



# FUTURE PROOFING YOUR STRUCTURE

Reviving/Repairing/Protecting  
Reinforced Concrete Structures

# Global leaders

IN TOTAL CORROSION MANAGEMENT



# Introduction

Sika is leading the way in Total Corrosion Management of concrete structures. Our approach encompasses concrete repair and protection, corrosion control and structural strengthening systems. Helping to prolong and extend the life of structures as well as provide a viable and cost effective alternative to demolition and rebuilding. Suitable for a wide range of projects including commercial and industrial buildings, residential properties, bridges, car parks and tunnels. For total peace of mind our guaranteed solutions are supported by the most highly trained and experienced sales and technical support network in the industry and backed with decades of experience.

Concrete corrosion represents the process of concrete deterioration due to the aggressive influences of the environment and may be physical, chemical or biochemical.



# How & why

## CONCRETE STRUCTURES DETERIORATE

Concrete is a relatively durable and robust building material but it can be severely weakened by poor manufacture or a very aggressive environment. Concrete degradation can be a cause for concern on its own, or in reinforced concrete structures it may lead to decreased protection to the steel. This in turn encourages corrosion of the steel, often followed by cracking and spalling of the concrete which can lead to structural damage.

### DETERIORATION OF CONCRETE IS DUE TO:

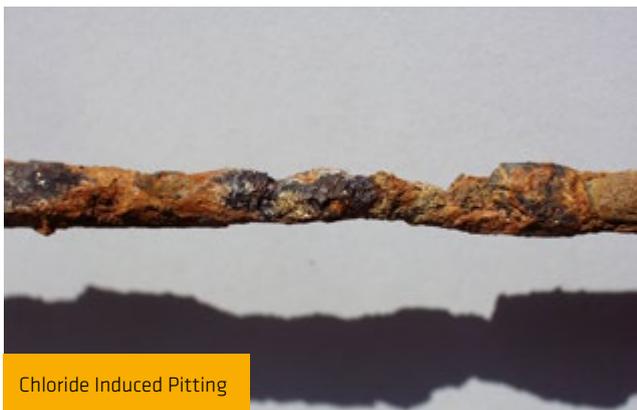
- Chemical degradation
- Corrosion of the steel reinforcement
- Mechanical attack
- Physical damage

### UNDERLYING CONTRIBUTORS TO DETERIORATION:

- Poor construction
- Lack of maintenance
- Design faults



*"Sika has been associated with concrete refurbishment since the company was founded over 100 years ago..."*





# Repair & protection measures

The successful repair and protection of concrete structures which have been damaged or which have deteriorated requires professional assessment, then design, supervision and execution of technically correct principles – in accordance with the Principles and Methods defined in the British Standard BS EN 1504.

The 11 best practice principles and methods of repair and protection in accordance with BS EN 1504 are:

1. Protection against ingress
2. Moisture control
3. Concrete restoration
4. Structural strengthening
5. Physical resistance
6. Resistance to chemicals
7. Preserving or restoring passivity
8. Increasing resistivity
9. Cathodic control
10. Cathodic protection
11. Control of anodic areas

Sika has been associated with concrete refurbishment since the company was founded over 100 years ago. We have developed fundamental procedures and pioneering products for the permanent repair and protection of decaying and damaged concrete. To assist owners, engineers and contractors with the correct selection of repair products, Sika has developed a schematic system of approach designed to meet the individual requirements of a structure, its exposure and use.

Sika's concrete repair and protection solutions are designed to rehabilitate and restore concrete surfaces back to their original quality and include the following:

- Concrete repair mortars
- Anti-carbonation coatings
- Corrosion inhibitors
- Reinforcement corrosion protection
- Sacrificial galvanic anodes
- Discrete CP anodes





# Diagnosis

## METHODOLOGY

### THE KEY STAGES IN THE REPAIR AND PROTECTION PROCESS:

#### ***Assessment of the Structure from the Condition Survey***

The assessment of a damaged or deteriorated reinforced concrete structure from the condition survey should only be made by qualified and experienced people. This process of assessment must always include the following aspects:

- The condition of the structure including visible, non-visible and potential defects.
- Review of the past, current and future exposure.

