

PRODUCT DATA SHEET

Sika® CarboDur® E

Pultruded carbon fibre plates for structural strengthening as part of a Sika® CarboDur® system

DESCRIPTION

Sika® CarboDur® E plates are pultruded carbon fibre reinforced polymer (CFRP) laminates, designed for strengthening concrete, timber, masonry, steel and fibre reinforced polymer structures.

Sika® CarboDur® E plates are bonded onto the structure as externally bonded reinforcement using Sikadur®-30 epoxy resin based adhesive.

Please refer to the relevant Product Data Sheet for more detailed information about the adhesive.

USES

Sika® CarboDur® E may only be used by experienced professionals.

Sika® CarboDur® E systems are used to improve, increase or repair the performance and resistance of structures for:

Increased Load Carrying Capacity:

- Increasing the load capacity of floor slabs, beams and bridge sections
- For the installation of heavier machinery
- To stabilise vibrating structures
- For changes in building use

Damage to structural elements due to:

- Deterioration of the original construction materials
- Steel reinforcement corrosion
- Accidents (Vehicle impact, earthquakes, fire)

Improvement of serviceability and durability:

- Reduced deflection and crack width
- Stress reduction in the steel reinforcement
- Improved fatigue resistance

Change of the structural system:

- Removal of walls and / or columns
- Removal of floor and wall sections to create access / openings

Resistance to possible events:

- Increased resistance to earthquakes, impact or explosion etc.

To repair design or construction defects such as:

- Insufficient / inadequate reinforcement
- Insufficient / inadequate structural depth

CHARACTERISTICS / ADVANTAGES

- Non corroding
- Very high strength
- Excellent durability
- Unlimited lengths, no joints required
- Low system thickness, simple execution of plate intersections or crossings
- Easy transportation (rolls)
- Lightweight, very easy to install, especially overhead (without temporary support)
- Minimum preparation of plate, applicable in several layers
- Smooth edges without exposed fibres as result of production by pultrusion
- Extensive Testing and Approvals available from many countries worldwide

APPROVALS / CERTIFICATES

- France: CSTB - Avis Technique 3/10-669, SIKA CARBODUR SIKA WRAP
- Slovakia: TSUS, Building Testing and research institutes,
- Slovakia: Technical Approval TO-09/0080, 2009: Systémy dodatočného zosilňovania konštrukcií Sika® CarboDur® a SikaWrap®.

- Poland: Technical Approval ITB AT-15-5604/2011: Zestaw wyrobów Sika® CarboDur® do wzmacniania i napraw konstrukcji betonowych
- Poland: Technical Approval IBDiM Nr AT/2008-03-0336/1 „Płaskowniki. pręty, kształtki i maty kompozytowe do wzmacniania betonu o nazwie handlowej: Zestaw materiałów Sika® CarboDur® do wzmacniania konstrukcji obiektów mostowych
- Fib, Technical Report, bulletin 14: Externally bonded FRP reinforcement for RC structures, July 2001.
- USA: ACI 440.2R-08, Guide for the Design and construction of Externally Bonded FRP Systems for strengthening concrete structures, July 2008.
- UK: Concrete Society Technical Report No. 55, Design guidance for strengthening concrete structures using fibre composite material, 2012.
- Switzerland: SIA 166:2004 Klebebewehrungen
- Italy: CNR-DT 200/2004 - Guide for the Design and Construction of Externally Bonded FRP Systems for Strengthening Existing Structures

PRODUCT INFORMATION

Packaging	Supplied in rolls of 5, 25 and 100 m			
Appearance / Colour	Carbon fibre reinforced polymer with a vinyl ester matrix, black			
Shelf life	Unlimited			
Storage conditions	No exposure to direct sunlight (UV light), in dry conditions and at temperatures of max. 50 °C			
Density	1.55 g/cm ³			
Dimensions	Type	Width	Thickness	Cross section area
	Sika® CarboDur® E 512	50 mm	1.2 mm	60 mm ²
	Sika® CarboDur® E 514	50 mm	1.4 mm	70 mm ²
	Sika® CarboDur® E 812	80 mm	1.2 mm	96 mm ²
	Sika® CarboDur® E1012	100 mm	1.2 mm	120 mm ²
	Sika® CarboDur® E1014	100 mm	1.4 mm	140 mm ²
	Sika® CarboDur® E1214	120 mm	1.4 mm	168 mm ²
Fibre volume content	> 70 %			

TECHNICAL INFORMATION

Laminate tensile strength	Mean	Characteristic*	(ASTM D3039)
	2200 N/mm ²	2000 N/mm ²	
Values in longitudinal direction of fibres * 5 % fractile			
Laminate modulus of elasticity in tension	Mean	Characteristic*	(ASTM D3039)
	180 kN/mm ²	170 kN/mm ²	
Value in longitudinal direction of fibres * 5 % fractile			

Laminate elongation at break in tension	Mean	Characteristic*	(ASTM D3039)
	1.22 %	1.18 %	

Value in longitudinal direction of fibres

* 5% fractile

Reaction to fire	Where required for local regulations, Sika® CarboDur® E plates can also be over coated with additional fire protection materials (e.g. Sikacrete® -213 F, Sika® Pyroplast® Wood P)
-------------------------	--

