



# WATERPROOFING LEAK SEALING SOLUTIONS WITH SIKA INJECTION SYSTEMS

FOR CONCRETE, MASONRY AND NATURAL STONE STRUCTURES

BUILDING TRUST



# LEAK SEALING SOLUTIONS

For Concrete, Masonry and Natural Stone Structures

**LEAKING CONCRETE STRUCTURES BELOW GROUND** such as basements and civil engineering structures, can have a greatly reduced service life due to steel corrosion and concrete damage, in addition to any reduced functionality and use. In order to avoid the expensive costs of repairs to the structure, or to water damaged interior finishing's, furnishings or other goods, plus the costs of any operational downtime, these leaks can often be securely sealed and waterproofed by injection.

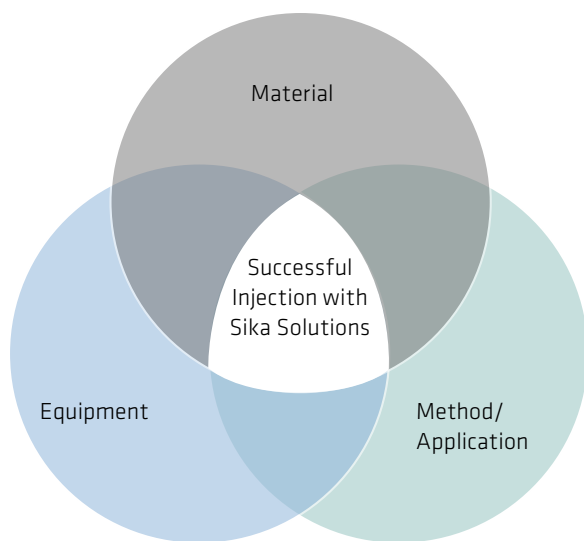
Sika provides an extensive range of injection systems for all types of leak sealing applications in concrete, masonry and natural stone structures. These can be used at any time, including during the initial construction works, or later to extend the service life during any subsequent refurbishment, according to the specific project's requirements. Sika injection systems can not only close, flexibly bridge, seal and make leaking structures watertight for the long term, some can also be used to increase or restore structural integrity and load bearing capacity, thereby providing complete and durable maintenance solutions.

Sika's high performance injection materials are also fully compatible with Sika's complete Engineered Waterproofing range and they can be used for the repair and sealing of cracks, voids, joints, hoses and compartment systems in many different structures. As a prerequisite, all of Sika's injection products are also fully tested and conform to all of the relevant global standards.



# SUCCESSFUL WATERPROOFING WITH SIKA INJECTION SYSTEMS

There are three primary success factors involved in ensuring the effectiveness and durability of injection works. It is essential that the right combination of injection materials, injection equipment and injection method must be selected and this is what Sika's extensive technical and practical experience provides:



## **INJECTION MATERIAL**

The selection of the right injection material and indeed the right specific injection product for the defined project requirements is the first key factor for success. This especially means the materials viscosity, flexibility and behaviour in contact with water that can all significantly influence the effectiveness of the injection.

## **INJECTION EQUIPMENT**

Appropriate equipment for the selected injection material, including for the correct preparation, mixing and delivery of the material is the second key success factor. This means everything from the initial dosage and mixing, through delivery from a suitable pump, to use of the right packers/ports/connectors.

## **INJECTION METHOD / APPLICATION**

Thirdly, the correct injection method and application techniques must be used by trained, competent and experienced contractors, in order to ensure the success and provide complete and permanent leak sealing solutions

## ADDITIONAL ADVANTAGES OF SIKA

### **COMPLETE SIKA SOLUTIONS**

Sika is a 'full range' supplier, which means that Sika not only has the full range of alternative injection technologies and materials, but we are also the world's leading supplier of engineered waterproofing, concrete repair and protection solutions in order to prevent, or to seal and waterproof, any types of leaks in your structure – from the 'Basement to the Roof.'

### **SIKA INJECTION SOLUTIONS TO GLOBAL STANDARDS**

Sika's injection solutions are tested and approved to the leading global standards to provide safe and reliable injection solutions.

### **TECHNICAL EXPERTISE AND PRACTICAL EXPERIENCE**

Sika provides advice and support from the design office through to completion of the injection and any associated works on site. This expert technical advice and practical assistance is to help you ensure the selection and installation of the right injection materials, with the equipment and application methods etc.

### **TRAINING**

We understand that on many projects it will be preferable to use an experienced Specialist Contractor for injection works to seal any leaks that occur, whilst on others for different practical and logistic reasons, it will be better to train teams from the main contractor to do the work. This is why Sika provides unrivalled technical and practical training both on and off site, to help ensure that both the engineering staff and the site operatives fully understand the requirements and procedures – all supported with Sika's detailed documentation including Method Statements and Quality Control checklists.

### **LOCAL SIKA PRESENCE**

All around the world there are experienced Sika professionals to provide this technical support exactly where it is required, in your office or on site.