#### ***Identification and Diagnosis of the Root Causes of Deterioration***

Following review of the original design, construction methods and programme, and the assessment from the condition survey, it is possible to identify the “root causes” of each different type and area of damage:

- Identify defects and mechanical, chemical or physical damage to the concrete.
- Identify concrete damage due to reinforcement corrosion.

#### ***Determine the Repair and Protection Objectives and Options***

With most damaged or deteriorated structures, the owner has a number of options which will effectively decide the appropriate repair and protection strategy to meet the future requirements of the structure.

These options include:

- Do nothing
- Downgrade the structure or its capacity
- Prevent or reduce further damage with no or minimal repair
- Improve, refurbish or strengthen all or part of the structure
- Demolition

#### ***Selection of the Appropriate Repair Principles and Methods***

To meet the owner’s future requirements, the appropriate Repair and Protection Principles must be selected, and then the best method of achieving each principle must be decided.

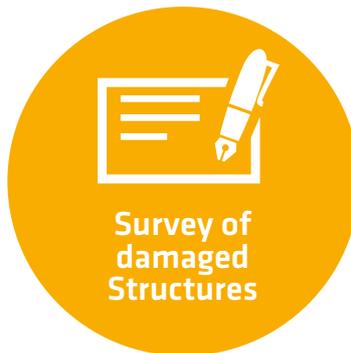
# How Sika can help...

Sika produces concrete repair products for global use that meet all relevant standards, guidelines, local requirements and other recommendations. We know our customers demand simple, easy to use products with additional added value, so we also develop internal Sika tests and procedures to further control the practical performance and quality of our products.

We are a world leader in concrete repair mortars, protection coatings for concrete, special mortars for extreme and demanding applications and structural strengthening using carbon fibre technology.

*“Sika is the expert and default supplier for all repair and protection products within the UK. Sika is a trusted part of the design and delivery team.”*

## OUR KEY SERVICES:





# Corrosion inhibitors

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## **SYSTEM ADVANTAGES CORROSION CONTROL & PREVENTION**

Recommended for new and existing structures

No requirement to remove existing sound concrete

No damage to existing structure with this system

Preserves the natural concrete appearance

Faster project completion

Suitable for all structures

Delays the onset of corrosion, extends service life of structures

Can double the service life of many new structures

Can be used on Carbonated & Chloride contaminated structures

Liquid & Capsule types available

Surface applied & buried systems available. Can be used under existing sound coatings.





# Structural Strengthening

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## SYSTEM ADVANTAGES

Can be used on reinforced concrete, timber, masonry, cast iron and steel, on civil and building structures, on the top or bottom of beams and slabs to increase flexural capacity or on the sides of beams and columns to improve shear resistance

Increased structural strength and improves shear resistance

Low installation cost

Fast turn around accelerates project times for refurbishment projects

Solving of difficult access problems, enables the redistribution of loads around new openings

Existing services can be left in place

Increased corrosion resistance and resistance to chemical attack

Different types of carbon fibre plates, rods & fabrics available

Low water absorption structural adhesives



# Galvanic & CP Anodes



## SYSTEM ADVANTAGES CORROSION CONTROL & PREVENTION

### Sika® Galvashield®

Tried and Tested Sacrificial Anode with over 15 years track record with 25 -30 years life expectancy of anode

Suitable for most levels of chloride

Economical solution

Suitable for new and existing structures

Particularly suitable for highway structures

For chloride and contaminated concrete

Different types & sizes available

### Sika® Ebonex

Cathodic protection

Discrete impressed current anode

25-50 years life expectancy

Stops corrosion of steel

Offers a high level of cathodic protection

Can be fully monitored and maintained

Suitable for high steel density

Different sizes available



# Protective Concrete Coatings

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## **SYSTEM ADVANTAGES SIKAGARD ANTI-CARBONATION COATINGS**

- Gives old buildings an instant facelift
- Cost effective renovation solution
- Range of colours
- Easy to apply by roller or spray machinery
- Solvent free no risk to applicators or the general public
- Crack bridging option ensures the movement of the structure does not affect the aesthetics
- Water vapour permeable
- Prevents water ingress
- High diffusion resistance to carbon dioxide

# Case Studies

## Merrion Centre MSCP, Leeds:



Forming part of the multi-million pound upgrade of the iconic Merrion Centre in Leeds, Sika working with Town Centre Securities PLC, Town Centre Car Parks, GMI Construction Group, Curtins Consulting and Makers Construction Ltd has provided a range of concrete repair, structural strengthening and corrosion management systems during a major refurbishment of the 950 space multi-storey car park which has seen it transformed the most modern and technologically advanced car park in Leeds.

