



# FLOORING SIKAFLOOR SOLUTIONS FOR MULTI-STOREY & UNDERGROUND CAR PARKS



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# SIKAFLOOR® SOLUTIONS FOR MULTI-STOREY AND UNDERGROUND CAR PARKS

## **PARKING STRUCTURES TODAY**

Parking has become a vital part of today's mobile community, especially in metropolitan areas and airports. The rapid growth rate of these areas means continually providing more parking spaces by building new car parks and frequently extending and refurbishing existing ones.

## **WHERE DO YOU LIKE TO PARK?**

Successful parking structures are designed to meet the user's demands, which vary from feeling safe and welcome to knowing that their cars are in a secure environment. Given the choice, people always park in a light, bright car park where they feel their property is being looked after and safe.

## **MECHANICAL STRESSES**

Car Park Systems applied in multi-story and underground car parks are subject to extreme mechanical stress during normal operation of the parking structure. Areas subject to the highest levels of stress are the running aisles, turning ramps and pay station areas. In order to provide a long term, durable solution, good adhesion is required - not only between the substrate and the decking system but also between the different layers within the system. Sika developed a practical test machine that clearly demonstrates the ability of the Sika Car Park Systems, especially the Elastomeric System, to resist the ultimate abrasion test - refer to page 8.

## **ROOFS AND WATERPROOFING**

Top Deck Car Parks represent the greatest challenge for exposed trafficable waterproofing systems. In addition to the mechanical stresses, car park decks must have crack bridging properties and resist high levels of UV (Ultra Violet Radiation), while retaining their good looks for long periods:

- Sika Top Deck Systems have high levels of flexibility and have been fully tested to conform with the crack bridging requirements of EN 1062.
- Tested to meet German Industry Standard DIN V 18026 OS 11a and 11b.
- Able to resist high levels of UV radiation in two ways:
  - The hard silica quartz rich aggregate wear layer blocks UV radiation.
  - A high UV resistant finish coating is applied to give additional protection and a long lasting, great appearance to the finish.

## **INVESTIGATION AND SURVEY OF EXISTING PARKING STRUCTURES**

Multi-storey and underground car parks are both subject to many different stresses. In order to discover the root causes of distress and deterioration, it is essential to carry out a professional Condition Survey and Assessment. It is obviously important to balance the cost of the investigative work with the benefits that the information derived will provide, but an appropriate survey and assessment is often critical to the process of successfully maintaining and extending the service life of a parking structure.

## **NEW BUILD**

Modern parking structures are essential and integrated into a city's architecture. They are frequently built using 'fast-track' construction techniques, with as much off-site construction as possible, to reduce disruption.

Therefore precast and prefabricated sections of steel frames and concrete decks and stairways are usually combined in composite structures for new car parks. The adequate protection of new build car parks will prevent a cost intensive refurbishment in the future.

## **REFURBISHMENT**

Most existing multi-storey car parks have been built since 1940 and they are predominantly of reinforced concrete construction. Many also have a history of early deterioration. This is due to poor design, poor construction, low standards of maintenance and repair, or a combination of all three. The exposure is more similar to that of bridges and as a result, deterioration, particularly reinforcement corrosion due to the effects of carbonation, has had a major impact on their durability. These bad experiences have served to emphasise the need for improved performance in design, workmanship and material selection, to ensure the performance and safety of new and existing car parking structures.

# MULTI-STOREY AND UNDERGROUND CAR PARKS - TOP DECKS AND EXPOSED AREAS



**REQUIREMENTS**

## TOP DECK - DYNAMIC CRACK BRIDGING

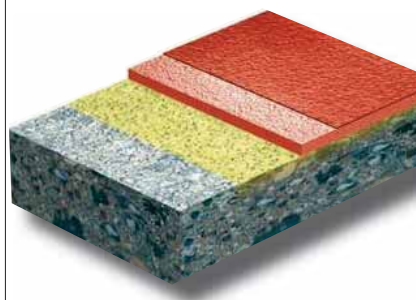
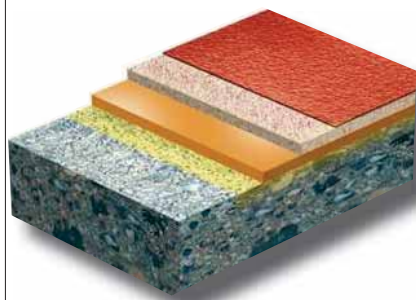
- High abrasion resistance
- Waterproof
- Thermal exposure
- Dynamic crack-bridging
- UV resistance (non yellowing)
- Comfort and care
- German standard (OS-11a)