SYSTEMS

System structure	The system build-up and configuration as described must be fully complied with and may not be changed.
	Resin Adhesive <u>Sikadur®-30</u>
	CFRP plate <u>Sika® CarboDur® E</u>
	For detailed information on Sikadur®-30 please refer to the Sikadur®-30 Product Data Sheet and the "Method Statement CarboDur® Externally Bonded Reinforcement"

APPLICATION INFORMATION

Consumption	Width of CarboDur® plate	Typical Consumption of Sikadur®-30
	50 mm	0.25–0.35 kg/m
	80 mm	0.40–0.55 kg/m
	100 mm	0.55–0.80 kg/m
	120 mm	0.65–1.00 kg/m

APPLICATION INSTRUCTIONS

SUBSTRATE QUALITY

Sika® CarboDur® E plates externally bonded to the concrete surface

Sika recommended minimum concrete pull-off strength after surface preparation:

- Mean: 2.0 N/mm²
- Minimum: 1.5 N/mm²

Note: Different minimum requirements may be defined by the relevant design guidelines.

The effective concrete pull-off strength after surface preparation has to be verified.

If the concrete pull-off strength is below the stated minimum requirements, alternative Sika solutions are available:

- CarboDur® applied in slots as near surface mounted (NSM) reinforcement
- SikaWrap® fabrics: Please refer to the Product Data Sheet for the SikaWrap® fabrics

Concrete must generally be older than 28 days (dependent on curing conditions and the type of concrete etc.)

Sika® CarboDur® E externally bonded to other substrates

For application of CarboDur® plates to all other substrates (brick, stone, steel, wood, fibre reinforced polymer etc.) please refer to the Method Statement or contact Sika technical service for detailed advice.

SUBSTRATE PREPARATION

Concrete must be cleaned and prepared to achieve a

laitance and contaminant free, open textured surface. Please also refer to the Method Statement for further information.

APPLICATION METHOD / TOOLS

Please refer to the relevant Product Data Sheet:

- Sikadur®-30
- Sikadur®-30 LP

CarboDur® plates can be cut with a diamond saw or a hacksaw.

Please refer to the "Method Statement Sika® CarboDur® System" Ref: 850 41 05.

FURTHER INFORMATION

Method Statement

Sika® CarboDur® System, Ref: 850 41 05

IMPORTANT CONSIDERATIONS

- A suitably qualified Structural Engineer must be responsible for the design of the strengthening works.
- Additionally, as this application is structural, great care must also be taken in selecting suitably experienced and trained specialist contractors.
- Sika® CarboDur® strengthening systems with Sika® CarboDur® E plates must be protected from permanent exposure to direct sunlight, moisture and/or water. Please refer to the relevant Method Statement and Product Data Sheets for the selection of suitable overcoating materials, in situations where systems will be fully or partially exposed.
- Maximum permissible continuous service temperature is approx. +50 °C.

- Please also refer to the relevant Method Statements for further limitations and guidelines
- Contact Sika technical service for detailed advice.

BASIS OF PRODUCT DATA

All technical data stated in this Product Data Sheet are based on laboratory tests. Actual measured data may vary due to circumstances beyond our control.

LOCAL RESTRICTIONS

Please note that as a result of specific local regulations the performance of this product may vary from country to country. Please consult the local Product Data Sheet for the exact description of the application fields.

ECOLOGY, HEALTH AND SAFETY

REGULATION (EC) NO 1907/2006 - REACH

This product is an article as defined in article 3 of regulation (EC) No 1907/2006 (REACH). It contains no substances which are intended to be released from the article under normal or reasonably foreseeable conditions of use. A safety data sheet following article 31 of the same regulation is not needed to bring the product to the market, to transport or to use it. For safe use follow the instructions given in the product data sheet. Based on our current knowledge, this product does not contain SVHC (substances of very high concern) as listed in Annex XIV of the REACH regulation or on the candidate list published by the European Chemicals Agency in concentrations above 0,1 % (w/w).

LEGAL NOTES

The information, and, in particular, the recommendations relating to the application and end-use of Sika products, are given in good faith based on Sika's current knowledge and experience of the products when properly stored, handled and applied under normal conditions in accordance with Sika's recommendations. In practice, the differences in materials, substrates and actual site conditions are such that no warranty in respect of merchantability or of fitness for a particular purpose, nor any liability arising out of any legal relationship whatsoever, can be inferred either from this information, or from any written recommendations, or from any other advice offered. The user of the product must test the product's suitability for the intended application and purpose. Sika reserves the right to change the properties of its

products. The proprietary rights of third parties must be observed. All orders are accepted subject to our current terms of sale and delivery. Users must always refer to the most recent issue of the local Product Data Sheet for the product concerned, copies of which will be supplied on request.

Sika Hellas ABEE

15 Protomagias Str.
14568 Kryoneri
Attica-Greece
Tel.: +30 210 8160 600
Fax: +30 210 8160 606
www.sika.gr | sika@gr.sika.com



Product Data Sheet

Sika® CarboDur® E
September 2020, Version 01.01
020206010010000044

SikaCarboDurE-en-GR-(09-2020)-1-1.pdf