# TYPICAL SOURCES OF LEAKS IN CONCRETE STRUCTURES



1



Leaking Cracks

2

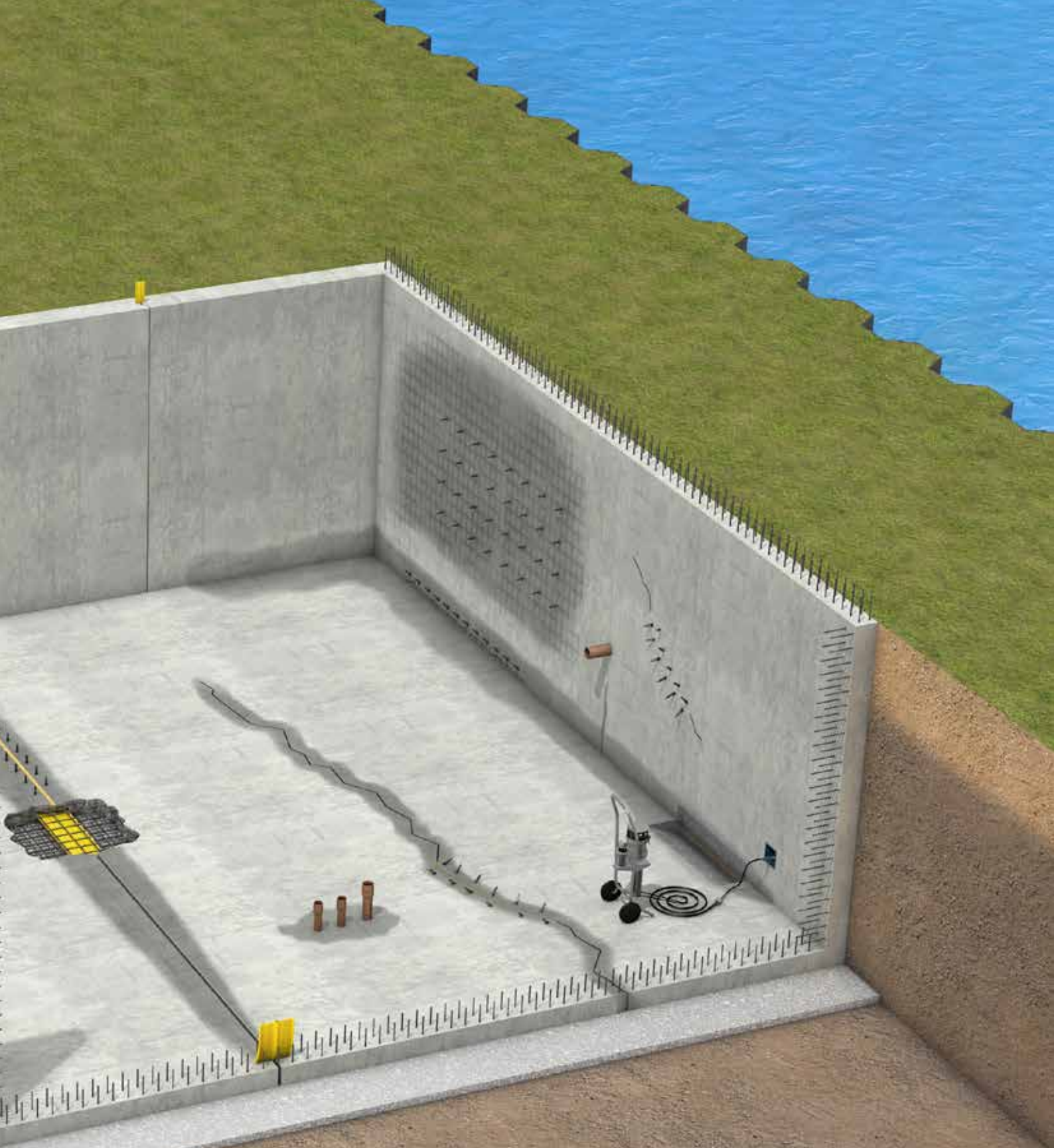


Leaking Construction Joints

3



Leaking Movement Joints

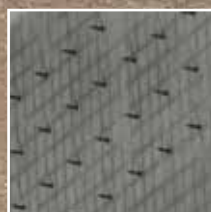


4



Leaking Areas of Voids i.e. Honeycombing

5



Leaking Areas i.e. at Wall Ties

6



Leaking Compartment Membrane System

7



Leaking Penetrations i.e. Pipe Penetrations

# INJECTION MATERIAL TECHNOLOGIES AND SIKA INJECTION PRODUCTS



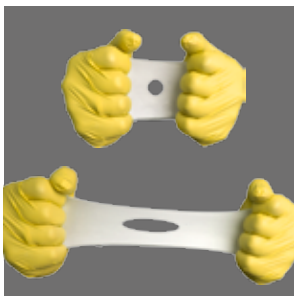
## **POLYURETHANE FOAM RESINS**

Polyurethane foaming resins are designed to expand with water to temporarily block the passage of water through the crack or void. Their fast expansive reaction with water forms a tough and flexible / elastic foam. For permanent waterproofing, these polyurethane foaming resins are re-injected with a suitable non-foaming injection resin – usually also based on polyurethane as below.



## **POLYURETHANE RESINS**

Polyurethane resins are hydrophobic, flexible and used for the non-structural injection sealing and waterproofing of voids, cracks and joints. Their low viscosity allows good penetration into the concrete structure to seal the leaks and achieve a durable elastic seal. Polyurethane resins seal with very good edge adhesion to concrete and their hydrophobic characteristics. In voids, cracks and joints with high water ingress, pre-injection as temporary waterstopping with a Polyurethane foaming resin as mentioned above is required.



## **ACRYLATE RESINS**

Acrylate resins are hydrophilic, very flexible and used for non-structural injections of cracks, joints and voids, including for injection hose systems, compartment systems and area (e.g. Grid and Curtain) injection works. For application Acrylate resins have an extremely low viscosity (similar to water) and therefore have ideal penetration abilities. Their reaction (hardening) time is also adjustable, which allows flexibility in adaptation of the injection material to the prevailing conditions on site (e.g. temperature and injection distance etc.). Acrylate resin based materials seal and waterproof leaks through their hydrophilic swelling behaviour in contact with water. The injection equipment is also easily cleaned with water.



## **EPOXY RESINS**

Epoxy resins have relatively high tensile and compressive strengths in relation to concrete, they are generally regarded as 'rigid' materials and widely used for structural repairs by injections of cracks and voids in load bearing reinforced concrete structures or elements. Their low viscosity allows excellent penetration into cracks in the structure and this also helps to ensure permanent and durable load transfer based on their excellent adhesion to the concrete. Epoxy resin based materials are suitable for many different structural injection requirements and applications in dry and slightly damp.