## TOP DECK - STATIC CRACK BRIDGING

- High abrasion resistance
- Waterproof
- Thermal exposure
- UV resistance (non yellowing)
- Comfort and care
- Static crack-bridging
- German standard (OS-11b)



**DESIGN / BUILD-UP**



**SIKA SYSTEM / PERFORMANCE**

Primer: **Sikafloor-156**

Membrane: **Sikafloor-350 N Elastic**

Abrasion layer: **Sikafloor -375** a solvent free, polyurethane binder, broadcast with Quartz sand

Seal coat: **Sikafloor-359 N**

Layer thickness: 4 - 5 mm



Primer: **Sikafloor-156**

Membrane: **Sikafloor-350 N Elastic**, a solvent free, highly elastic polyurethane binder, broadcast with Quartz sand

Seal coat: **Sikafloor-359 N**

Layer thickness: 3 - 4 mm



# MULTI-STOREY AND UNDERGROUND CAR PARKS - INTERMEDIATE DECKS



## REQUIREMENTS

### INTERMEDIATE DECK - ELASTOMERIC SYSTEM

- Waterproof
- Thermal exposure
- Static crack-bridging
- UV resistance (non yellowing)
- High abrasion resistance
- German standard (OS-13)

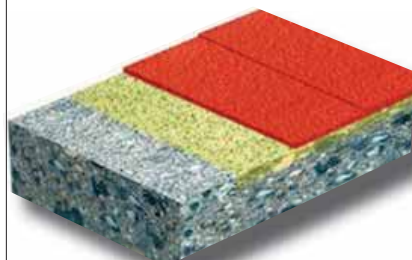
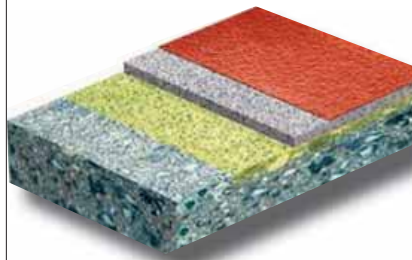
Also suitable for ramps (use Extender T)

### INTERMEDIATE DECK - RIGID SYSTEM

- High abrasion resistance
- Waterproof
- Slip resistance
- Aesthetics
- German standard (OS-8)



## DESIGN / BUILD-UP



## SIKA SYSTEM / PERFORMANCE

Primer: **Sikafloor-156**

Wearing layer: **Sikafloor-375** a solvent free polyurethane binder, broadcast with Quartz sand

Seal coat: **Sikafloor-359 N**  
Layer thickness: 3 - 4 mm



Primer: **Sikafloor-156** (optional)

Base coat: **Sikafloor-264** a solvent free, coloured epoxy binder, broadcast with Quartz sand

Seal coat: **Sikafloor-264**  
Layer thickness: 1 - 3 mm



# MULTI-STOREY AND UNDERGROUND CAR PARKS - ON-GRADE SLABS



## REQUIREMENTS

### BASEMENT DECK - RIGID SYSTEM

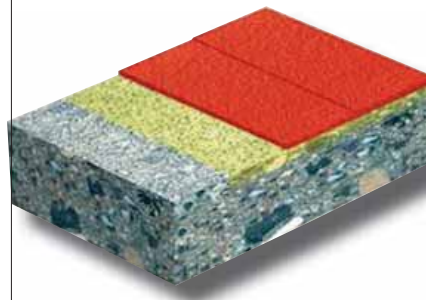
- High abrasion resistance
- Waterproof
- Slip resistance
- Aesthetics
- German standard (OS-8)

### BASEMENT DECK - VAPOUR PERMEABLE SYSTEM

- High abrasion resistance
- Waterproof
- Slip resistance
- Water vapour diffusion open



## DESIGN / BUILD-UP



## SIKA SYSTEM / PERFORMANCE

Primer: **Sikafloor-156** (optional)

Wearing layer: **Sikafloor-264** a solvent free, coloured epoxy binder, broadcast with Quartz sand

Seal coat: **Sikafloor-264**  
Layer thickness: 1 - 3 mm



Primer: **Sikafloor-155 W N**

ECC screed: **Sikafloor-81 EpoCem** an epoxy modified, cementitious self-smoothing screed, broadcast with Quartz sand

