikaFiber®	Synthetic microfibers for concrete	Sikaplan®	Waterproofing membranes
Sigunit®	Shotcrete accelerators	Sikadur®-31 SBA	Segmental bridge adhesive
SikaFiber®	Synthetic macrofibers for shotcrete		



THE ESCOBAL MINE, GUATEMALA

Since the Escobal project in Guatemala broke ground, Sika has been involved as the main supplier for concrete admixtures and many other specialty chemicals. In order to achieve the ore throughput levels of 4'500 tons per day, of which half will be put back underground in the form of cemented paste backfill, the mine needs an efficient in-cycle support installation for rapid development rates. From the very beginning, one of the main challenges was to provide enough underground production headings in order to source enough ore feed for the mill on surface. Hence, multiple ore development headings are driven simultaneously, in sometimes difficult ground conditions, which require expert shotcrete support in mix design and spray application that is all fully integrated into the mining cycle.

Sika Solutions:	
Sika® ViscoCrete®	Superplasticizers
Sika® ViscoFlow®	Slump retainers
SikaTard®	Consistency stabilizers
Sigunit® Alkali-free	High performance shotcrete accelerators
Sika®-PM	Shotcrete spraying system

A GLOBAL COMPANY BUT LOCAL PARTNER



FOR MORE INFORMATION ON TUNNELING & MINING:



WE ARE SIKA

Sika is a specialty chemicals company with a globally leading position in the development and production of systems and products for bonding, sealing, damping, reinforcing, and protection in the building sector and industrial manufacturing. Sika has subsidiaries around the world and produces innovative technologies for customers worldwide. In doing so, it plays a crucial role in enabling the transformation of the construction and transportation sector toward greater environmental compatibility.

Any product name or reference reflects the Sika product name at the time of creation of this document and may differ from the product name or reference during past events.

Our most current General Sales Conditions shall apply.

Please consult the most current local Product Data Sheet prior to any use.



SIKA SERVICES AG
Tueffenwies 16
CH-8048 Zurich
Switzerland

Contact
Engineered Refurbishment
Phone +41 58 436 40 40
www.sika.com

BUILDING TRUST

