



STM

# Sika® TECHNOLOGIES FOR SHOTCRETE, TUNNELING & MINING

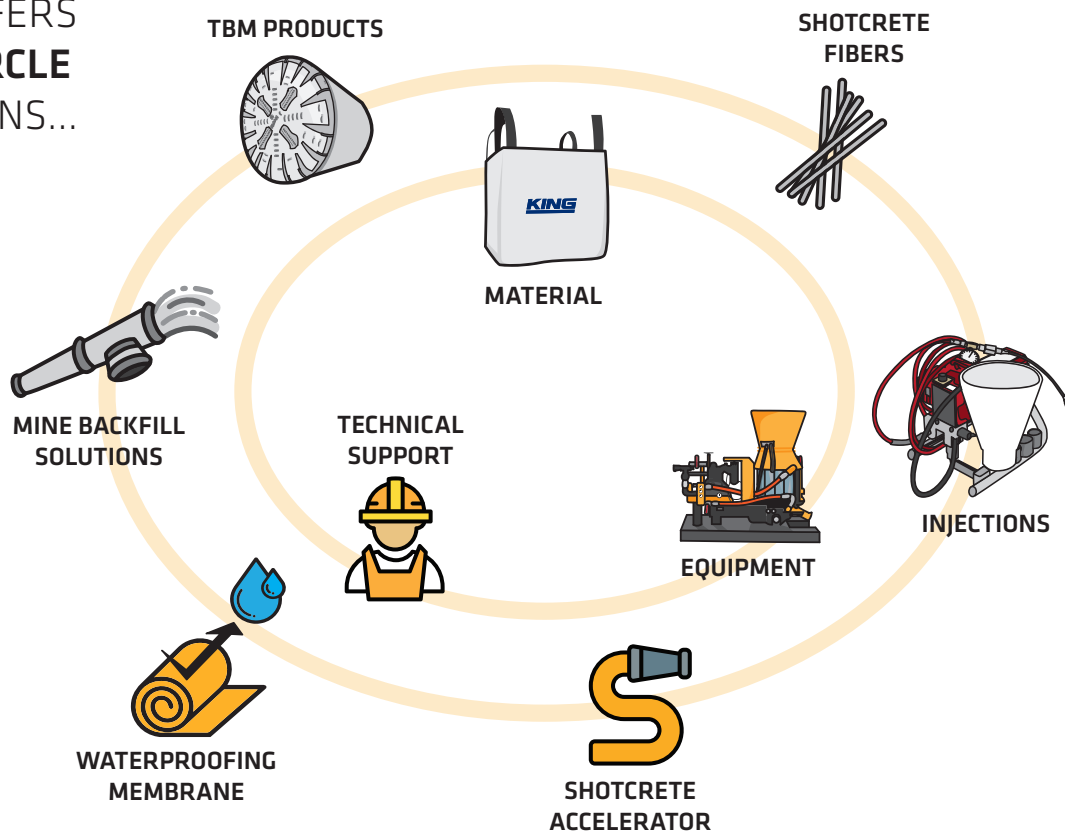
BUILDING TRUST  
CONSTRUIRE LA CONFIANCE



**FOR MORE THAN A CENTURY**, Sika has been involved in the most challenging tunneling and mining projects around the world. By profiting from this wealth of experience Sika is able to help bring superior underground practices and underground construction excellence to the far corners of the globe.

Today, Sika supplies tunneling and mining solutions for the largest and most technically complex projects everywhere in the world. All projects below ground have their own challenges and special requirements. Together with our partners, Sika takes on these challenges and implements tailored solutions for each project's specific technical requirements, environmental conditions and logistical hurdles. Sika is at the forefront when it comes to efficiency improvements in tunneling and mining by reducing excavation times through the creation of advanced shotcrete solutions and by optimizing the cost performance of concrete in all underground operations. With a fully integrated, innovative, high quality product portfolio, we have become your ideal business partner to continue forging ahead in underground construction.

SIKA OFFERS  
**FULL CIRCLE**  
SOLUTIONS...



# SHOTCRETE SOLUTIONS

(PRE-BLENDED SHOTCRETE MIXES, EQUIPMENT, SET ACCELERATORS, ADMIXTURES, FIBERS)



## SHOTCRETE APPLICATIONS

- Ground support in tunneling and mining construction
- Construction of underground concrete structures
- Slope and trenching stabilization
- Protective linings
- Shoring construction
- Concrete repair
- Restoration of historic buildings
- Pools and skate parks construction
- Refractory applications and building-up thicker layers.