Two coats of **Sikafloor-2530 W**  
Layer thickness: ca. 2 - 3 mm



# MULTI-STOREY AND UNDERGROUND CAR PARKS - RAMPS



## REQUIREMENTS

### RAMPS - FLEXIBLE SYSTEM

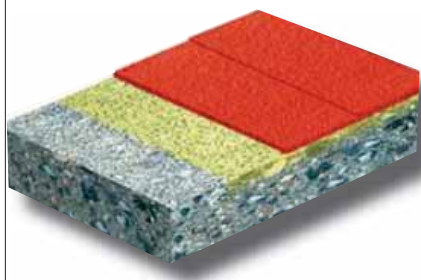
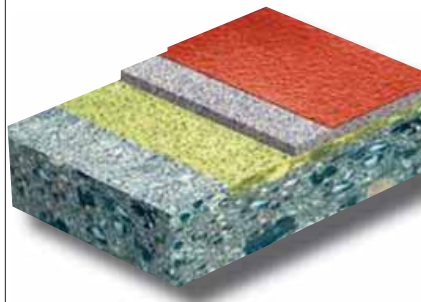
- High abrasion resistance
- Waterproof
- Thermal exposure
- Static crack bridging

### RAMPS - RIGID SYSTEM

- High abrasion resistance
- Waterproof
- Slip resistance
- Aesthetics
- German standard (05-8)



## DESIGN / BUILD-UP



## SIKA SYSTEM / PERFORMANCE

Primer: **Sikafloor-156**

Wearing layer: **Sikafloor-375 (Extender T)**  
broadcast with Quartz sand

Seal coat: **Sikafloor-359 N**  
Layer thickness: 3 - 4 mm



Primer: **Sikafloor-156** (optional)

Wearing layer: **Sikafloor-264** a solvent free, coloured epoxy binder, broadcast with Quartz sand

Seal coat: **Sikafloor-264**  
Layer thickness: 1 - 3 mm



# MULTI-STOREY AND UNDERGROUND CAR PARKS - WALKWAYS | STAIRS | LIGHT TRAFFIC



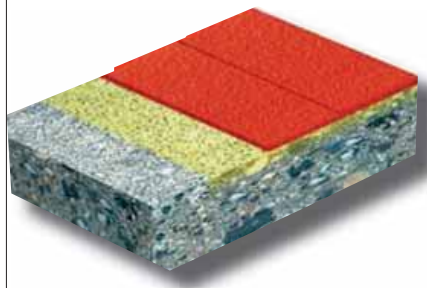
## REQUIREMENTS

### WALKWAYS | STAIRS | LIGHT TRAFFIC - FLEXIBLE SYSTEM

- High abrasion resistance
- Waterproof
- Slip resistance
- Aesthetics



## DESIGN / BUILD-UP



## SIKA SYSTEM / PERFORMANCE

Primer: **Sikafloor-156** (optional)

Base coat: **Sikafloor-156**, broadcast with Quartz sand

Seal coat: **Sikafloor-400 N Elastic**  
Layer thickness: 2 - 3 mm



## GUIDE

### TRAFFIC AND MECHANICAL WEAR



Heavy and frequent traffic increases physical requirements for mechanical resistance, measured as abrasion. Often the greatest wear or exposure occurs in localised areas. Trucking aisles or sections around specialised plant for example, may require different or additional treatment to the surrounding general floor area.

### CHEMICAL RESISTANCE



Resistance to chemical attack is a major factor for many floor finishes. Assess the effects on the floor of the individual chemicals present, plus their combined or mixed effects and the consequences of any chemical reactions. Higher temperatures usually increase the aggressive nature of chemicals.

### SERVICE TEMPERATURE



Thermal shock resistance can be a major requirement for floors. It is important to consider not only the

temperature of operating machinery and the products in the processes, but also the temperature of adjacent areas.

At either end of the scale, the spills of chemicals and temperature extremes from hot water or steam used for cleaning and cold from blast freezers can represent an extremely demanding environment, which many Sikafloor systems can durably accommodate.

### FLOOR COATING ON GREEN AND DAMP CONCRETE



In many refurbishment and new construction situations, freshly poured concrete must be coated and protected quickly. To reduce the waiting time for specific moisture evaporation from the substrate, innovative solutions such as Sika EpoCem technology can be used.

### MULTIPLE COLOUR SHADES



The Sikafloor range is available in almost every stable colour shade and special colours can be made to order or matched to a client's requirements.

### SLIP RESISTANCE



Floor areas may require different degrees of slip resistance, dependent on their environment, i.e. 'wet' or 'dry' processing areas.

