

Construction



# Sika<sup>®</sup> CarboDur<sup>®</sup> Structural Strengthening Systems

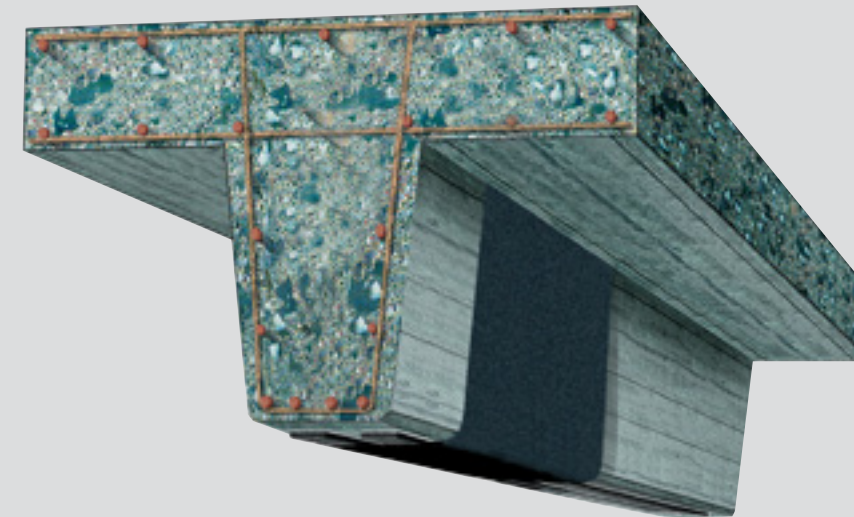




# Structural Strengthening with Sika® CarboDur® Composite Systems

## Reasons for Strengthening

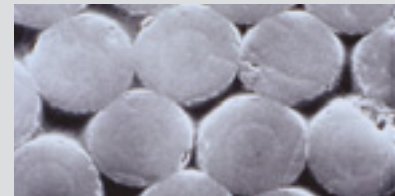
- **Durability problems** due to poor or inappropriate construction materials
- **Inadequate** design or construction
- **Aggressive** environments not properly understood during the design stages
- **Increased** loading requirements due to changes of policy or use of structures
- **Increased life-span** requirements made on ageing infrastructure
- **Exceptional** or accidental loading



## Materials used



**CFRP Plates**  
Carbon fiber reinforced plates produced by pultrusion process with precise material properties. Mostly used for flexural strengthening of dynamic and static loaded structures such as bridges, beams, ceilings or walls.



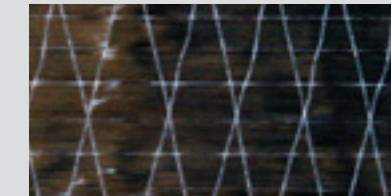
**Carbon Fibres in CFRP Plates**  
Magnification 1:2000  
Fiber volume content > 70 %



**Sika CarboShear L**  
L-shaped carbon fiber link used as externally bonded shear reinforcement, mostly used for shear reinforcement of T-beams as an anchoring tool for CFRP plates.

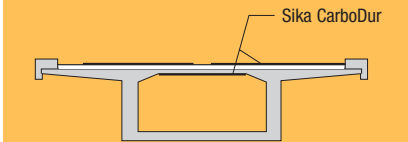


**FRP Fabrics**  
Uni- and bidirectional fabrics with carbon, glass and aramid fibers. Mostly used for seismic retrofitting and shear strengthening.

