



READY TO PERFORM,  
WHEN YOU NEED IT TO  
**SikaTard® 960 HC**

BUILDING TRUST



# SIKA SHOTCRETE TECHNOLOGY

Successful sprayed concrete requires the combination of many aspects of modern concrete technology especially concrete admixture chemistry, together with modern materials handling technology. The increasing demands for cost-effectiveness and the protection of health and the environment mean that sprayed concrete has been in continuous development. Sika's products for sprayed concrete represent the newest generation and cutting-edge technologies that have resulted from more than one hundred years of involvement in the business. With this experience, expert knowledge and a focus on performance and economy, Sika provides reliable proven solutions!

The multiple demands placed on sprayed concrete today no longer allow standard solutions. Dependent on the spray process and the type of structure, different conditions are imposed on the sprayed concrete during application and in service. In tunnel construction sprayed concrete is normally used for excavation stabilization, in open-pit mining and on major construction sites it is typically used for rock and soil stabilization on slopes. In bridge and other civil engineering repair and refurbishment works, sprayed concrete is often used specifically because formwork can thereby be dispensed with. Through more than 100 years of activity in these complex areas, Sika profoundly understands the difficulties and challenges and provides solutions that surmount them.



- 1 Excavation stabilization with shotcrete
- 2 Sika admixtures for an underground batching plant
- 3 Sika MiniShot - shotcrete testing in lab-scale
- 4 Slope stabilization with shotcrete

# SIKA SHOTCRETE PRODUCTS

Sika is the expert in all the available technologies for sprayed concrete, including both the wet and the dry spray processes. A combination of our research, development and globalized production of specialist sprayed concrete admixtures, such as Sigunit® and Sika® ViscoCrete®, plus our years of experience in tunneling, mining and on all types of major construction projects, this makes Sika the ideal partner for owners, designers and contractors on any type of sprayed concrete works.

Continuous innovation is the key to the global success of Sika products for sprayed concrete, mastering the increasing demands for environmental protection, cost-effectiveness and performance in service. Successful projects and references all around the world speak for us. Major new structures such as the Gotthard Base Tunnel in Switzerland and the Karahnjúkar Hydroelectric Dam in Iceland are being built today with Sigunit® and Sika® ViscoCrete® technologies. These systems are of course produced subject to the requirements of the international „Responsible Care®“ environmental management system, which also requires continuous improvement in the areas of health and safety, as well as the protection of the environment.



# SPRAYED CONCRETE – SHOTCRETE APPLICATIONS



## SHOPE 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.



## 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'S LATEST ADMIXTURE TECHNOLOGY - SIKATARD® 960 HC



## SikaTard® 960 HC

Sika's new cement hydration stabilising admixture for sprayed concrete, represents the newest generation and cutting-edge technology for tunnelling and mining. With multiple demands placed on sprayed concrete today, standard solutions are no longer enough. SikaTard®-960 HC is designed to delay the cement hydration process by stabilising the mixture for long periods so the concrete can be delivered on site to the shotcrete applicator. The cement hydration can then be reactivated with the use of Sika Sigunit® accelerators for efficient and effective application with no downtime. Sika provides a complete solution for sprayed concrete ensuring fresh concrete is delivered at its optimal performance and ready for its intended application, no matter how difficult the location or challenging the project.

# CONCRETE REQUIREMENTS AND APPLICATIONS - TUNNELING & MINING



## 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

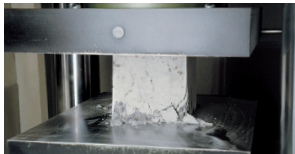
In tunnel segment production, high early strengths for rapid demolding, followed by the highest requirements with regards to performance and durability have to be fulfilled.



## SLIKLINE CONCRETE

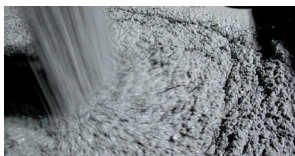
Sliklines are farthest from the concrete pump and immersed in the concrete for a lot of the time, so the mix design needs the right admixtures for the works to continue without segregation and blocking of the lines.

## 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 TECHNOLOGY



## **Sika® ViscoCrete®**

Superplasticizers with strong water reduction and extended workability times.

## **Sika® ViscoFlow®**

Special designed admixture for extended workability times under demanding conditions.

## **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.

## **SikaTell®**

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

## **SikaTard®**

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

## **SikaMix®**

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

## **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 significantly improve the ductility, impact resistance and the tensile strength of shotcrete.

# BUILDING TRUST SINCE 1910

SIKA PROVIDES WATERPROOFING SOLUTIONS FOR MORE THAN

## 100 YEARS

THE FIRST PRODUCT - SIKA®-1 - IS STILL ON THE MARKET

EVERY YEAR SIKA SUPPLIES ENOUGH ROOF MEMBRANES TO COVER THE

## WHOLE OF BRISBANE

MORE THAN

## 30%

INTERIOR NOISE REDUCTION IN VEHICLES THANKS TO SIKA'S ACOUSTIC SOLUTIONS

USING SIKA'S LONG-LASTING WINDOW INSTALLATION SEALANTS, MORE THAN

## 1 MILLION

WINDOW FRAMES ARE SEALED EACH YEAR HELPING TO SAVE MORE THAN

## 10,000

TANKER LOADS OF HEATING OIL OVER THEIR COMPLETE LIFETIME

IN 2013 SIKA LAUNCHED IT'S PATENTED ADMIXTURES

## SIKA WT-100L & SIKA WT-200P

FOR A WATERTIGHT CONCRETE SYSTEM

WITH

## 100 AWARDS

IN 18 YEARS, SIKA IS THE COMPANY WITH THE MOST CONCRETE REPAIR PROJECTS AWARDED WORLDWIDE

THANKS TO SIKA'S RANGE OF WATER REDUCERS OVER

## 25,000 MILLION LITRES OF WATER

ARE SAVED ANNUALLY IN CONCRETE PRODUCTION

IN OVER 80 COUNTRIES, MORE THAN

## 10,000 ROOFING CONTRACTORS

ARE TRAINED AND CERTIFIED BY SIKA

## 50%

OF ALL CARS PRODUCED WORLDWIDE USE SIKA PRODUCTS