To avoid reoccurrence of damage to any reinforced concrete structure, it is essential that the root cause and extent of all defects are clearly understood.

If repairs, such as patching, crack injection, application of sealant, coatings, or deck membranes are performed without this understanding, (usually involving an experienced consultant), the result will be a repeated failure in either the same or adjacent locations.

**PROBLEM:**
Extreme chloride-induced corrosion damage in parking stall areas.

**POSSIBLE CAUSES:**
- Original improper concrete mix design
- Inadequate cover of concrete over reinforcing steel
- Open construction joints or original shrinkage cracks
- Defective movement joints
- Unsealed decks

**PROBLEM:**
Severe and dangerous delamination of soffits due to the leakage of deicing salts through the deck.

**POSSIBLE CAUSES:**
- Carbonation induced corrosion due to insufficient concrete cover
- Steel corrosion due to chloride ingress. As the steel corrodes, it expands causing cracking of the concrete which leads to spalling

**PROBLEM:**
Spalling of concrete over reinforcing steel.

**POSSIBLE CAUSES:**
- Original shrinkage cracks in the deck provide a path for chlorides
- Blocked or inadequate drainage
- Absence of, or defects in membranes
- Inadequate movement joints

Severe slab degradation

Chloride-induced corrosion causing spalling of the concrete deck

Corrosion accelerated by carbonation and low cover
Once the probable causes of deterioration have been identified, it is essential that a thorough investigation be conducted to determine the existing condition of the parking structure. This appraisal should be carried out by a design professional with specific experience in concrete restoration.

Developing a successful rehabilitation program requires an overall assessment, with the types of distress, and their causes and extent carefully evaluated and understood. Only then can a repair and protection strategy be developed.

Appraisals should include both the topside and underside of decks, columns and beams, as well as all other concrete elements.

**FOCUS ON:**
- Crack patterns and size
- Previous repair locations
- Spalling concrete
- Delaminating or hollow concrete
- Location of movement joints
- Location of drains
- Ponding of surface water
- Chloride content and depth profile
- Carbonation range and extent
- Depth of concrete cover over rebar
- Concrete permeability
- Petrographic examination of cores (to check for ASR, etc.)
- Condition of waterproofing membranes
Sika offers a complete range of high performance, premium quality repair mortars for every application from cosmetic to structural repair on parking decks. Our repair mortars are compatible with Sika repair and protection materials to ensure that both the visual signs of damage and the latent deterioration are addressed, extending the life of the structure. Sikadur epoxy resin technology include both low modulus and high modulus formulations with viscosity ranges from super low sealer/healers to gel paste anchoring solutions.

**SikaTop®, SikaQuick®, SikaRepair®, SikaCem® and Sikacrete®**

- Proven excellence over 30 years of on-site performance
- Repair mortars and concretes suitable for application by hand, form and pour/pump, machine spray wet or dry in thickness from 1/8” to full depth
- One and two component polymer modified cementitious mortars
- Unique epoxy/cement reinforcement primer and bonding agent (Sika Armatec 110 EpoCem)
- Available with migrating/penetrating corrosion inhibitor (Sika FerroGard) to reduce incipient anode corrosion (“ring halo” effect) where active chlorides present in the parent concrete accelerate corrosion around the new repair
- Exciting and new pre-packaged, self-consolidating concrete, Sikacrete: a full range of pre-extended concrete materials that eliminate adding stone on the job

**Sikadur® STRUCTURAL REPAIR RESINS**

- Three decades of proven performance
- 100% solids high or low modulus range of structural bonding and injection resins
- Extended pot life grades for more working times
- Super low viscosity, moisture tolerant epoxy penetrating systems for topical slab protection against chlorides and water penetration
Total Corrosion Management is a comprehensive approach to addressing any problem caused by corrosion in a parking garage. Because conditions in a parking garage can vary significantly, the best solution may need to vary as well in order to address the range of problems.

**Sika® FerroGard®-903**
- Surface Applied Corrosion Inhibitor
  - Significantly reduces corrosion
  - Delays the onset of corrosion
  - Economic and easy to apply by roller, brush or spray

**Sika® FerroGard®-908**
- Dual-functional corrosion inhibitor and penetrating sealer
  - Reduces active corrosion
  - Increases resistivity of concrete
  - Repels water and chloride ions
  - Contains silane sealer and amino alcohol corrosion inhibitor

**Sika® FerroGard® 650, 670 AND 675**
Sika FerroGard embedded galvanic anodes consist of a zinc core surrounded by a specially formulated cementitious mortar. The zinc core corrodes preferentially to the surrounding rebar it is attached to, providing galvanic protection to the reinforcing steel.