This is principally a question of reconciling the surface profile and finish, with the demands for ease of cleaning and the type and likelihood of spillages. Generally speaking the greater the profile, the greater the slip resistance.

### WATERPROOFING



Sikafloor systems can provide an impermeable seal to protect both the concrete from attack by aggressive liquids and the underlying ground water from the leakage of pollutants. This ensures the reliable containment of these potentially aggressive and environmentally harmful materials.

### FIRE RESISTANCE



Fire classifications for floors are given by national and local authorities. Floors protected and designed with liquid polymers also have

to meet these requirements, which is no problem for Sikafloor systems.

### RAPID CURING



Flooring systems with rapid curing properties can reduce down-time to a minimum. This is often required during refurbishment, new construction and for low temperature applications. Sika has a complete range of fast curing and accelerated systems.

### CRACK-BRIDGING ABILITY



Static and dynamic crack-bridging properties are often required for floor coating systems in order to adequately protect the substrate (for instance on car park decks) otherwise sufficient stress relief and / or movement joints must be incorporated into the structure itself. Sika systems are tested for crack-bridging performance down to at least -20°C.

### UV LIGHT RESISTANCE



Where colour is important or where high UV Light radiation exposure is anticipated, suitably resistant and light fast Sikafloor systems are available.



# THE ULTIMATE ABRASION RESISTANCE TEST

## SIKA TESTING ELASTOMERIC CAR PARK DECKING SYSTEMS TO THEIR LIMITS!

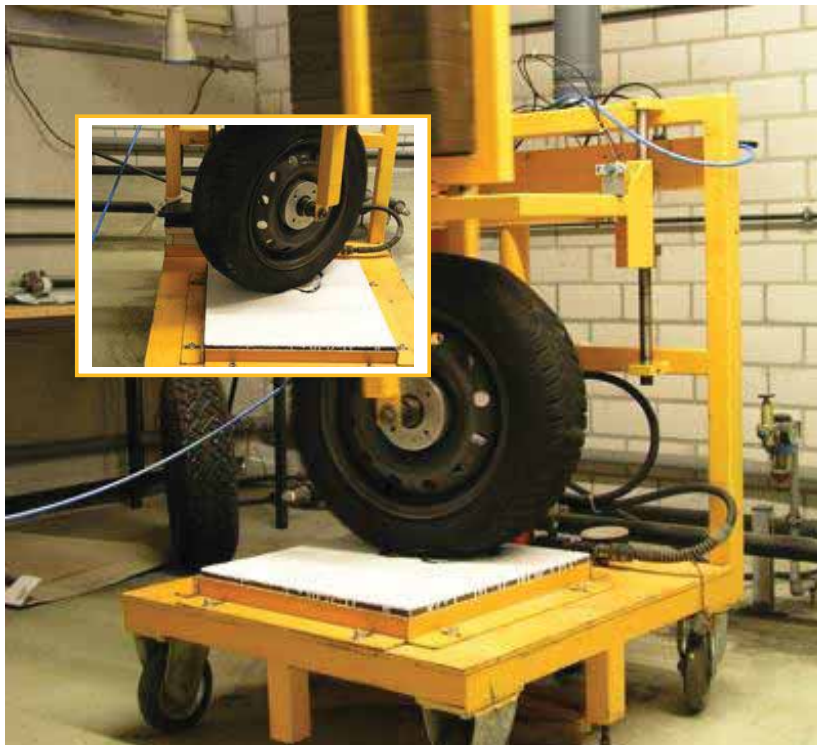
Car park decking systems applied in multi-storey and underground car parks are subject to extreme mechanical stress during normal operation of the parking structure. Areas subject to the highest levels of stress are the running aisles, turning areas, ramps and pay station areas. In order to provide a long term solution, good adhesion is required not only between the substrate and the decking system but also between the different layers within the system.

In order to demonstrate the durability of the system it is therefore important to carry out practical abrasion resistance tests, especially of the elastomeric car park decking systems.

Sika developed a testing machine, that allows the replication of the maximum mechanical stresses produced by real car tyres.

The air operated test rig is designed so that the car tyre, which is loaded with 230kg, moves through a 100° angle of deflection over a given number of cycles.

The table provides an indication of the relative performance of Sika car park decking systems and those of our competitors, in respect of the system's ability to resist mechanical stresses which can result in abrasion.