## PRE-PACKAGED BENEFITS

- Pre-blenched technology containing blended aggregates & carefully selected components to develop the correct mix required for the project
- Easily shipped to remote locations
- Ability to mix on demand



## SIKA STM SOLUTIONS

- Pre-Packaged Shotcrete Materials
- Shotcrete Accelerators
- Shotcrete SikaFibers
- Shotcrete Equipment

## THE MANY DEMANDS PLACED ON A SHOTCRETE MATERIAL AND OPERATION TODAY NO LONGER ALLOW FOR THE INDUSTRY'S PREVIOUS SHOTCRETE SOLUTIONS.

Depending on the shotcrete spraying process, the type of structure, and the environment, there are many different conditions that are imposed on the shotcrete during application and in service.

Sika's shotcrete solutions are designed to overcome

these challenges. Sika's shotcrete product offering represents the newest generation in cutting-edge technologies that have resulted from more than one hundred years of involvement in the industry. With this experience, expert knowledge and a focus on performance and economy, Sika provides a reliable proven solutions.

# PRE-PACKAGED SHOTCRETE MATERIALS

In 2019, Sika acquired King Packaged Materials Company which has been a trusted industry resource of both dry mix and wet mix processes. The strength of the King Shotcrete Solutions brand lies in its ability to provide high-quality shotcrete material and equipment combined with the industry's best technical support team. The pre-packaged materials are produced from three ISO 9001 registered, shotcrete production facilities. The facilities have the capabilities to meet many different project requirements. The pre-packaged shotcrete material can include; air-entrainment for improved freeze-thaw and salt-scaling resistance, synthetic or steel fiber reinforcement for increased load-carrying and energy absorbing capacities, set-time accelerators for early-age strength gain and rapid re-entry into a mine, and specialty mixes that perform exceptionally well in cold temperatures and other demanding conditions.

The pre-packaged shotcrete materials can be adjusted to have additional features which include the following:

- Macro-Synthetic fibres (MF) to increase energy absorption, load carrying capacity, and impact resistance
- Micro-Synthetic fibres (SY) to reduce plastic shrinkage cracking
- Steel fiber (ST) to increase energy absorption, load carrying capacity, and impact resistance
- Accelerator (X, X2, X3) can be added to the pre-packaged mix at three different dosage rates for increased setting times with air entrainment for above grade applications
- Underground accelerated (UG, UG2, UG3) can be at three different accelerator dosage rates with non air entrainment for underground (tunneling & mining) applications
- (CI) Available with corrosion inhibitor
- Can be blended to meet ACI 506 "Guide to Shotcrete" Table 1.1, Gradation No. 1 or Gradation No. 2

PRODUCTS	ADVANTAGES	TARGET APPLICATIONS
King® MS-D1	<ul style="list-style-type: none"> <li>• Dry Mix process shotcrete</li> <li>• Portland cement-based</li> <li>• Micro Silica Fume enhanced</li> <li>• Air entrainment provides superior resistance to freeze-thaw cycles and salt scaling</li> </ul>	Civil Construction / Repair or Tunneling <ul style="list-style-type: none"> <li>• Additional option to meet requirements of NSF/ANSI-61 standard for structures containing drinking water</li> </ul>
King® MS-D3	<ul style="list-style-type: none"> <li>• Dry Mix process shotcrete</li> <li>• High-early strength Portland cement-based</li> <li>• Micro Silica Fume enhanced</li> <li>• Air entrainment provides superior resistance to freeze-thaw cycles and salt scaling</li> </ul>	Civil Construction / Repair or Tunneling / Mining
King® MS-W1	<ul style="list-style-type: none"> <li>• Wet Mix process shotcrete</li> <li>• Portland cement-based</li> <li>• Micro Silica Fume enhanced</li> <li>• Air entrainment provides superior resistance to freeze thaw cycles and salt scaling</li> </ul>	Civil Construction / Repair or Tunneling / Mining
King® LR-D1	<ul style="list-style-type: none"> <li>• Dry Mix process shotcrete</li> <li>• Portland cement-based</li> <li>• Provides low resistivity values</li> <li>• Specifically designed for use with cathodic protection systems</li> </ul>	Civil Construction / Repair