**Sika® FerroGard® Anodes**
- Corrosion prevention for “ring anodes” adjacent to spall repairs
- Placed at the perimeter of the repair
- Use at the interface of new full-depth slab replacement or partial depth areas
- Highly chloride contaminated concrete

**Mayorhold Parking Garage**
ICRI Project of the Year 2006
Because chloride contents and active corrosion rates varied by level, Sika FerroGard-903 was used on the upper levels and impressed current cathodic protection was used on the lower levels.

**6th Street Parking Garage**
ICRI Award of Merit, Parking, 2005
Sika FerroGard-903 was spray-applied to over 100,000 sf of deck surface. Remote corrosion rate monitoring was installed to monitor the effectiveness of the repair system.

**FerroGard Anodes used to prevent corrosion of rebar near the slab edge**

**FerroGard anodes installed where an existing slab and a new, full-depth slab meet**
Unprotected concrete decks exposed to rainfall, freeze-thaw, carbonation and deicing salts will deteriorate. “Passive” protection originally provided by the cement paste around the reinforcing steel will progressively be destroyed and unseen corrosion of embedded steel will occur, often resulting in spalls, cracks and leaks.

Sika provides comprehensive solutions to waterproofing problems with maximum protection. Sika’s wide range of polyurethanes and epoxies are designed to make concrete and masonry impermeable to water, while offering flexibility to handle all of your parking deck waterproofing needs.

Protection Systems for Parking Decks
Sika Selection Guide

<table>
<thead>
<tr>
<th>System</th>
<th>Technology</th>
<th>Coats (excluding primer)</th>
<th>Application Days</th>
<th>VOCs</th>
<th>Crack Bridging/Modulus</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sikalastic® 720/745 Traffic</td>
<td>2-component polyurethane</td>
<td>2-3</td>
<td>1-2</td>
<td>below 10</td>
<td>1/16&quot; dynamic</td>
<td>fast cure, low odor</td>
</tr>
<tr>
<td>Sikalastic® 390/391/395</td>
<td>2-component polyurethane</td>
<td>2-3</td>
<td>2-3</td>
<td>below 10</td>
<td>1/16&quot; dynamic</td>
<td>low odor</td>
</tr>
<tr>
<td>Sikalastic® 710/715/735 AL</td>
<td>1-component polyurethane</td>
<td>3-4</td>
<td>3-4</td>
<td>below 250</td>
<td>1/16&quot; dynamic</td>
<td>no pot life restrictions, enhanced UV stability with aliphatic top coat</td>
</tr>
<tr>
<td>Sikalastic® 710 Lo-VOC/715 Lo-VOC /736 AL Lo-VOC</td>
<td>1-component polyurethane</td>
<td>3-4</td>
<td>3-4</td>
<td>below 100</td>
<td>1/16&quot; dynamic</td>
<td>no pot life restrictions, enhanced UV stability with aliphatic top coat</td>
</tr>
<tr>
<td>Sikalastic® 22 Lo-Mod Hybrid</td>
<td>polyurethane waterproofing with epoxy wearcoat</td>
<td>2-3</td>
<td>2-3</td>
<td>below 10</td>
<td>1/16&quot; dynamic</td>
<td>flexible waterproofing, high abrasion resistance, optional top coat</td>
</tr>
<tr>
<td>Sikadur® Epoxy Broadcast Overlay</td>
<td>epoxy</td>
<td>1</td>
<td>1</td>
<td>below 100</td>
<td>low modulus</td>
<td>high abrasion resistance</td>
</tr>
<tr>
<td>Sikadur® 55 SLV</td>
<td>low viscosity epoxy</td>
<td>1</td>
<td>1</td>
<td>below 150</td>
<td>high modulus</td>
<td>healer/sealer</td>
</tr>
<tr>
<td>Sikagard® 705 L</td>
<td>100% silane sealer</td>
<td>2</td>
<td>1</td>
<td>below 350</td>
<td>not applicable</td>
<td>transparent sealer</td>
</tr>
<tr>
<td>Sikagard® 706 Thixo</td>
<td>silane based impregnation cream</td>
<td>1</td>
<td>1</td>
<td>below 350</td>
<td>not applicable</td>
<td>transparent sealer</td>
</tr>
<tr>
<td>Sikagard® 740</td>
<td>40% silane sealer</td>
<td>2-3</td>
<td>1</td>
<td>below 350</td>
<td>not applicable</td>
<td>transparent sealer</td>
</tr>
</tbody>
</table>