## **MICROFINE CEMENT SUSPENSION**

Microfine cement suspensions are non-flexible and therefore non-movement accommodating, rigid, polymer modified, injection materials (also often known as Microfine cement grouts), which are based on blends microfine cements. They are now widely used for structural injection works to seal non-moving cracks, voids and daywork joints for example. Due to their polymer modification, these cement based materials can also have high flow characteristics and very good penetration ability.

**Sika® Injection-101 RC**

Sika® Injection-101 RC is a low viscosity, fast-foaming, solvent-free, water-reactive polyurethane foaming resin based injection product, which cures to a very dense and hard-elastic foam with a very fine cellular structure. It has stable expansion with no shrinkage after curing. The free-foaming volume expansion rate in contact with water is up to 40 times. The reaction time of Sika® Injection-101 RC can be even further accelerated with Sika® Injection-AC10.

**Sika® Injection-105 RC**

Sika® Injection-105 RC is a low viscosity, fast-foaming, solvent-free, water-reactive polyurethane foaming resin based injection product, which cures to a dense elastic foam with a fine cellular structure. It has a free-foaming volume expansion rate in contact with water of up to 15 times.

**Sika® Injection-201 CE**

Sika® Injection-201 CE is a very low viscosity, solvent-free non-foaming polyurethane resin based injection product, which hardens in both dry and wet conditions. In contact with water it will form an elastic and flexible compound and therefore this also helps to create a durable watertight pore structure within the concrete. Sika® Injection-201 CE is tested and approved to EN 1504-5, and has an easy to use mixing ratio of 1:1 by volume. The hardening reaction can also be further accelerated with Sika® Injection-AC20.

**Sika® Injection-203**

Sika® Injection-203 is a very low viscosity, elastic and solvent-free, polyurethane resin based injection product, which hardens in both dry and wet conditions to form an elastic, watertight void filling and crack sealing material. Sika® Injection-203 has a mixing ratio of 2:1 by volume and is tested and approved according to European Standard EN 1504-5, and German Standard ZTV-Ing (RISS).

**Sika® Injection-304**

Sika® Injection-304 is a ultra-low viscosity, elastic and very quick-setting polyacrylic resin based injection gel. The reaction time is adjustable between 40 seconds and 4 minutes. Due to this fast reaction time, Sika® Injection-304 is only injected with a two component pump and it is generally used for sealing and waterproofing areas of damage or leaks with high water ingress, including under hydrostatic pressure.

**Sika® Injection-306**

Sika® Injection-306 is an ultra-low viscosity, very elastic, polyacrylic resin based injection product with a versatile and adjustable hardening time. Sika® Injection-306 hardens in both dry and wet conditions to form an elastic and flexible gel-like material, which also has high chemical resistance. It can be injected with either a 1- or 2-Component Injection pump and is mainly used as a re-injectable leak sealing resin system for SikaFuko® hoses and around damaged membrane / compartment systems. The reaction time is adjustable between 8 and 50 minutes.

**Sikadur®-52 N/LP**

Sikadur®-52 is a rigid, solvent-free, low viscosity, high strength structural, epoxy resin based injection product with medium and long pot-life grades available. It is used to structurally bond and seal cracks over 0.3 mm in width. Sikadur®-52 is also tested and approved according to European Standard EN 1504-5.

**Sika® Injection-451**

Sika® Injection-451 is a solvent free, very low viscosity, high strength structural epoxy resin based injection product. It was specially developed for its penetrating abilities in order to structurally bond and seal finer cracks down to only 0.1 mm in width. It is also tested and approved according to German Standard ZTV-ING (RISS).

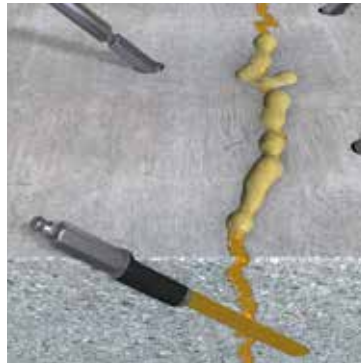
**Sika® InjectoCem®-190**

Sika® InjectoCem®-190 is a rigid, two component injection product, based on a blend of polymer modified microfine cements. It is widely used for sealing, filling and structural strengthening of wider cracks and into or around construction joints. It is also used for the injection of SikaFuko® Injection Hoses as a re-injectable system.

# SELECTION OF SIKA INJECTION MATERIALS

## PROBLEM

Leaking Cracks / Penetrations  
Dry and / or containing water



## REQUIREMENTS

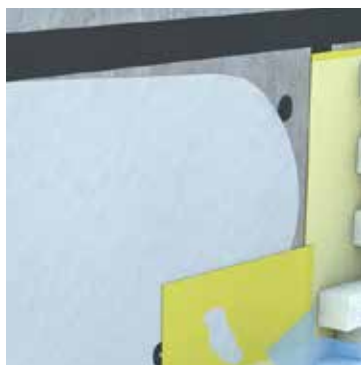
- Waterproofing cracks and around penetrations of width  $>0.2$  mm with hydrostatic pressure
- Waterproofing cracks and around penetrations of width  $>0.2$  mm without hydrostatic pressure (dry, damp or wet surfaces)
- Force transfer across dry cracks of width  $>0.3$  mm
- Force transfer across dry cracks of width  $>0.1$  mm

Leaking Expansion Joints (movement) and Construction / Daywork Joints (non-moving)



- Waterproofing construction joints with and without hydrostatic pressure
- Waterproofing joints where the original joint sealing / waterproofing system is damaged or was not properly installed

Leaking Membrane Compartment Systems



- Waterproofing damaged and leaking sheet membrane compartment systems

Leaking Wall / Kicker Areas



- Grid injection (into the surface for larger areas e.g. Honeycombing or poor concrete compaction etc.)
- Curtain injection (e.g. behind the structure or element to seal leaks due to multiple tie bar holes or other multiple minor defects / leaks)