**A clear result: Sika systems confirm the best abrasion resistance!**

System in accordance with DAfStb OS 11b



**Sikafloor -350 N | -359 N**



**Competitor I**

System in accordance with DAfStb OS 11a (UV stable seal coat)

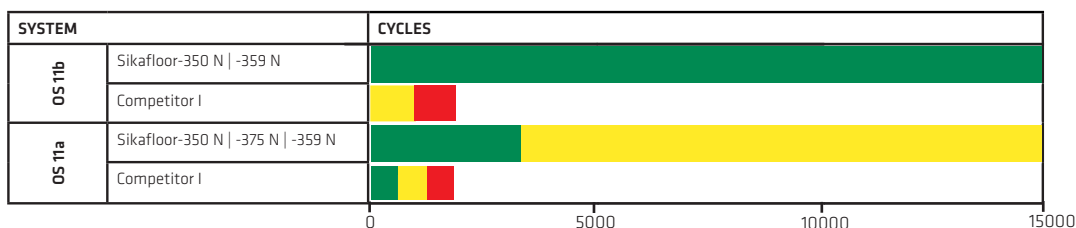


**Sikafloor -350 N | -375 N | -359 N**



**Competitor I**

Pictures taken after 2000 cycles



- **no damage visible:** no cracks, no aggregate has been worn out
- **damage visible:** cracks visible in the seal coat, several aggregates have been worn off
- **damaged:** seal coat has been removed in several large areas or completely

# THE SIKAFLOOR® APPLICATION PROCEDURE - SUBSTRATE INSPECTION AND PREPARATION

THE SUBSTRATE IS THE BASIS OF A FLOOR, WHETHER IT IS NEW OR OLD. THOROUGH INSPECTION AND ASSESSMENT ARE ESSENTIAL TO DETERMINE THE CORRECT SUBSTRATE PREPARATION FOR A SUCCESSFUL FLOORING SYSTEM. A DURABLE BOND MUST BE ACHIEVED BETWEEN THE NEW FLOOR SYSTEM AND THE SUBSTRATE. THIS REQUIRES A DRY, SOUND AND CLEAN SURFACE TO BE PREPARED, WITHOUT DUST OR OTHER CONTAMINANTS, PRIOR TO APPLICATION OF THE FLOORING SYSTEM.

## MEASURING THE COMPRESSIVE STRENGTH

The compressive strength of the substrate should not be less than 25 N/mm<sup>2</sup> (25 MPa). To meet defined loads, a higher strength may be required. It is advisable to take a number of measurements across the floor and in all parts of the proposed installation to confirm suitability of the compressive strength.



## DETERMINING THE COHESIVE STRENGTH

Concrete substrates generally have cement laitance with low strengths in the top few millimetres. This weak layer must always be removed. Stresses from concrete shrinkage, thermal shock or excessive loading may also lead to reduced cohesive strength. The minimum cohesive strength should be: 1.5 N/mm<sup>2</sup> (1.5 MPa). Any inadequate areas must be removed and replaced.



## SUBSTRATE MOISTURE CONTENT

It is extremely important to measure the substrate moisture content because cement bound substrates should normally only be coated when the moisture is compliant with the technical data sheet. A very simple method for checking moisture presence is the test according to ASTM D4263 (Polyethylene-sheet) (at least 1 m x 1 m of polyethylene sheet, taped to the concrete surface). This should be left in position for at least 24 hours, prior to removal and testing. Any condensed vapour transmissions are thereby detected. Substrate moisture greater than 4% (or 6% if Sikafloor-161 Primer is used) using Tramex Moisture Meter or rising moisture (condensed vapour) indicates the need for additional drying time or the use of Sika EpoCem Technology as a temporary moisture barrier.



## QUALITY ASSURANCE

Sika Quality Assurance documentation is to be filled out by the contractor. Quality Assurance includes measurements of ambient and substrate conditions. If atmospheric climate factors are ignored, serious flooring defects such as poor adhesion, water marks, void formation, irregular surfaces and inadequate curing may occur. The following data must therefore be checked several times a day, before, during and after application to ensure that they are within the system limitations:

- Ambient temperature (air temperature)
- Substrate temperature
- Dew point



## PREPARATION AND CLEANING

Areas of weak substrate or surface laitance will compromise the adhesion characteristics of any installed system, if not fully removed. Surfaces must therefore always be mechanically prepared down to a sound substrate. Any dirt, dust, oils and grease or other contaminants will also reduce or prevent adhesion of any topping, so these must also be removed by thorough cleaning and vacuuming of all residues.







# FOR MORE Sikafloor® INFORMATION:



**WHO WE ARE**

Sika AG, Switzerland, is a globally active speciality 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 high quality 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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