Sikalastic® AND Sikagard® SYSTEMS
TRAFFIC DECK SOLUTIONS

**Siklastic® 710/715 AND 710 Lo-VOC/715 Lo-VOC TRAFFIC SYSTEMS**
- Single-component, elastomeric, waterproofing traffic system
- Excellent crack-bridging properties and flexibility even at low temperatures
- Excellent resistance to abrasion and wear
- Impervious to water and deicing salts
- Available aliphatic and top coats

**Siklastic® 720/745 AND 390/391/395 TRAFFIC SYSTEMS**
- Two-component, elastomeric, waterproofing traffic system
- Low odor, solvent-free formulation
- Fast turnaround system minimizes downtime
- Excellent crack-bridging properties as well as abrasion and chemical resistance

**Sikadur® EPOXY BROADCAST OVERLAY SYSTEM**
- Two-component, fast curing epoxy protection system
- Superior resistance to abrasion and wear
- Excellent durability
- Optional polyurethane top coats
- Solvent-free, fast turnaround

**Siklastic® 22 LO-MOD HYBRID DECK SYSTEM**
- One or two-component, elastomeric, waterproofing base coat
- Low odor, solvent free, low VOC, primerless and fast turnaround options
- Low-modulus epoxy-based wear coat
- Full broadcast or seeded aggregate wear coat options
Sika CarboDur and SikaWrap are carbon fiber reinforced polymer (CFRP) systems consisting of strips, rods, wraps and accessories for upgrading, repairing and seismically retrofitting concrete structures.

**REASONS FOR STRENGTHENING WITH CarboDur® AND SikaWrap® INCLUDE:**

- Changes of use
- Excessive deflection of beams
- Errors in construction or design
- Modifications to structural system
- Increased loading requirements
- Damage from aging and corrosion
- Seismic upgrade
- Vehicle impact
- Structural cracking
- Blast hardening

**ADDITIONAL BENEFITS OF STRENGTHENING WITH Sika® CarboDur® AND SikaWrap® SYSTEMS INCLUDE:**

- No reduction of headroom
- Speed and simplicity of installation
- Significant reduction of parking downtime
- No changes in structural appearance
- Suitable for application in very confined spaces
- Can be covered with coatings after application
- Can be applied in any length
- Proven technology
CHEMICAL ANCHORING

Sika Corporation has a comprehensive range of anchoring products. For all your chemical anchoring installations on any building structure, this wide range of product offering has a solution that will fit your application requirements. Some of the highlights of this product range are:

- AC-308 Evaluation Reports for cracked and Un-cracked Concrete
- Meets ASTM C 881
- Design software for engineers
- Epoxy and Epoxy Acrylate products - solutions with wide range of chemistries
- Easy to use - Does not require special tools

AnchorFix® RANGE OVERVIEW

<table>
<thead>
<tr>
<th>Sika Anchorfix Product</th>
<th>Cartridge Sizes (ml)</th>
<th>Approvals</th>
<th>Non-cracked Concrete</th>
<th>Cracked Concrete</th>
<th>Seismic</th>
<th>Threaded Rod</th>
<th>Rebar</th>
<th>Dry Concrete</th>
<th>Damp Concrete</th>
</tr>
</thead>
<tbody>
<tr>
<td>AnchorFix®-3001</td>
<td>250, 600, 1500</td>
<td>ICC ES ESR-3608, NSF-61-9, ASTM C 881</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>AnchorFix®-2</td>
<td>300, 850</td>
<td>IAPMO UES ER-0306, NSF 61-9</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>AnchorFix®-500</td>
<td>600, 1500 10 Gal kits</td>
<td>ASTM C 881</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>AnchorFix®-2 Arctic</td>
<td>850</td>
<td>ETA</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>AnchorFix®-1</td>
<td>300</td>
<td>ETA</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
Sikaflex® SEALANTS

Sikaflex sealants are a complete range of one component moisture-cure and two component chemical-cure polyurethane sealants for overhead, vertical and horizontal joints. They offer permanent thermal and dynamic movement capability for most joints with elastic durability of up to +100/-50% joint movement.

**Sikaflex® 2C NS/SL:**
- Two component, 3 day full cure
- Capable of ± 50% joint movement
- Cold weather accelerator available
- Easy to mix, gun and tool

**OUTSTANDING FEATURES INCLUDE:**
- Fast tack-free time
- Extreme tear resistance
- 30 year history of performance
- Compatibility with Sikalastic Traffic and Sikagard Coating Systems
- Elastic durability to below -20°F (-29°C)
- High chemical resistance
- Easy to use

Sikasil® SEALANTS

Sikasil sealants are ultra low modulus silicones for sealing joints in concrete parking structures that are excellent for low temperature placement and offer excellent flexibility for dynamic and thermal joint movement.