CRITERIA	SUITABLE SIKA INJECTION PRODUCTS
<ul style="list-style-type: none"> <li>■ Fast and stable foaming and expansion, for temporary sealing, plus very low viscosity and long-term flexibility for permanent sealing and waterproofing.</li> </ul>	<ul style="list-style-type: none"> <li>■ Sika® Injection-101 RC /-105 RC (for temporary sealing) followed by: Sika® Injection-201 CE /-203 (for permanent flexible sealing)</li> </ul>
<ul style="list-style-type: none"> <li>■ Very low viscosity and long-term flexibility for permanent sealing</li> </ul>	<ul style="list-style-type: none"> <li>■ Sika® Injection-201 CE /-203 (for permanent flexible sealing)</li> </ul>
<ul style="list-style-type: none"> <li>■ Low viscosity, rigid, excellent adhesion and full bond to the crack substrate surfaces for structural bonding</li> </ul>	<ul style="list-style-type: none"> <li>■ Sikadur®-52</li> </ul>
<ul style="list-style-type: none"> <li>■ Very low viscosity, rigid, excellent adhesion and full bond to the crack substrate surfaces for structural bonding.</li> </ul>	<ul style="list-style-type: none"> <li>■ Sika® Injection-451</li> </ul>
<ul style="list-style-type: none"> <li>■ Fast and stable foaming and expansion for temporary sealing, plus very low viscosity and long-term flexibility for permanent sealing and waterproofing.</li> </ul>	<ul style="list-style-type: none"> <li>■ Sika® Injection-101 RC /-105 RC (optional for temporary sealing in case of hydrostatic pressure) followed by: Sika® Injection-201 CE /-203 (for permanent flexible sealing)</li> </ul>
<p><i>Pre-installed SikaFuko® injection hose system in construction joints or as a back-up system on waterbars:</i></p>	<ul style="list-style-type: none"> <li>■ Sika® Injection-306 (for permanent flexible sealing)</li> <li>■ Sika® InjectoCem®-190 (for use in dry areas only)</li> </ul>
<ul style="list-style-type: none"> <li>■ Very low viscosity, long term flexibility, long pot-life for optimum penetration, re-injectable for permanent sealing</li> </ul>	
<p><i>Damaged expansion sections of waterbars:</i></p> <ul style="list-style-type: none"> <li>■ Low viscosity, long term high flexibility, with adjustable reaction times for permanent sealing..</li> </ul>	<ul style="list-style-type: none"> <li>■ Sika® Injection-306 (for permanent flexible sealing)</li> <li>■ Sika® Injection-304 (for permanent flexible sealing)</li> </ul>
<ul style="list-style-type: none"> <li>■ Extremely low viscosity, highly flexible, long pot-life / extended reaction time, re-injectable for permanent sealing</li> </ul>	<ul style="list-style-type: none"> <li>■ Sika® Injection-306 (for permanent flexible sealing)</li> </ul>
<ul style="list-style-type: none"> <li>■ Low viscosity, void filling, rigid material for load transfer in both (dry and damp areas)</li> </ul>	<ul style="list-style-type: none"> <li>■ Sika® InjectoCem®-190 (dry area) (optional, patch repairs with Sikadur®-31 CF)</li> </ul>
<ul style="list-style-type: none"> <li>■ Very low viscosity, flexible, designed for permanent sealing (in wet areas)</li> </ul>	<ul style="list-style-type: none"> <li>■ Sika® Injection-306 /-304 (optional, patch repairs with Sikadur®-31 CF)</li> <li>■ Sika® Injection-201 CE /-203 (optional, patch repairs with Sikadur®-31 CF)</li> </ul>
<ul style="list-style-type: none"> <li>■ Extremely low viscosity, highly flexible, adjustable reaction time, designed for permanent sealing</li> </ul>	<ul style="list-style-type: none"> <li>■ Sika® Injection-306 /-304</li> </ul>

# EQUIPMENT FOR SIKA INJECTION MATERIALS

## INJECTION PUMP TECHNOLOGIES FOR SUCCESSFUL WATERPROOFING

There are two different pump technologies available on the market today for resin and microfine cement injection, there are 1- and 2-component pumps. The most widely used are the 1- or single component pumps, which have the key advantage of being available for a much lower cost, and so the contractor's investment is a fraction of what it would be for a 2- or two component pump. The main reason that 2-component pumps are still used is that they are the best and in fact the only way to inject fast and very fast curing resins, because of their extremely short pot-life; plus they are best for injecting large volumes of material.

### SINGLE-COMPONENT PUMPS:

The storage container of the pump is filled with the pre-mixed resin or microfine cement grout. The pot-life of this injection material starts after mixing and it is always necessary to apply the complete mixed volume within the relevant pot-life.

There are hand, piston and diaphragm pumps available using 1-component pump technologies and they are designed to accommodate and handle small or medium volumes of injection material.

### TWO-COMPONENT PUMPS:

These have two storage containers and each container is filled separately with a different component; with the components only coming together when they are pumped through the static mixer. The pot-life therefore starts in the static mixer and so this kind of pump can be used for very fast reacting resin based materials.

There are 2-component pumps designed specifically for each of the different resin technologies available, which is due to their differing viscosity, mixing ratio and reaction time etc., as well as for different types of applications. For fast-gelling acrylate or polyacrylate resins as they are also known, a separate rinsing pump is recommended to be used for cleaning the pump and static mixer.

There are also 2-component piston pumps available which can successfully inject medium to high volumes of 2-component PU or epoxy resins, even against high hydrostatic pressure.