The Merrion Centre was the largest indoor shopping centre in the UK when it opened in 1964. It features a split deck multi-storey car park, operated by Town Centre Car Parks (TCCP), that has been faced with fifty years of exposure to water, de-icing salts, airborne contaminants and the constant use of vehicles. In a bid to modernise and upgrade the facility, owners Town Centre Securities PLC, comprehensive refurbishment plans included structural repairs, new waterproof deck systems, improved signage and bay markings and LED lighting.

Highly experienced in the application of Sika products and with a long track record of success in concrete repairs and strengthening, Makers Construction Ltd were appointed by consulting engineers Curtins Consulting and main contractor GMI Construction Group to carry out the repairs and undertake the largest project of this type in Europe. Approached early in the design process, Sika carried out on-site testing of the reinforced concrete structure in order to provide an appraisal of the extent of corrosion which allowed for the most cost-effective and technically viable corrosion mitigation solution.

With the renovation of Leeds' most iconic and busiest car park now complete, the specification of a range of innovative products from Sika has ensured the car park was transformed within the shortest timeframe possible.

## Britannia House:



In the heart of Bradford city centre, Britannia House was in need of renovation as its concrete exterior and steel frame was showing signs of failure. With substantial fractures to the stone cladding and corrosion to the steel frame and rebar, Sika provided a complete refurbishment solution including cathodic protection – with more than 2,500 anodes installed across the top three floors.

Encased in scaffolding for an 8 month programme of works, the 1930s steel-framed concrete building was restored and revitalised by main contractor William Anelay and specialist contractor Freysinnet. For the concrete exterior and steel reinforcements, consulting engineer Mott Macdonald specified a concrete repair and protection solution from building product manufacturer Sika.

Utilising the quality products, design support, in-situ guidance and many years practical experience of Sika, the refurbishment of Britannia House by William Anelay and Freysinnet was completed to the highest standard.

*"Galvanic anodes redress the electrochemical imbalance induced through removal of contaminated concrete in patch repairs," said Cameron Vauvelle-Don, Sales Manager at Sika.*

*"Sika Ebonex is our discrete cathodic protection system that provides long term durability to both new and existing structures under highly aggressive conditions."*

## Pallatine Building



Located on Blackpool's world-famous seafront promenade, the Palatine Building had been subjected to the harmful effects of sea water for a number of years. With its concrete frame showing signs of corrosion and spalling, Sika supplied a range of concrete repair and protection systems to bring the entertainment venue back to its best.



Built in the 1970s, the Palatine Building is one of Blackpool's landmark buildings and hosts the UK's longest running seaside show. Appointed to complete the refurbishment scheme, contractor Hardisty CRN utilised a range of high performance systems from Sika to protect the building from corrosion as part of a reliable, long term and complete package solution.

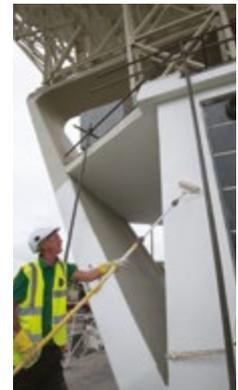
Designed to rehabilitate and restore concrete surfaces back to their original quality, Sika's repair and protection solutions are backed up by a highly experienced technical team who offer expert specification advice and support. Most of the company's product range are also CE Marked and accredited for use under BS EN1504, the British Standard for **'Products and systems for the protection and repair of concrete structures'**.