PRODUCTS	ADVANTAGES	TARGET APPLICATIONS
King® MS-D3 UG	<ul style="list-style-type: none"> <li>• Dry Mix process shotcrete</li> <li>• High-early strength Portland cement-based</li> <li>• Micro Silica Fume enhanced</li> <li>• Air entrainment provides superior resistance to freeze-thaw cycles and salt scaling</li> </ul>	Mining
King® HC-D1	<ul style="list-style-type: none"> <li>• Dry Mix process shotcrete</li> <li>• High resistance to cracking</li> <li>• Designed to be highly compatible with existing concrete substrates</li> <li>• Ideal for concrete repairs realized in the interest of sustainable development.</li> </ul>	Civil Construction / Repair
King® ArmourGuard	<ul style="list-style-type: none"> <li>• Dry Mix process shotcrete</li> <li>• High-early strength Portland cement-based</li> <li>• Steel fibre-reinforced for increased impact and abrasion resistance and load carrying capacity</li> <li>• Available with Rapid Set technology</li> </ul>	Mining - Ore pass linings and brows, truck dumps, ore and rock chutes or other applications of high impact and abrasion
King® RS-D1	<ul style="list-style-type: none"> <li>• Dry Mix process shotcrete</li> <li>• Utilizing Rapid Set technology providing reduced setting times and very rapid strength development</li> </ul>	Civil Construction / Repair or Tunneling
King® RS-D2	<ul style="list-style-type: none"> <li>• Dry Mix process shotcrete</li> <li>• Utilizing Rapid Set technology providing reduced setting times and very rapid strength development</li> </ul>	Mining

# Sika® Sigunit® SHOTCRETE ACCELERATOR, SikaFiber® SOLUTIONS & EQUIPMENT

## Sigunit® SHOTCRETE ACCELERATOR

The use of shotcrete has increased in popularity as it has become the preferred method for providing rock support. This trend has also led to a higher demands being placed on the shotcrete accelerator's performance.

Project requirements, most notably in underground construction, can be especially challenging. Projects can require the accelerator to develop fast and high compressive-strengths for rapid excavation with minimal rebound to reduce waste. In addition, alkali free accelerators can be required to avoid pollution and leachate of alkalis into the ground and surface water.



### ACCELERATOR Sika® Sigunit® L-500 AFI

- High early strength development.
- Significant concrete rebound reduction.
- Good long-term strength and durability.
- Alkali-free: avoids pollution and leachate of alkalis into ground and surface water.
- Easier overhead spraying by improved adhesion of shotcrete to rock and concrete.
- Reduction of dust formation.

## SikaFiber® FULL SHOTCRETE SOLUTIONS

### SELECTING THE RIGHT SikaFiber® FOR SHOTCRETE APPLICATIONS

Fiber reinforced sprayed concrete is the most effective means of support due to speed of delivery, economy, safety, and durability.

### EQUIPMENT

Sika equipment provides a complete line of machines for processing wet and dry mix shotcrete. The equipment that Sika carries, is known for outstanding quality, functionality and reliability. In addition to traditional underground construction, we have machines that are also used in special civil engineering applications, on tunnel boring machines, and for the application of refractory material in the steel industry.



# CONCRETE SOLUTIONS

(PRE-BLENDED CONCRETE MIXES, ADMIXTURES)

Over the past one hundred 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.



## PRODUCTS

King® PC-S6 UG 35	Pre-packaged, 35 MPa concrete mix for underground construction
King® RS-S6 UG	Pre-packaged, rapid hardening concrete mix for underground construction
King® MS-S10 SCC UG	Pre-Packaged, high performance self-consolidating concrete mix for underground construction
King® LH-S10	Low-heat generating pre-packaged, concrete mix for underground construction
King® PC-S10 35	Pre-packaged, 35 MPa concrete mix for general construction
Sika® ViscoCrete®	Superplasticizers
Sika® ViscoFlow®	Slump retainers
Sika® Stabilizer	Viscosity control agents

# INJECTIONS & GROUTING SOLUTIONS

## INJECTIONS

Sika offers an extensive range of injection resin technologies for all types of applications. Unconstrained geology below ground represents a major challenge in tunneling and mining operations around the world, and Sika is there to help you meet the task.