		Single-component pump	Two-component pump (Acrylate)	Vacuum pump	Colloidal Mixer
<b>Polyurethane Foam Resins</b>	Sika® Injection-101 RC Sika® Injection-105 RC	X			
<b>Polyurethane Resins</b>	Sika® Injection-201 CE Sika® Injection-203	X			
<b>Acrylate Resins</b>	Sika® Injection-306	X	X	X	
	Sika® Injection-304		X		
<b>Epoxy Resins</b>	Sikadur®-52 Sika® Injection-451	X			
<b>Microfine Cement</b>	Sika® InjectoCem®-190	X		X	X

## INJECTION EQUIPMENT FOR SUCCESSFUL WATERPROOFING

### **SINGLE COMPONENT PUMPS FOR POLYURETHANE (PU), POLYACRYLATE AND EPOXY RESINS, PLUS MICROFINE CEMENT SUSPENSIONS**

Single component pumps are the universal injection pumps and suitable for a wide range of applications. They are ideal for professional crack sealing applications and for the injection of SikaFuko® hoses and membrane compartment systems.



### **TWO-COMPONENT PUMPS FOR POLYACRYLATE GELS**

Two component pumps are designed for curtain injection behind the structure, for high volumes, or using fast reacting polyacrylate gel resins.



### **VACUUM PUMPING EQUIPMENT FOR RE-INJECTION OF SikaFuko® INJECTION HOSE SYSTEMS**

Vacuum pumping equipment is important for reinjection of the SikaFuko® Injection hose systems. It is used for flushing and cleaning the SikaFuko® hoses with water after injection with acrylate gel or microfine cement materials, to enable the system to be used for future re-injection if required.



### **MIXING EQUIPMENT FOR MICROFINE CEMENT SUSPENSIONS**

A colloidal mixer is needed for the complete and thorough mixing of microfine cement suspensions such as the high performance Sika® InjectoCem®-190.



# SIKA ACCESSORIES FOR SUCCESSFUL INJECTION WORKS

## SIKA® INJECTION PACKERS FOR DIFFERENT APPLICATIONS

Sika® Injection Packers or Ports as they are also known, are fixed into or onto the structure and are used as nozzles to connect the injection pump to the structure and direct the material to fill the cracks or voids. Sika Connection Packers are used to connect embedded injection hoses or compartment systems.

### MECHANICAL PACKERS

for high and low pressure injection where drilling holes is possible



**Type MPS**

For Polyurethane, Epoxy and Acrylate resin injection.



**Type MPR**

For Polyurethane, Epoxy and Acrylate resin injection.



**Type MPC**

For Microfine cement injection.

### SURFACE PACKERS

for low pressure injection, where drilling holes in the surface is not possible or best avoided due to damage or the location of steel reinforcement etc.



**Type SP**

For Epoxy injections - generally with patch repairs.

### CONNECTION PACKERS

#### Sikaplan® W Injection piece

for injection of membrane compartments



**Type Sikaplan® W Inj.**

For Acrylate injection

#### SikaFuko® Packer tong

for Injection of SikaFuko® Injection hose System



**Type SikaFuko® Packer tong**

For Acrylate, Polyurethane, Epoxy and microfine cement injections.

			Packer Type					
			Mechanical			Surface	Connection	
Application	Concrete/Substrate Condition/Quality	Injection Pressure	MPS	MPR <sup>1</sup>	MPC <sup>2</sup>	SP	Sikaplan® W Inj.	SikaFuko® Packer tong
Crack and void injection	Drilling not possible (steel reinforcement)	1 - 10 bar				X		
	Good or Poor (drilling is possible!)		X	X	X	X		
SikaFuko® injection								X
Compartment injection	N/A						X	
Curtain injection	Good or Poor (drilling is possible!)	10 - 200 bar		X <sup>4</sup>				
Crack and void injection			X	X				

1) Recommended for high pressures and high flow rates 2) Specially designed for injection with microfine cement 3) Just 13 mm diameter 4) Only with button head (non-return) fitting

## SIKA® INJECTION EQUIPMENT / PUMP CLEANING SYSTEM

Sika® Injection Cleaning System includes a full range of cleaning and conservation agents for the efficient and reliable use, storage and re-use of all types of injection pumps with the Sika® Injection product ranges. All of the Sika Cleaning and Conserving products are produced free of CFC's, FC and chlorine.

### Sika® Injection Cleaner C1

Sika® Injection Cleaner C1 is a cleaning agent for cleaning injection pumps during or directly after the injection. It removes uncured liquid epoxy and polyurethane resin materials completely.

### Sika® Injection Cleaner C2

Sika® Injection Cleaner C2 is a very strong cleaning agent for removing residues of cured resins. It should only be used to remove cured resins during the repair and maintenance of the injection pumps. This Cleaner must not be used for rinsing the injection pumps after use.

### Sika® Injection Conservator

Sika® Injection Conservator cares for the valves and seals of a pump after use and in storage, it should always be used and is particularly useful when it is not known when the next use of the pump will be, or when it is known that the pump will not be used for a long time.

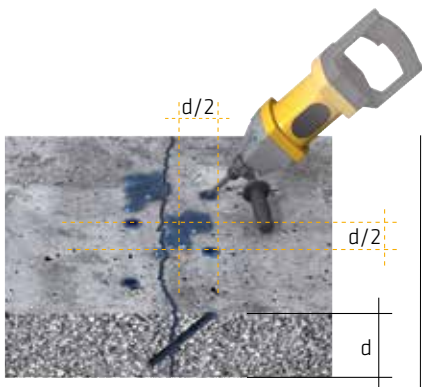


	Polyurethane Foams	Polyurethane Resins	Epoxy Resins	Acrylate Resin	Cement based products
	Sika® Injection-101 RC Sika® Injection-105 RC	Sika® Injection-201 CE Sika® Injection-203	Sika® Injection-451 Sikadur®-52	Sika® Injection-304 Sika® Injection-306	Sika® InjectoCem®-190
Inter-mediate Cleaning	Sika® Injection Cleaner C1	Sika® Injection Cleaner C1	Sika® Injection Cleaner C1	Water	Water
Final Cleaning	Sika® Injection Cleaner C 1	Sika® Injection Cleaner C 1	Sika® Injection Cleaner C 1	Water + standard dish liquid	Water
Cleaning of cured material	Sika® Injection Cleaner C 2	Sika® Injection Cleaner C 2	Sika® Injection Cleaner C 2	Sika® Injection Cleaner C 2	Mechanically
Conservation of pumps	Sika® Injection Conservator	Sika® Injection Conservator	Sika® Injection Conservator	Sika® Injection Conservator	Sika® Injection Conservator

# THE CRACK INJECTION PROCESS

**CRACKS IN CONCRETE STRUCTURES** can be caused as the result of excessive load or stress on the structure by internal or external forces (e.g. ground movement). Leaking cracks need to be closed and sealed to secure the watertightness and durability of the structure.