Concrete repair mortars, anti-corrosion coatings, corrosion inhibitors, reinforcement corrosion protection and the full Galvashield range of embedded galvanic anodes make up Sika's extensive product range. Offering the perfect combination of innovation in product development, the highest standards of manufacturing and technical expertise, Sika's range of concrete repair and protection systems proved the ideal solution at the Palatine Building.

## Jodrell Bank:



At Jodrell Bank Observatory in Cheshire – the world renowned centre for radio astronomy – Sika has demonstrated its ability to deliver high performance concrete repair and protection solutions with a comprehensive range of the company's products helping to repair a concrete frame supporting their Mark II telescope.



When cracking and spalling was discovered in the telescope's concrete base, the University of Manchester required a specification to restore the concrete profile and provide future protection. Appointed to complete the refurbishment, contractor Grade 2 utilised a range of high performance systems from Sika, using Sika® Ferrogard®-903+ as part of the corrosion control strategy.

With the concrete structure fully repaired and protected, the Mark II Telescope is once again supported and protected by a structure that is built to last. The complete repair and protection solution from Grade 2 and Sika will ensure that this important telescope at Jodrell Bank Observatory is less susceptible to the Great British weather and the effects of the local environment.

**"On a site which was very difficult to access due to the shape of structure we also couldn't use a fixed scaffold as the telescope had to freely rotate any time of day or night," explains Steve Parry, Operations Manager at Grade 2. "The versatility of the cherry pickers allowed us to complete the high quality application of Sika products and bring this famous structure back to its best."**

# Case Studies

## High Chelmer Car Park:



A comprehensive range of concrete repair, corrosion management and waterproof car park decking products from Sika has helped transform Chelmsford's 1960s High Chelmer multi-storey car park into a safer, more stylish and modern parking facility. Completed to such a high standard, the project was short-listed in the Best Car Park Refurbishment category at the British Parking Awards 2012.

In March 2011, following the discovery of localised instances of concrete spalling due to expansive corrosion of the reinforcement bars, Chelmsford Borough Council acted upon professional advice from the structural and civil engineers to close High Chelmer Car Park and Retail Market to allow significant repairs and a full refurbishment to be completed.

Aiming to reopen the car park fully within 16 weeks, an efficient concrete repair solution with a proven track record was required. With market leading reliability and the ability to exceed the requirements of BS EN1504, the standard for concrete repair and protection, a complete concrete repair, corrosion management and waterproof decking system from Sika was specified. During site inspections it was discovered that the car park required 1,500m<sup>2</sup> of repairs – 50% more than the original figure of 1,000m<sup>2</sup>. It was anticipated that the concrete required repairs to a depth of 75mm, however, on commencement of work this was amended to 85mm.

Sika, offered a full range solution for the concrete repair corrosion management using a combination of Sika<sup>®</sup> Galvashield<sup>®</sup> XP2 sacrificial anodes, Sika<sup>®</sup> Ferrogard<sup>®</sup>-903 migrating corrosion inhibitor and 120 tonnes of Sika<sup>®</sup> Armocrete flowable microconcrete. The car park decks were then waterproofed with 36,000kg of the highly durable and cost-effective Sikafloor<sup>®</sup>-161/-264 car park inter-deck system – finished in a range of colours to differentiate between each car park section. The soffits and columns were cleaned of contaminants using a jet washing process before being repaired using Sika Monotop 615 concrete repair mortar and coated with an anti-carbonation coating. The refurbishment package was completed within an extended 21 week timeframe. This allowed the car park to reopen in November 2011 – in perfect time for the busiest shopping period of the year.

## Mixenden Court:



With the requirement for a cost effective, reliable and efficient way to repair damaged concrete surfaces and extend the life of four tower blocks in Halifax, leading concrete repair specialist JDF Restoration specified an advanced concrete repair system from global building product manufacturer Sika.

Built in the 1965, the four 15 storey tower blocks in Mixenden required refurbishment due to concrete deterioration. With the intention of repairing and protecting to provide longevity and extend the life of the buildings, the specification included the Monotop repair system and the anti-carbonation coating Sikagard<sup>®</sup>-675W for the reinforced concrete frame with the fast cure balcony coating Sikafloor-415 for the recoating to the balconies.