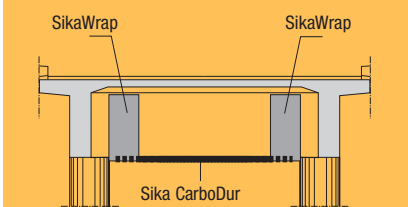


## Sika® Systems

- Flexural Strengthening with**
- **Sika® CarboDur®** CFRP plates
  - **Sika® CarboHeater**, heating device for rapid application
  - **Sika® CarboDur®** prestressed CFRP plates
  - **SikaWrap®** FRP fabrics



- Shear Strengthening with**
- **Sika® CarboShear® L** CFRP plates
  - **SikaWrap®** FRP fabrics



- Seismic Retrofitting with**
- **SikaWrap®** FRP fabrics



## Upgrading of existing Civil Engineering Infrastructure

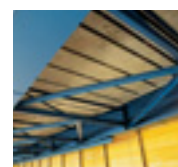
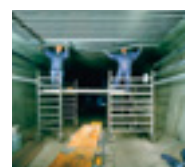
### Columns/Poles



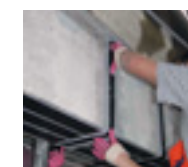
### Silos/Chimneys/Towers



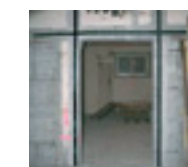
### Bridge Decks



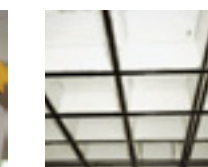
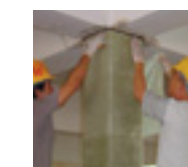
### Beams/Girders



### Buildings



### Parking Structures



# Sika® CarboDur® Structural Strengthening Systems

## CFRP Plates System Components

<b>Sika® CarboDur®</b> CFRP plates	Elastic modulus Tensile strength	<b>Type S</b> 165 000 N/mm <sup>2</sup> 2800 N/mm <sup>2</sup>	<b>Type M</b> 210 000 N/mm <sup>2</sup> 2800 N/mm <sup>2</sup>	<b>Type UH</b> 400 000 N/mm <sup>2</sup> 1800 N/mm <sup>2</sup>
<b>Sika® Prestressing Systems</b>	Prestressing of <b>Sika® CarboDur®</b> plates over 200 kN (20 tons) with <b>Sika® StressHead</b> or <b>Sika® LEOBA CarboDur®</b> prestressing system			
<b>Sika® CarboHeater</b> Heating device	Fast application (2 – 3 hrs) of <b>Sika® CarboDur®</b> plates			
<b>Sika® CarboShear® L</b> L-shaped CFRP plates	Min. tensile load Elastic modulus	126 kN/40 mm width 120 000 N/mm <sup>2</sup>		
<b>Sikadur®</b> Epoxy adhesives and mortars	Application temperature Elastic modulus Bond strength Use	<b>Sikadur®-30</b> 10 – 35 °C 12 800 N/mm <sup>2</sup> > 4 N/mm <sup>2</sup> (concrete failure) Plate adhesive	<b>Sikadur®-30 LP</b> 25 – 55 °C 10 000 N/mm <sup>2</sup> > 4 N/mm <sup>2</sup> (concrete failure) Plate adhesive	<b>Sikadur®-41</b> 10 – 35 °C 9000 N/mm <sup>2</sup> > 4 N/mm <sup>2</sup> (concrete failure) Repair mortar

## FRP Fabrics System Components

<b>SikaWrap®</b> FRP Fabrics	Several types of <b>SikaWrap®</b> FRP fabrics are available to meet the requirement of specifier and contractor. Unidirectional woven and non-woven fabrics made of glass, aramid and different types of carbon fibers are available. Bi-directional types can be offered with carbon and glass fibers. The range of areal weight is between 200 and 600 g/m <sup>2</sup> for carbon, 400 to 1000 g/m <sup>2</sup> for glass and 300 to 600 g/m <sup>2</sup> for aramid fiber fabrics. Further possibilities and fiber combinations are available on request.
<b>Sikadur®</b> Epoxy impregnating resins	All <b>SikaWrap®</b> fabrics can be impregnated with the system tested <b>Sikadur®</b> impregnating resins that are all suited for the most common substrate types.

For additional information see corresponding Product Data Sheets.

## Also available from Sika



**Sika Services AG**  
Corporate Construction  
CH-8048 Zürich  
Switzerland  
Phone +41 1 436 40 40  
Fax +41 1 436 46 86  
www.sika-construction.com

Your local Sika Company

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