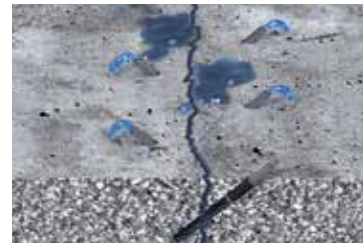
## SEQUENCE OF APPLICATIONS



**1.** Drill holes for the packer alternating at a 45° angle to the concrete surface as shown in the picture.  
Ø of drill hole = Ø of packer + 2 mm.



**2.** Install the mechanical packers. Tighten the mechanical packers so that they can withstand the maximum injection pressure.



**3.** Fix the non-return valve on the first packer and start the injection process.

**4.** When the injection material flows out of the second packer during the injection process, fix the non-return valve on to this as quickly as possible. Stop injection at the first packer and continue at the second packer.

**5.** Repeat this procedure from packer to packer.

**6.** If necessary, e.g. after injection of PU-foaming resins, a secondary injection procedure is carried out to ensure the crack is completely filled and sealed with non-foaming PU injection material.



### GENERAL INFORMATION

- On vertical elements always start injection from the bottom and work upwards
- Slow, low pressure injection is more effective than rapid, high pressure injection
- For detailed information please refer to the Sika Method Statement for Crack Injection (Waterproofing)

### TYPICAL SIKA PRODUCT

*For Waterproofing:*

Sika® Injection-101 RC (temporary)  
+ Sika® Injection-201 CE (permanent)

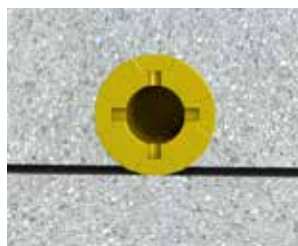
*For Load Transfer:*

Sikadur®-52

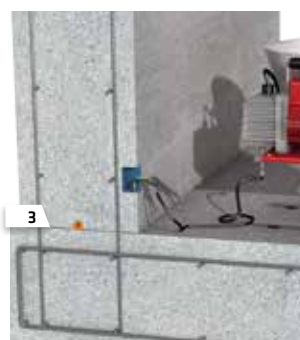
# JOINT INJECTION WITH SikaFuko® INJECTION HOSE SYSTEM

**SikaFuko® INJECTION HOSE SYSTEM** is used on its own for construction joint sealing, or it is used as a back-up system in combination with waterbars. Installation is done during the concreting phases of the project.

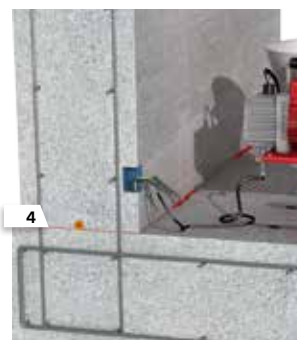
## SEQUENCE OF APPLICATIONS



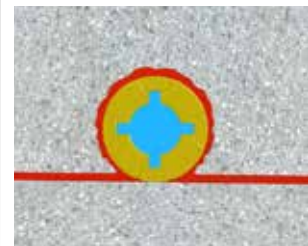
1. Locate start and end of injection hose in the affected construction joint e.g. in junction boxes.
2. Connect the pump to the injection hose system e.g. through Sika® Packer tong.



3. Begin injecting the SikaFuko® hose until the material flows out of the opposite end.



4. Close the opposite end and start injecting again until material is seeping out along the length of the joint.



5. When using re-injectable materials, the SikaFuko® hose can be flushed clean with water which is also removed by vacuum. The SikaFuko® hose is then ready for future re-injection if required.

### GENERAL INFORMATION

- SikaFuko® Systems must be installed before concreting the construction joint
- Documenting the location of the junction boxes and run of the hoses is important
- For detailed information please refer to the Sika Method Statement for SikaFuko®
- On vertical elements always start injection from the bottom and work upwards
- Slow, low pressure injection is more effective than rapid, high pressure injection

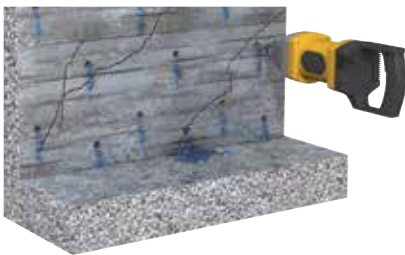
### TYPICAL SIKA PRODUCT

Sika® Injection-306

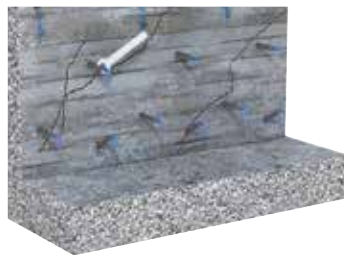
# THE CURTAIN INJECTION PROCESS

**BASEMENTS CAN DEVELOP LEAKS** over large sections of their whole area for many reasons including inadequate concrete mix design, placing or compaction, in addition to ground movement and rising water tables etc. These larger areas can be sealed by curtain injection behind the concrete structure.

