REFURBISHMENT STRUCTURAL STRENGTHENING WITH SIKA SYSTEMS

BUILDING TRUST

SikaWrap® FABRIC STRENGTHENING SYSTEM

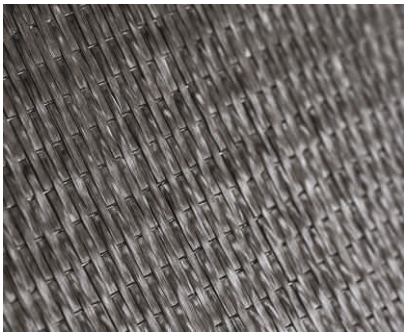
For structural column confinement, strengthening of weaker concrete, masonry, natural stone and timber structures

THE SikaWrap® FABRIC STRENGTHENING SYSTEM is comprised of unidirectional, carbon or glass fibre fabrics and Sikadur® structural epoxy resin based, impregnating resins. These unique combinations provide a wide range of strengthening and upgrading solutions to meet the many varied demands of different projects and applications.

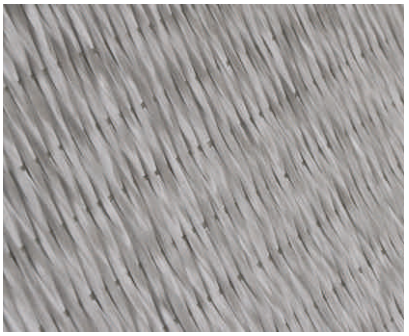
SikaWrap® Fabric Strengthening Systems deliver proven outstanding performance for:

Strengthening irregularly shaped structures and substrates

Note: Using a single layer of heavyweight fabric can sometimes be stronger and more cost effective than several layers of the standard lightweight fabrics



Carbon Fibre Fabric: SikaWrap® C
Active Strengthening: for constant or high loadings



Glass Fibre Fabric: SikaWrap® G
Passive Strengthening: for temporary loading and seismic event protection

SikaWrap® fabrics also including:
Aramid Fibre Fabrics, Special Bidirectional and Quadraxial Fabrics

TYPICAL STRUCTURAL APPLICATIONS

CONFINEMENT

- For structural members in compression
- To enhance load carrying capacity or ductility
- Multi-layer applications are possible

SHEAR STRENGTHENING

- Non-rectangular cross sections are possible
- End anchorages with SikaWrap® FX

SEISMIC STRENGTHENING

- Mostly using SikaWrap® glass fibre fabrics
- For passive strengthening solutions
- As an alternative to textile reinforced mortars (TRM)

WEAK SUBSTRATE STRENGTHENING

- For strengthening masonry, natural stone walls and other structures
- Flexural strengthening of weak concrete elements or structures

DRY AND WET APPLICATION

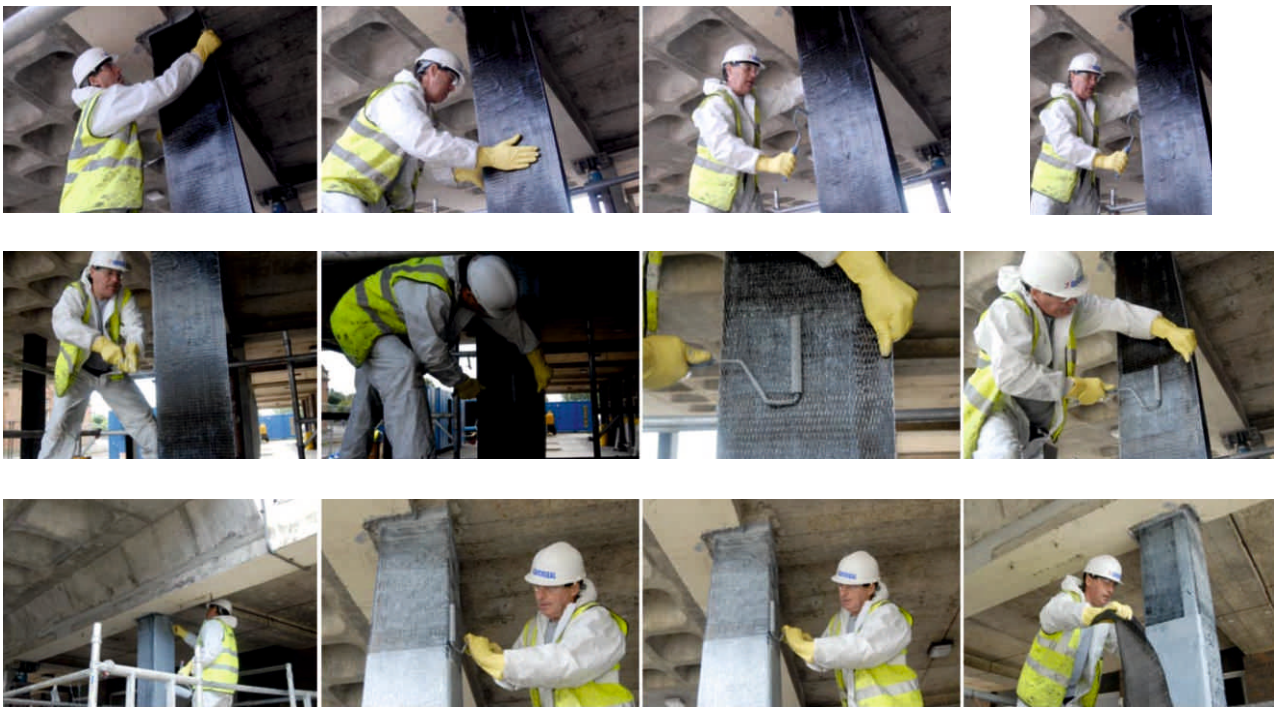
Dry application: For installation of lightweight fabrics up to 450 g/m²

