REFURBISHMENT
TOTAL CORROSION MANAGEMENT OVERVIEW

BUILDING TRUST

SIKA TOTAL CORROSION MANAGEMENT SYSTEMS ARE SUITABLE FOR ...

... MANY TYPES OF CONCRETE STRUCTURES

All reinforced concrete structures can suffer from damage and deterioration at some stages during their life span. Reliable Sika Total Corrosion Management Systems encompass an effective range of complete repair and protection solutions.

Infrastructure

Power Plants

Car Parks

Marine

Buildings

Silos

... ALL TYPES OF CORROSION PROBLEMS

The most common causes of steel reinforcement corrosion in concrete are carbonation or chloride ingress with water. Understanding the root cause of this steel corrosion determines the most effective repair and protection strategy. Sika's Total Corrosion Management systems then provide flexibility and choices to select the best and most cost effective solutions.

Chloride induced corrosion from sea water or de-icing salts

Atmospheric carbonation induced corrosion

TOTAL CONCRETE REFURBISHMENT MANAGEMENT

REINFORCED CONCRETE is the most widely used construction material in civil engineering. This composit material is valued for its compressive strength, availability, affordability, ease of use, and durability. However, despite these advantages, concrete has two durability weaknesses – it is porous and prone to cracking. Over time, this allows contaminants to penetrate, leading to deterioration and steel reinforcement corrosion. Traditionally, these issues are addressed with high-quality mix designs, sufficient reinforcement cover, and a high cement content. Today, the operation of old deteriorating structures and the demand for more CO_2 reduced, durable, and leaner construction is driving the need for additional solutions. Sika offers a wide range of innovative solutions to extend the lifespan of structures, improve concrete quality and protect it, thereby reducing the need to demolish and rebuild structures that could be preserved.

We categorize these solutions in 4 fields: corrosion, protection, repair and strengthening management. This overview-brochure only covers the first two.

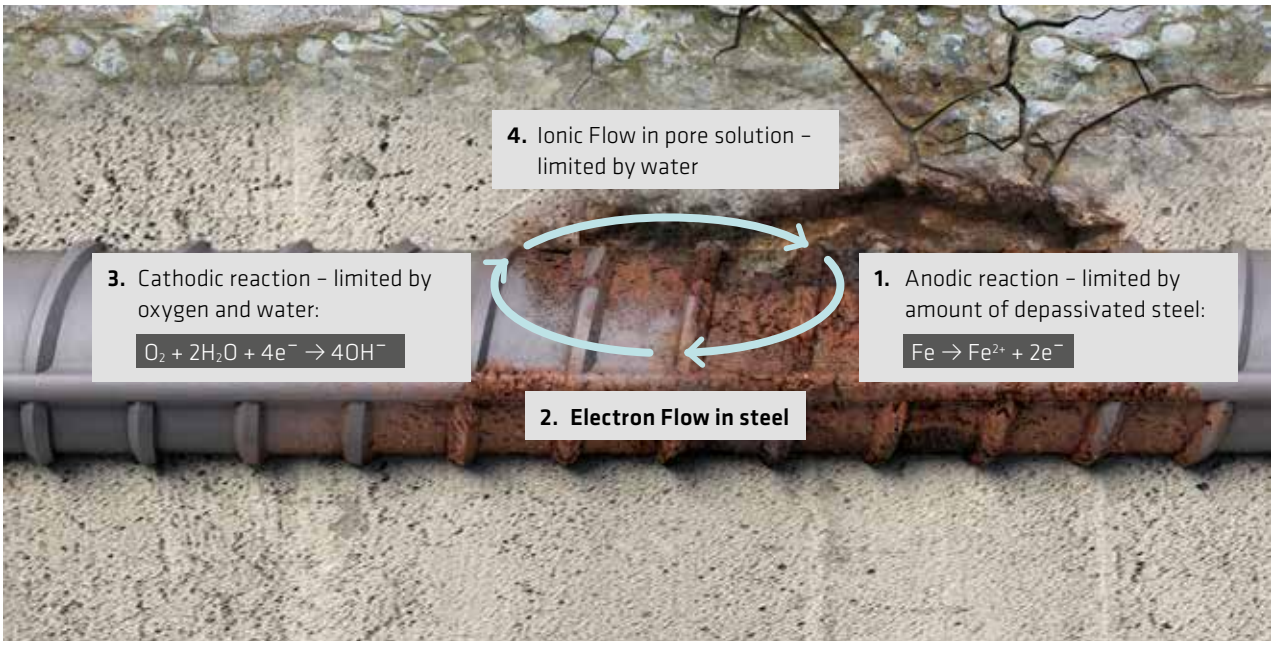
Contact us, so we can help you to ensure the right solution is chosen for each project.