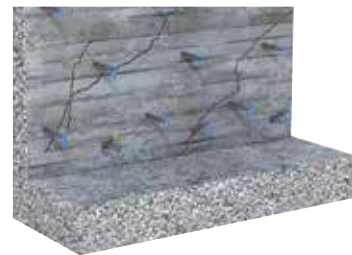
## SEQUENCE OF APPLICATIONS



**1.** Drill holes for the mechanical packers through the leaking building component at a spacing of 30 – 50 cm as shown in the picture.



**2.** Install the mechanical packers. Tighten the mechanical packers so that they can withstand the maximum injection pressures.



**3.** Fix the button head (non-return) fittings on the first packer and start the injection process at the lowest row of drill holes.

**4.** When the injection material flows out of the second packer during the injection process, fix the non-return valve on it as quickly as possible. Stop injection at the first packer and continue at the second packer.

**5.** Continue the injection procedure from packer to packer.



### GENERAL INFORMATION

- On vertical elements start injection from the bottom and work upwards
- Slow, low pressure injection is more effective than rapid, high pressure injection
- Detailed recording of the material flow in and out of each packer is important
- Test injection is recommended to define the best spacing for the packers

### TYPICAL SIKA PRODUCT

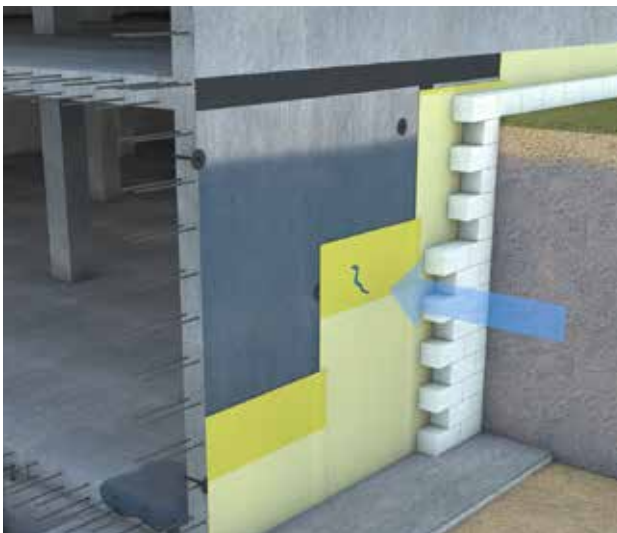
- Sika® Injection-306
- Sika® Injection-304 (high water ingress)



# THE MEMBRANE COMPARTMENT INJECTION PROCESS

**COMPARTMENTALIZED MEMBRANE SYSTEMS ARE USED** for securely waterproofing basements so that in the event of any future leaking or damage to the membrane, any leaking compartment can easily be repaired and sealed by injection through flanges accessible from inside the structure.

## SEQUENCE OF APPLICATIONS



1. Remove the face-plate from the junction box and expose the Control Tube vent ends for the leaking compartment. Connect a Sikaplan® W Injection Piece to one vent end.

2. Once a secure connection is made with the Sikaplan® W Injection Piece, start the injection pump. The injection process can be monitored through the remaining open vent ends of the same compartment.

3. Once the injection material is observed flowing out of an adjacent vent end, stop the pump (or close the valve on the pump assembly). Plug the vent end releasing injection material with a Sikaplan® W Injection Piece. Start pumping again through the same vent end that was being injected prior to observing material being released.

4. Repeat these procedures until all the vent ends of this compartment are injected and any water in the compartment is fully displaced and replaced by resin.

5. When the compartment vent ends are all filled with uncured injection resin under pressure, stop the pump.

6. The cleaning process to leave the Control Tubes re-injectable must begin before the injection material cures in the Control Tube vent ends.

### GENERAL INFORMATION

- It is important that the entire compartment be fully injected. Partially filled compartments do not guarantee long term watertightness
- On vertical elements always start injection from the bottom and work upwards
- Slow, low pressure injection is more effective than rapid, high pressure injection
- Very good documentation is important during installation of the membrane system
- For more detailed information please refer to the Sika Method Statement for Membrane Compartment injection

### TYPICAL SIKA PRODUCT

Sika® Injection-306

# CASE STUDIES

## SURFACE SEALING A LEAKING SHAFT



### PROBLEM

An inadequate waterproofing system had been selected for a concrete shaft standing in groundwater. Water was infiltrating the shaft from several construction joints and damaging the electrical installations.

#### Injection Material Requirements

- Very fast reacting
- Able to form a new permanent watertight seal
- Environmentally friendly

### SIKA SOLUTION

Curtain injection with

- Fast reacting polyacrylate gel resin Sika® Injection-304

#### Injection Equipment

- Sika® Injection Pump PN-2C and Sika® Injection Packer MPR with button head fittings

## SEALING CRACKS IN A BASEMENT



### PROBLEM

A basement garage built with waterbars, suffered settlement cracks in the structure after construction. Water was infiltrating because the garage was exposed to groundwater under hydrostatic pressure.

#### Injection Material Requirements

First phase:

- Fast foaming injection resin
- Reacting only in contact with water

Second phase:

- Low viscosity
- No shrinkage in subsequent dry conditions
- Good adhesion to concrete
- Environmentally friendly and chemically resistant

### SIKA SOLUTION

Crack injection with

- Fast reacting polyurethane foaming resin Sika® Injection-101 RC for temporary waterstopping
- Elastic, non-foaming polyurethane resin Sika® Injection-201 CE for permanent waterproof sealing

#### Injection Equipment

- Sika® Injection Pump EL-2 and Sika® Injection Packer MPS

## SEALING OF DAMAGED TUNNEL WATERPROOFING MEMBRANES



### PROBLEM

A tunnel below groundwater level was originally waterproofed with sheet membranes and waterbars. Membranes were damaged during the construction works but this went unnoticed until later when the tunnel began leaking. Fortunately the damage location was easily identified as the membrane and waterbars were formed into compartments.