- The Sikadur® impregnation resin is spread directly onto the prepared substrate, also filling small irregularities in the surface
- The dry fabric is placed on the resin and pressed on by hand
- The resin is worked into the fibre with a roller, always in the direction of the fibres
- When the fabric is fully impregnated, the excess resin can either be removed with a plastic scraper or additional resin can be applied for the installation of an additional layer

Wet application: installation of pre-impregnated fabrics heavier than 450 g/m²

- The Sikadur® impregnation resin is poured on a plastic sheet and the dry fabric placed on top of it
- The resin is worked into the sheet with a plastic roller until the fibres are completely impregnated
- The substrate is covered with a thin layer of the Sikadur® resin as a primer
- The wet fabric is applied on the primed substrate and pressed on firmly with a plastic roller, thereby removing any entrapped air

STEP BY STEP APPLICATION METHODOLOGY



SikaWrap® fibre reinforced polymer structural strengthening and seismic retrofitting system:

SikaWrap® video

Sika®CarboDur® and SikaWrap® SYSTEM EXPERIENCE

1970

Long Term Test
Sikadur® adhesive at
EMPA (ongoing!)

1991

First application of
SikaWrap® system

1994

First application of
Sika®CarboDur®
system

LONG TERM EXPERIENCE

More than 45 years experience with **Sikadur®** and more than 20 years experience with **SikaWrap®** and **Sika®CarboDur®** system

PROVEN DURABILITY

Sika Strengthening Systems have been tested for durability under many demanding conditions to ensure long-term performance in different applications and environments:

Long-term creep test: A concrete beam, strengthened with a steel plate applied with Sikadur® adhesive was loaded to 80% of the expected failure load back in 1971 and maintained ever since. The deflection has been stable for the past 40+ years with a very small amount of creep. This test is ongoing and conducted by an independent institute.

Artificial ageing: Samples of Sika CarboDur® and SikaWrap® were exposed to artificial ageing for 500 days. The test results before and after this exposure showed no changes or deterioration in the tensile, pull-off and lap shear strengths of the installed systems.

Exposure in an alkaline environment: Coated and uncoated Sika CarboDur® plates were fully immersed in a highly alkaline solution. The strength of the coated samples decreased 10 % after the first 90 days, and leveled out at a total strength loss of 14% after one year of exposure. While the results are hard to translate and interpret for real life environmental conditions, the positive result makes a strong argument for the durability of these Sika Strengthening Systems in alkaline environments.

Installation under oscillating dynamic load: Sika CarboDur® plates can be installed under oscillating dynamic load with no decrease in the strengthening capacity of the system (extensively tested by an independent external institute).

Sika CarboDur® SYSTEM

More than 20 years experience with installations all over the world

THE SIKA CARBODUR® SYSTEM is one of the most established and well-proven, carbon-fibre-reinforced polymer (CFRP) based structural strengthening solutions worldwide. It consists of Sika CarboDur® CFRP plates and rods, plus the structural epoxy resin based adhesives Sikadur®-30 and Sikadur®-30 LP. This simple and reliable, high performance system is easy to apply and provides outstanding long-term durability in service.

Proven Long Term Solutions	■ Extensive use and monitoring in numerous different applications for more than 20 years
Fast Installation = Minimal Down Time	■ No additional plate preparation work and one product for surface filling, priming and bonding
(In)-Visible Strengthening	■ External surface and near surface mounted applications (NSM) ■ Additional overcoating or mortar cover possible
Whole System = One Supplier	■ Including matrix resin of the plates, the bonding adhesive and the protective coatings where required

Sika CarboDur®

For externally bonded and near surface mounted (NSM) flexural strengthening of concrete, steel, timber, masonry and glass fiber structures.
Sika CarboDur® plates and rods are carbon fibre reinforced polymers produced by a pultrusion process to have precisely defined properties and performance; all in accordance with tight specifications and quality control procedures. The materials are widely used for the flexural strengthening of dynamic and statically loaded buildings and other structures including bridges, beams, ceilings and walls, for both negative and positive moments.

FLEXURAL STRENGTHENING:

Positive moments
■Park decks
■Buildings
■Bridges

Negative moments
■Bridge decks
■Flat roofs
■Curved substrates

See how Sika CarboDur® FRP plates strengthen a simple concrete beam to carry much higher loads:

Sika Solutions for Every Construction

Concrete

Waterproofing

Refurbishment

Flooring

Sealing & Bonding

Roofing

SIKA - THE CUSTOMISED SOLUTION PROVIDER

Sika's innovative ideas and expertise in evolving quality products has been a hallmark in the history of construction chemicals. For over hundred years Sika is consistently serving the construction industry with its pioneering technology and commitment.

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