CORROSION CRASH-COURSE

Corrosion in reinforced concrete occurs in localized areas called corrosion cells, which require 4 elements (see also image below):

1. **Anode** → Depassivated steel (lower potential) where iron atoms oxidize ($Fe \rightarrow Fe^{2+} + 2e^-$).
2. **Electron Flow** → The steel itself connects anode and cathode, allowing electron transfer.
3. **Cathode** → Adjacent steel next to the anode, where electrons from the anode reduce oxygen ($O_2 + 2H_2O + 4e^- \rightarrow 4OH^-$). This requires oxygen and moisture, with oxygen availability usually being the more limiting factor.
4. **Electrolyte** → The aqueous pore solution in concrete. If concrete becomes too dry, the electrolyte (pore solution) can disconnect, and ionic flow drops to a level where corrosion is negligible.

The reaction rates at the anode and cathode must be balanced. Besides the availability of oxygen and water, this balance is strongly influenced by the size of the anode (depassivated steel). When the surface area of the anode is small compared to the cathode, as in chloride-induced pitting corrosion, corrosion rates can become severe, reaching up to 1 mm steel cross-section loss per year.



TOTAL CORROSION MANAGEMENT – SIKA'S PRODUCT RANGE

REINFORCEMENT PROTECTION MORTARS

	Application Parameters			Usage		
	Corrosion Protection	Bonding Slurry	Spray application	Bridges	Car parks	Buildings
SikaTop® Armatec®-110 EpoCem®	xxxx	xx	✓	xxx	xxx	xx
Sika MonoTop®-1010 / SikaEmaco® P 5000 AP	xxx	xx	✓	xxx	xx	xxx

PROTECTIVE COATINGS

	Performance Parameters				
	Crack bridging	Long term performance	Mechanical cleaning resistance	Anti-Carbonation Properties	Chloride Impermeability
Sikagard®-5500	xxxx	xxx	x	xxx	xxx
Sikagard®-550 W Elastic / Sikagard®-330 EL	xxx	xxx	x	xxx	xxx
Sikagard®-675 W ElastoColor / Sikagard®-320	x	xxx	xx	xxxx	xxx
Sikagard®-680 S BetonColor	–	xxxx	xx	xxxx	xxx
Sikagard® M 338	–	xxx	xxx	xxxx	xxxx
Sikagard®-340 WCT	–	xxx	xxxx	xxxx	xxxx
Sikagard®-260 W PU	–	xxx	xxxx	xxxx	xxxx
Sikalastic®-6100 FX	xxxx	xxx	xx	xxx	xxx

HYDROPHOBIC IMPREGNATIONS

	Aspect		Performance Parameters				
	Liquid	Thixotropic	Chloride prevention	Penetration behavior	Durability	Corrosion protection	Freeze-thaw resistance
Sikagard®-705 L	✓		xxxx	xxxx	xxxx	xxx	xxxx
Sikagard®-706 Thixo		✓	xxxx	xxxx	xxxx	xxx	xxxx
Sikagard®-740 W	✓		xx	xx	xx	xx	xxx
Sikagard® H 303	✓		xx	xx	xx	xx	xxx

Legend: xxxx: Best performance xxx: Very suitable xx: Suitable x: can be considered for short to medium term – : Not suitable
Note: *Color retention and UV resistance are dependent on the color, as darker, more intense shades will always have lower UV resistance and color retention.

Tunnels	Marine structures
xx	xxx
xxx	xx

Aesthetic Parameters		Application Parameters			Usage			
Color retention / UV resistance*	Dirt pick up resistance	Low VOC	Hand application	Machine application	Civil engineered structures	Buildings	Tunnels	Marine structures
xxx	xx	xxxx	xxxx	xxxx	xxxx	xxxx	–	–
xxx	xx	xxx	xxxx	xxxx	xxx	xxx	x	–
xxx	xxx	xxx	xxxx	xxxx	xxx	xxx	xx	–
xxx	xxx	–	xxxx	xxxx	xxx	xx	x	x
x	xxx	xxx	xxxx	xxx	xxx	xxx	xx	xx
–	xxx	xx	xxxx	xxx	–	–	xxxx	–
xxx	xxx	xx	xxxx	xxx	–	–	xxxx	–
xxx	x	xxxx	xxxx	xxxx	xxxx	xxxx	xx	xxx