PRODUCTS	
SikaFix®-210	2-part, fast-reacting polyurethane-based resin with short gel times and high final strength for water stopping
Sika® Injection-216	2-part polyurethane-based structural injection resin for filling and sealing voids and cracks
Sika® Injection-307	3-part polyacrylic resin with very low viscosity, and an adjustable reaction time for stopping water
SikaFix®-501	2-part Silicate-based fast curing and foaming injection resin for heading face stabilization and void filling in tunneling and mining
Sika® Injection-310 US	Single component powder based polyacrylic injection resin for waterproofing repair. Activation by just adding water produces a very low viscosity resin which cures to form a tough elastic gel
SikaFix® HH+	1-part, low viscosity, high solids, hydrophobic (water-reacted) polyurethane injection foam for water stopping and filling voids



## GROUTING

Sika is a market leader in high quality cement-based grouts. These cementitious grouts are available all over the globe and widely used within the tunneling and mining industry for many different applications.

PRODUCTS	
King® Nordic Cable	Anchoring grout specifically designed for cold weather applications
King® Nordic	Sanded grout specifically designed for cold weather applications
King®MS Cable	Neat, high performance, shrinkage-compensated, anchoring grout
King® HS Cable	Neat, high performance, shrinkage-compensated, anchoring grout for applications exposed to sulphates
Sikaset® RHE	Low temperature, non-chloride, accelerating admixture
SikaCem® Accelerator	Non-chloride hardening accelerator formulated to increase the early strength of grouts without affecting the initial workability





# MINING BACKFILL ADMIXTURES (MBF) SOLUTIONS

## MINE BACKFILL (MBF) ADMIXTURES

Sika paste and hydraulic backfill admixtures are designed to improve and optimize backfill operations and can be dosed directly into the wetted out mix in the paste plant. The admixtures can have a dramatic effect on the rheological behavior of the paste/slurry, either as a high range water reducer for paste backfill or as viscosity modifying admixture for hydraulic fill operations.



## OPTIMIZE YOUR MIX

Sika applies similar principles that we use in concrete also for mine backfill plants worldwide using our chemical toolbox. We can help you to achieve the following with your backfill paste/slurry mix:

- Reduce binder consumption
- Improve compressive strength
- Minimize segregation and bleeding
- Improve the rheological properties of the slurry or paste
- Reduce wear and tear of machinery and paste lines
- Speed up mine and fill cycle time

## Customized solutions

Every mine paste/slurry is different in terms of its granulometry, the chemical composition and the binder types used. Sika is experienced in analyzing the different pastes and slurries in order to find the admixtures that will suit best. By doing so, we are in position to deliver the competitive edge when it comes to cost reduction and mix optimization.

### PRODUCTS

Sika® Stabilizer-313 MBF	Strong high range water reducing admixture suited for a range of gold deposit and polymetallic base metal deposits
Sika® Stabilizer-510 MBF Liquid Concentrate	High range water reducing admixture suited for a range of gold deposit and polymetallic base metal deposits
Sika® Stabilizer-402 MBF	Liquid-based viscosity modifying admixture, suitable for hydraulic fill mixes containing variable proportions of sands and/or tailings which can be manufactured and/or poorly graded

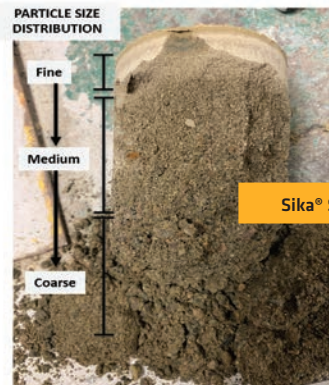


Reference (without Admixture)



### With Sika® Stabilizer-MBF

Some droplets of Sika Stabilizer-MBF can have a drastic effect on the rheology of the paste. Potential of increasing compressive strength and reducing cement through water reduction (Quebec Mine).



Reference



With Sika® Stabilizer-MBF

With Sika Stabilizer-402 MBF particles stay longer in suspension reducing the risk of pipe clogging through segregation of the water-rich slurry. Pictures show the homogenous particles distribution while filling which helps to reduce the water drainage time.

# TUNNEL BORING MACHINE (TBM) SOLUTIONS

## TUNNEL BORING MACHINE (TBM) SOLUTIONS

TBMs are very advanced equipment used as an alternative to drilling and blasting through rock and “conventional mechanical excavation” in soft ground. Mechanized tunneling has become more important with the rapid growth and expansion of underground construction in recent years. Sika provides a wide range of products designed specifically for use with a variety of TBMs, throughout the entire tunnel excavation and construction process.



