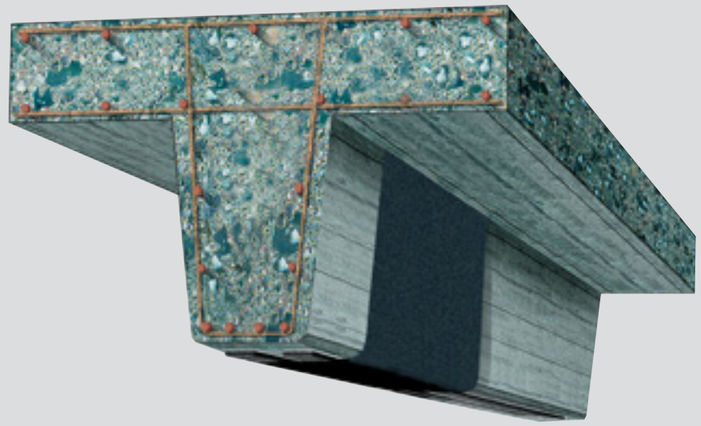
Construction

Sika® CarboDur®
Structural Strengthening Systems

Structural Strengthening with Sika® CarboDur® Composite Systems

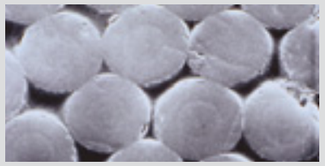
Reasons for Strengthening

- **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



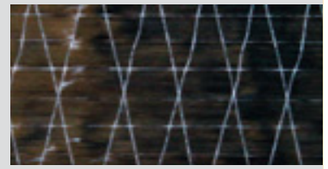
Materials used

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 walks.



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

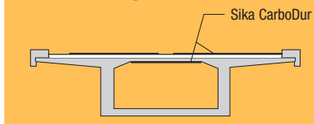
Sika CarboShear L
L-shaped carbon fiber link used as externally bonded shear reinforcement, mostly used for shear reinforcement of T-beams as an anchoring tool for CFRP plates.



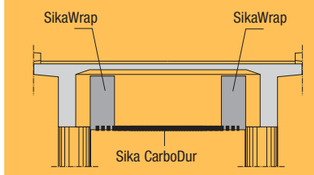
FRP Fabrics
Uni- and bidirectional fabrics with carbon, glass and aramid fibers. Mostly used for seismic retrofitting and shear strengthening.

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

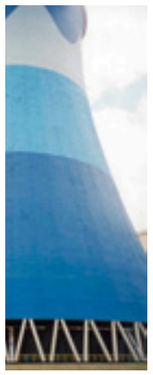


Seismic Retrofitting with
- **SikaWrap®** FRP fabrics

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

Sika® CarboDur® CFRP plates		**Type S**	**Type M**	**Type UH**
	Elastic modulus	165 000 N/mm²	210 000 N/mm²	400 000 N/mm²
	Tensile strength	2800 N/mm²	2800 N/mm²	1800 N/mm²
Sika® Prestressing Systems	Prestressing of **Sika® CarboDur®** plates over 200 kN (20 tons) with **Sika® StressHead** or **Sika® LEOBA CarboDur®** prestressing system			
Sika® CarboHeater Heating device	Fast application (2 – 3 hrs) of **Sika® CarboDur®** plates			
Sika® CarboShear® L L-shaped CFRP plates	Min. tensile load	126 kN/40 mm width		
	Elastic modulus	120 000 N/mm²		
Sikadur® Epoxy adhesives and mortars		**Sikadur®-30**	**Sikadur®-30 LP**	**Sikadur®-41**
	Application temperature	10 – 35 °C	25 – 55 °C	10 – 35 °C
	Elastic modulus	12 800 N/mm²	10 000 N/mm²	9000 N/mm²
	Bond strength	> 4 N/mm² (concrete failure)	> 4 N/mm² (concrete failure)	> 4 N/mm² (concrete failure)
	Use	Plate adhesive	Plate adhesive	Repair mortar

FRP Fabrics System Components

SikaWrap® FRP Fabrics	Several types of **SikaWrap®** 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/m² for carbon, 400 to 1000 g/m² for glass and 300 to 600 g/m² for aramid fiber fabrics. Further possibilities and fiber combinations are available on request.
Sikadur® Epoxy impregnating resins	All **SikaWrap®** fabrics can be impregnated with the system tested **Sikadur®** impregnating resins that are all suited for the most common substrate types.

For additional information see corresponding Product Data Sheets.

Also available from Sika



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Responsible Care
Certified Quality System ISO 9001/EN 29001 since 1986
Certified Management System ISO 14001 since 1997