To provide an overall layer of protection and in order to match the existing surfaces, the JDF operatives cleaned the reinforced concrete frame of contaminants using a jet washing process before the application of Sikagard ElastoColor-675W. Used to aesthetically enhance concrete substrates and particularly suited as a final protective coating for facades, the anti-carbonation treatment provides a high quality yet economical water-based, acrylic coating to protect against weathering and ageing.

## University of Cambridge:



In a conservation area at the University of Cambridge, global building product manufacturer Sika has supplied a comprehensive concrete repair and corrosion inhibitor system – fully compliant with BS EN 1504 standards – to return five ageing buildings to the highest standards of aesthetics, performance and weather resistance.



Located on the western edge of Cambridge city centre, Sidgwick Site is home to several of the university's arts and humanities faculties. Appointed to repair damaged concrete and protect the structural steel of five individual structures, contractor Concrete Repairs Limited (CRL) completed the 1,400m<sup>2</sup> application within a 10 week works programme.

With all five buildings located within the conservation area, the repair system had to be completed with a sympathetic finish to the sensitive location. Approved to adhere to the area's strict application requirements, two clear protective coatings – Sikagard®-6805 Cleargaze and Sikagard®-7005 – were applied to provide the final layer of weather protection.

## Hawley Bridges:



When the M3 Hawley Lane Bridge started to show signs of excessive deflection under heavy traffic, engineers at Enterprise Mouchel devised a repair solution that included the installation of a new central bridge pier to support two existing outer piers. To counteract changes to the deck's dynamics and reinforce the bridge between the three structural piers, Sika® Carbodur® rods and Sika® Carbodur® plates were used – marking one of Europe's largest applications of composite reinforcement systems.

Using the company's extensive experience of structural strengthening – including in 2011 the UK's largest application of ultra-high modulus composite reinforcement at Embankment Tube Station – Sika were closely involved at Hawley Bridge from initial specification to project completion. The company's full range of structural strengthening systems are suitable for increased loading, change of use, column wrapping, as well as applications in the nuclear industry for protection against seismic activity.

On track to be delivered within a two month period, the project will be successfully finished to the highest standard thanks to a well-organised, detailed application process and with minimal effect on the road's users – above and below the M3 Hawley Lane Bridge.

# SIKA FULL RANGE SOLUTIONS FOR CONSTRUCTION:



LIQUID APPLIED ROOFING



SINGLE PLY ROOFING



CONCRETE



CONCRETE REPAIR



STRUCTURAL STRENGTHENING



WATERPROOFING



JOINT SEALING



FAÇADE STRUCTURAL ADHESIVES



FLOORING



INDUSTRY



DISTRIBUTION



BUILDING TRUST

## FOR MORE INFORMATION:



### WHO WE ARE

Sika Limited and Sika Ireland Limited are part of the global Sika Group, specialising in the manufacture and supply of chemical based products. Sika have 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 has subsidiaries in 101 countries around the world and manufactures in over 200 factories. With more than 20,000 employees Sika generates annual sales of CHF 7.09 billion (£5.45bn). We are also committed to providing quality, service, safety and environmental care.

In the UK and Ireland, we provide market-leading solutions for concrete, waterproofing, roofing, flooring, refurbishment, sealing & bonding, and industry, and have manufacturing sites in Welwyn Garden City, Preston, Leeds and Dublin with more than 870 employees and a turnover of more than £260 million.

The information, and, in particular, the recommendations relating to the application and end use of Sika® products, are given in good faith based on Sika's current knowledge and experience of the products when properly stored, handled and applied under normal conditions. In practice, the differences in materials, substrates and actual site conditions are such that no warranty in respect of merchantability or of fitness for a particular purpose, nor any liability arising out of any legal relationship whatsoever, can be inferred either from this information, or from any written recommendations, or from any other advice offered. The proprietary rights of third parties must be observed. Please refer to our homepage [www.sika.co.uk](http://www.sika.co.uk) for our current standard terms & conditions applicable to all orders. Users should always refer to the most recent issue of the Product Data Sheet for the product concerned, copies of which will be supplied on request.



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