PRODUCTS	
Sika® Stabilizer-1xxx TBM	A series of foaming agents for the production of injection foams which are sprayed into the tunnel face to modify the characteristics of soft ground, including its plasticity, texture and permeability, in order to make the work and progress of the TBM easier and faster
Sika® Stabilizer-2xxx TBM	A series of main drive and tail seal sealants for sealing the TBM from ground contaminants
Sika® Stabilizer-3xxx TBM	A series of water absorbing polymers, viscosity modifiers and stabilizers for foams specially formulated for improving the excavation process in difficult ground conditions
Sika® Stabilizer-5xxx TBM	A series of set retarding admixtures for cement / bentonite injection grouts, commonly used in backfilling operations during tunnel excavation with shielded TBMs
Sika® Stabilizer-6xxx TBM	A series of set and hardening accelerating admixtures for cement / bentonite injection grouts, commonly used in backfilling operations during tunnel excavation with shielded TBMs

# WATERPROOFING

Sika's waterproofing systems are designed to protect underground structures for the duration of their lifespans against water infiltration which can cause expensive and irreversible damage. Count on Sika's industry leading waterproofing systems to provide life-long protection of the structures on your project.

## Compartmentalized Membrane System with Integrated Injection Backup:

For more than 50 years, Sika's loose-laid synthetic, PVC or TPO-based membranes have been the below ground waterproofing system of choice where high performance and an 100+ year service-life is required. Through the continuous development of this technology, the service life of Sika's membranes remains unchallenged in the market and the company's leading position is also maintained by its ability to perform the most advanced material tests.

## Fully-Bonded Sheet Membranes:

Fully bonded sheet membrane systems have been developed as an alternative to the market standard loose-laid membrane systems. With a fully-bonded sheet membrane system, Sika's advanced polymeric membranes are designed to form a full surface bond with the structural concrete. The benefits of this type of system include cost-efficiency due to its ease of application, while maintaining a high level of durability.



## PRODUCTS

Sikaplan®	Loose laid PVC and TPO sheet membrane systems designed for long-term durability that can be built as standard single layer compartment systems up to an active control system to meet the highest demands of any tunnel or below ground structure
SikaProof®	Fully-bonded TPO membrane system offering a high level of waterproofing safety along with installation efficiency. Typically used for tunnel shafts and cut-and-cover tunnels
Sika® Greenstreak® PVC Waterstops	The industry's most comprehensive collection of waterstop products and solutions used to seal construction and expansion joints in concrete structures. Available in varying sizes, types, design and dimensions according to their use
Sika® Drainage Mat	Prefabricated drainage composites. Used as a protection course for Sikaplan® and/or SikaProof® membrane systems as well as to provide a means of collecting and conveying excess water to drain locations
SikaSwell®	Swellable profile and sealant waterstops which can be used in watertight concrete structures for systematic sealing of construction joints

# SIKA - YOUR SINGLE SOURCE SUPPLIER

## Roofing Systems



## Concrete Production



## Joint Sealing



## Grouting & Anchoring



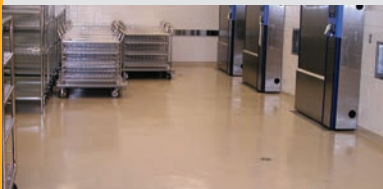
## Concrete Repair & Protection



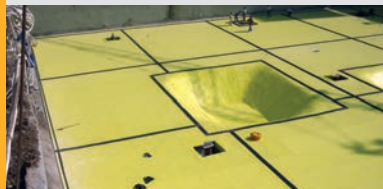
## Structural Strengthening



## Floor & Wall Systems



## Waterproofing Systems



## Masonry



## Shotcrete



## Tunneling



## Mining



Sika Canada Inc., a member of the Sika Group, is a leader in the field of speciality chemicals for construction and manufacturing industries. Our product lines feature high quality roofing systems, concrete admixtures, tunneling and mining products, mortars and resins, sealants and adhesives, structural strengthening components, industrial and decorative flooring, as well as protective coatings and waterproofing systems. Our expertise is borne out of a global presence and served by strong, local support. Sika has earned the trust of our customers for over 100 years, by delivering the highest standards of commitment and partnership.

*Our most current General Sales Conditions shall apply.  
Please consult the most current local Product Data Sheet prior to any use.*

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