**Sikasil® 728 SILICONES:**
- Available in one component non-sag, self leveling, and a two component, rapid cure self leveling silicone.
- Capable of +100/-50% joint movement capability
- Multiple packaging sizes available
The application of Sikagard coatings to concrete surfaces such as walls and the underside of pre cast members and concrete slabs will provide protection from ingress of carbon dioxide, chlorides and other water-borne salts, and provide resistance to weathering, frost and dirt pick-up. Sikagard coatings are not vapor barriers and will allow vapor transmission through the coating. Sikagard coatings provide a uniform silk finish in over 450 standard colors.

**CONCRETE PROTECTIVE COATING**

The application of Sikagard coatings to concrete surfaces such as walls and the underside of pre cast members and concrete slabs will provide protection from ingress of carbon dioxide, chlorides and other water-borne salts, and provide resistance to weathering, frost and dirt pick-up. Sikagard coatings are not vapor barriers and will allow vapor transmission through the coating. Sikagard coatings provide a uniform silk finish in over 450 standard colors.

**ADDITIONALLY, Sikagard® COATING SYSTEMS PROVIDE:**

- Water based, acrylic, non-toxic, VOC compliant coatings
- Dynamic and thermal crack bridging capabilities down to -25°C
- Excellent resistance to dirt pick-up and mildew
- Proven durability results over 15 years in service periods.
- Exceptional UV resistance & color stability

---

**CONCRETE PROTECTIVE COATING**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Sikagard®-570</th>
<th>Sikagard®-550 W Elastocolor</th>
<th>Sikagard®-670 W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chloride resistance</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Excellent</td>
</tr>
<tr>
<td>Carbonation resistance</td>
<td>Superior</td>
<td>Superior (tested after 10 years exposure)</td>
<td>Excellent (tested after 10 years exposure)</td>
</tr>
<tr>
<td>Crack-bridging capacity</td>
<td>Superior (tested down to 0°C)</td>
<td>Excellent (tested down to 0°C)</td>
<td>Will accept normal hygrothermal movement</td>
</tr>
<tr>
<td>Long-term weathering</td>
<td>Superior</td>
<td>Superior</td>
<td>Excellent</td>
</tr>
<tr>
<td>Resistance to wind-driven rain</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Excellent</td>
</tr>
<tr>
<td>Reinforced</td>
<td>Possible</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Breathability</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Aesthetics</td>
<td>Pigmented</td>
<td>Pigmented</td>
<td>Pigmented</td>
</tr>
<tr>
<td>Color</td>
<td>463 Standard colors, color matching available</td>
<td>463 Standard colors, color matching available</td>
<td>463 Standard colors, color matching available</td>
</tr>
</tbody>
</table>

Sikagard® 670W anti-carbonation coating applied to underside of slab/ceiling

Sikagard® 670W acrylic protective coating spray applied. Excellent option to increase light reflectivity and brightness
SIKA FULL RANGE SOLUTIONS FOR CONSTRUCTION:

WATERPROOFING
CONCRETE
REFURBISHMENT
SEALING AND BONDING
FLOORING
ROOFING

FOR MORE INFORMATION:

All sales of Sika products are subject to Sika’s current Terms and Conditions of Sale available at www.usa.sika.com or by calling 201-933-8800. Prior to each use of any Sika product, the user must always read and follow the warnings and instructions on the product’s most current Product Data Sheet, product label and Safety Data Sheet, which are available at www.usa.sika.com or by calling Technical Services at 1-800-933-7452. Nothing contained in any Sika materials relieves the user of the obligation to read and follow the warnings and instructions for each Sika product as set forth in the current Product Data Sheet, product label and Safety Data Sheet prior to product use.

The sale of all Sika products are subject to the following Limited Warranty:

LIMITED MATERIAL WARRANTY

Sika warrants this product for one year from date of installation to be free from manufacturing defects and to meet the technical properties on the current Product Data Sheet if used as directed within shelf life. User determines suitability of product for intended use and assumes all risks. Buyer’s sole remedy shall be limited to the purchase price or replacement of product exclusive of labor or cost of labor.

NO OTHER WARRANTIES EXPRESS OR IMPLIED SHALL APPLY INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SIKA SHALL NOT BE LIABLE UNDER ANY LEGAL THEORY FOR SPECIAL OR CONSEQUENTIAL DAMAGES. SIKA SHALL NOT BE RESPONSIBLE FOR THE USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT OR ANY OTHER INTELLECTUAL PROPERTY RIGHTS HELD BY OTHERS.

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

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