Application Parameters				Usage				
Low VOC	Vertical	Overhead	Horizontal	Bridges	Car parks	Buildings	Tunnels	Marine structures
xx	xxx	xx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
xxx	xxxx	xxxx	xx	xxxx	xxxx	xxxx	xxxx	xxxx
xxxx	xxx	xx	xxxx	x	xx	xxxx	xx	x
xxxx	xxx	xx	xxxx	x	xx	xxxx	xx	x

TOTAL CORROSION MANAGEMENT – SIKA'S PRODUCT RANGE

CORROSION INHIBITORS

	Product Types		Performance Parameters			Application
	Surface applied corrosion inhibitor	Concrete admixture corrosion inhibitor	Chloride content % bwc at steel rebar level		Carbonation induced corrosion	New construction
			<1%	<2%		
Sika® FerroGard®-901	–	✓	xxx	xx	xxx	xxxx
Sika® FerroGard®-903 Plus	✓	–	xx	–	xxx	–
Sikagard®-8500 CI	✓	–	xxxx	xxx	xxxx	xxxx

GALVANIC ANODES

	Product Types		Performance Parameters			Application
	Temporarily impressed current**	Placed in concrete repair area	Chloride content % bwc at steel rebar level		Carbonation induced corrosion	New construction
			<1.5%	2–3%		
Sika® FerroGard®-300 Hybrid*	✓	–	xxxx	xxx	xxxx	xxxx
Sika® FerroGard®-400 Galvanic	–	–	xxxx	x	xxxx	–
Sika® FerroGard®-500 Patch	–	✓	xxxx	x	xxxx	–
Sika® FerroGard®-700 Rebar	–	✓	xxx	–	xxxx	xxx

Advantages Galvanic Anodes:

- Mitigation of the incipient (or ring) anode effect
- No need to remove carbonated or chloride contaminated concrete
- Minimum closure of infrastructure (speed, no need for scaffolding support structure etc.)
- Minimum noise emissions (no high pressure water jetting)
- Application from backside of structure possible

Legend: xxxx: Best performance xxx: Very suitable xx: Suitable x: can be considered for short to medium term – : Not suitable
Note: *Only one to use if there is already chloride induced depassivation of the reinforcement steel
** Target charge: ~50 kC/m², usually from a 8–9V DC power source, e.g., car batteries or rectifiers

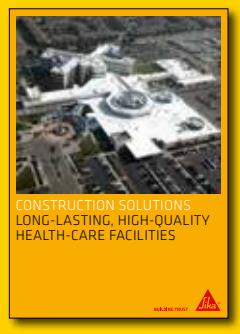
Parameters			Usage				
	Corrosion prevention and control	Incipient anodes mitigation	Bridges	Car parks	Buildings	Tunnels	Marine structures
	xxx	xx	x	x	xxx	x	x
	xx	xx	x	x	xxx	x	x
	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx

Parameters			Usage				
	Corrosion prevention and control	Incipient anodes mitigation	Bridges	Car parks	Buildings	Tunnels	Marine structures
	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	xxxx	xx	xxx	xxx	xxxx	xxx	xxx
	xxxx	xxxx	xxxx	xxxx	xxxx	xxx	xxxx
	xxxx	xxx	xx	xx	xxx	xx	xx

ALSO AVAILABLE FROM SIKA

REFURBISHMENT
THE REPAIR AND PROTECTION OF REINFORCED CONCRETE WITH SIKA
IN ACCORDANCE WITH EUROPEAN STANDARDS EN 1504

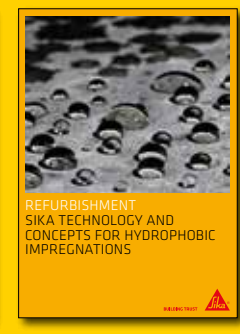
REFURBISHMENT
SIKA SOLUTIONS FOR BRIDGES



CONSTRUCTION SOLUTIONS
LONG-LASTING, HIGH-QUALITY HEALTH-CARE FACILITIES

REFURBISHMENT
CONCRETE REPAIR AND PROTECTION OF CHIMNEYS AND COOLING TOWERS

REFURBISHMENT
SIKA TECHNOLOGIES AND SOLUTIONS FOR WASTE WATER TREATMENT PLANTS



REFURBISHMENT
SIKA TECHNOLOGY AND CONCEPTS FOR HYDROPHOBIC IMPREGNATIONS

FOR MORE INFORMATION ON SIKA REFURBISHMENT SYSTEMS AND SOLUTIONS:

WE ARE SIKA
Sika is a specialty chemicals company with a leading position in the development and production of systems and products for bonding, sealing, damping, reinforcing and protecting in the building sector and the motor vehicle industry. Sika's product lines feature concrete admixtures, mortars, sealants and adhesives, structural strengthening systems, flooring as well as roofing and waterproofing systems.

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