#### Injection Material Requirements

- Permanently elastic
- Able to form a new permanent watertight seal
- Gel time able adaptable to specific requirements
- Capable of absorbing (swelling) and releasing (shrinking) in contact with water for future security

### SIKA SOLUTION

Compartment injection with

- Acrylate resin gel based Sika® Injection-306

#### Injection Equipment

- Sika® Injection Pump PN-2C

## STRUCTURAL CONCRETE CRACK REPAIRS ON A BRIDGE



### PROBLEM

Cracks with the potential to become a significant structural problem occurred in the support piers of a motorway bridge due to excessive dynamic loads from increased traffic.

#### Injection Material Requirements

- Different viscosities to suit different crack widths
- High mechanical and adhesive strengths
- Suitable for both dry and damp crack conditions

### SIKA SOLUTION

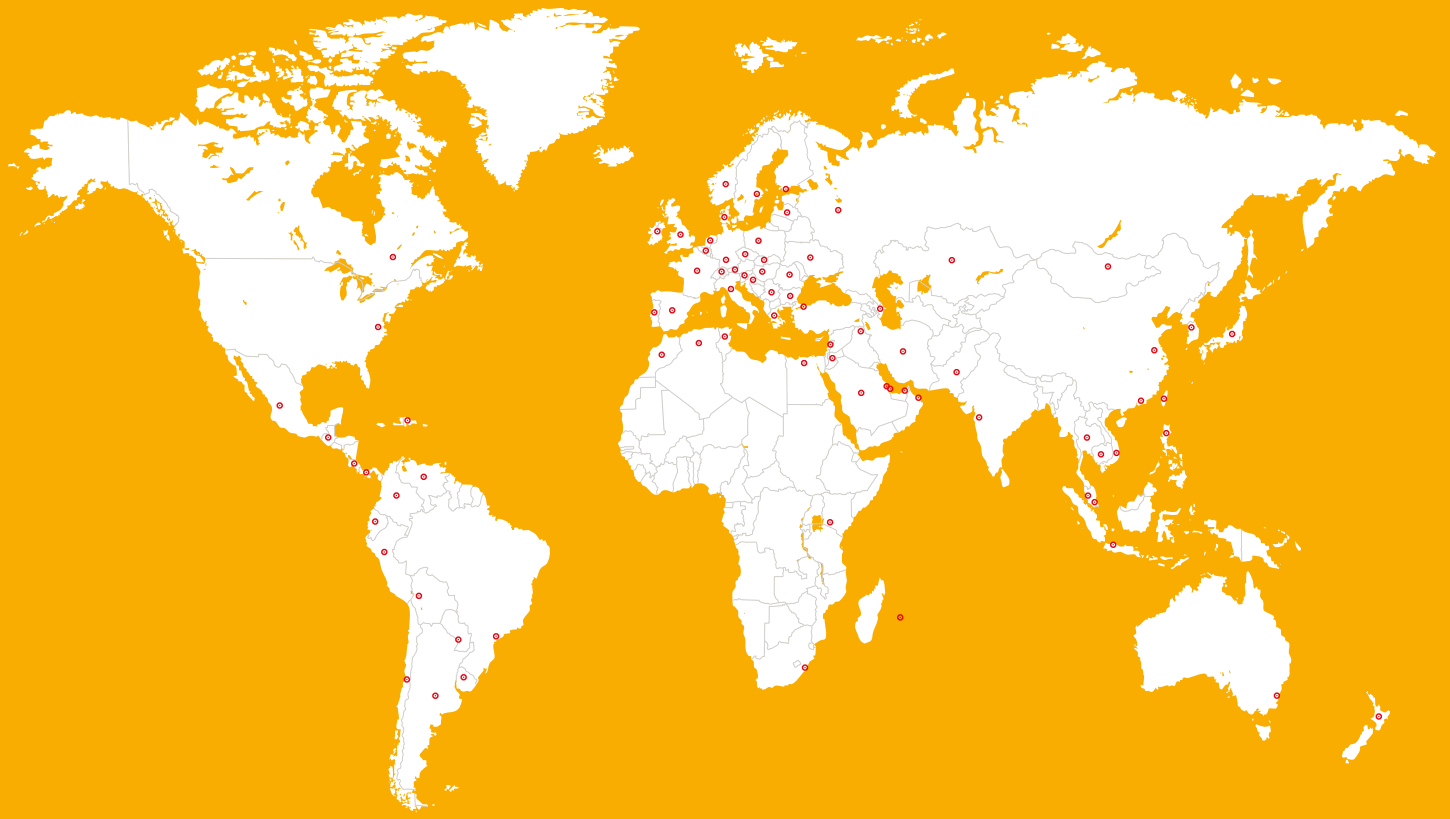
Crack injection with

- Low viscosity epoxy resin based Sikadur®-52 Injection for cracks >0.3 mm
- Ultra-low viscosity epoxy resin based Sika® Injection-451 for cracks 0.1 – 0.3 mm
- Epoxy patch repair material Sikadur®-31 CF

#### Injection equipment

- Sika® Injection Pump EL-2 and Sika® Injection Packer SP

# GLOBAL BUT LOCAL PARTNERSHIP



## FOR MORE INFORMATION:



### WHO WE ARE

Sika AG, Switzerland, is a globally active specialty chemicals company. Sika supplies the building and construction industry as well as manufacturing industries (automotive, bus, truck, rail, solar and wind power plants, façades). Sika is a leader in processing materials used in sealing, bonding, damping, reinforcing and protecting loadbearing structures. Sika's product lines feature highquality concrete admixtures, specialty mortars, sealants and adhesives, damping and reinforcing materials, structural strengthening systems, industrial flooring as well as roofing and waterproofing systems.

Our most current General Sales Conditions shall apply.  
Please consult the Data Sheet prior to any use and processing.



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