PRODUCT DATA SHEET

WOVEN UNIDIRECTIONAL CARBON FIBRE FABRIC, DESIGNED FOR STRUCTURAL STRENGTHENING APPLICATIONS AS PART OF THE SIKA® STRENGTHENING SYSTEM.

PRODUCT DESCRIPTION

SikaWrap®-231 C is a unidirectional woven carbon fibre fabric with high strength, designed for installation using the dry or wet application process.

USES

SikaWrap®-231 C may only be used by experienced professionals.
Structural strengthening of reinforced concrete, masonry, brickwork and timber elements or structures, to increase flexural and shear loading capacity for:

- Improved seismic performance of masonry walls
- Replacing missing steel reinforcement
- Increasing the strength and ductility of columns
- Increasing the loading capacity of structural elements
- Enabling changes in use / alterations and refurbishment
- Correcting structural design and / or construction defects
- Increasing resistance to seismic movement
- Improving service life and durability
- Structural upgrading to comply with current standards

CHARACTERISTICS / ADVANTAGES

- Manufactured with heat-set weft fibres to keep the fabric stable
- Multifunctional fabric for use in many different strengthening applications
- Flexible and accommodating to different surface planes and geometry (beams, columns, chimneys, piles, walls, soffits, silos etc.)
- Available in different widths for optimum utilisation
- Low density for minimal additional weight
- Extremely cost effective in comparison to traditional strengthening techniques

APPROVALS / STANDARDS

- 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
- 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.

PRODUCT INFORMATION

Construction	Fibre orientation	0° (unidirectional)	
	Warp	Black carbon fibres 99 %	
	Weft	White thermoplastic heat-set fibres 1 %	
Fibre type	Selected high strength carbon fibres		
Packaging		**Fabric length per roll**	**Fabric width**
	1 roll in cardboard box	≥ 50 m	600 mm
Shelf Life	24 months from date of production		

Storage Conditions	Store in undamaged, original sealed packaging, in dry conditions at temperatures between +5 °C and +35 °C. Protect from direct sunlight.
Dry Fibre Density	1.80 g/cm^3
Dry Fibre Thickness	0.129 mm (based on fibre content)
Area Density	235 g/m^2 ±10 g/m^2 (carbon fibres only)
Dry Fibre Tensile Strength	4 900 N/mm^2 (ISO 10618)
Dry Fibre Modulus of Elasticity in Tension	230 000 N/mm^2 (ISO 10618)
Dry Fibre Elongation at Break	1.7 % (ISO 10618)

TECHNICAL INFORMATION

Laminate Nominal Thickness	0.129 mm		
Laminate Nominal Cross Section	129 mm^2 per m width		
Laminate Tensile Strength	**Average** 4 300 N/mm^2	**Characteristic** 3 850 N/mm^2	(EN 2561*)
Laminate Tensile Modulus of Elasticity	**Average** 225 kN/mm^2	**Characteristic** 210 kN/mm^2	(EN 2561*)
	* modification: sample with 50 mm Values in the longitudinal direction of the fibres Single layer, minimum 27 samples per test series		
Laminate Elongation at Break	1.91 %		(EN 2561)
Tensile Resistance	**Average** 555 N/mm	**Characteristic** 497 N/mm	(EN 2561)
Tensile Stiffness	**Average** 29.0 MN/m 29.0 kN/m per ‰ elongation	**Characteristic** 27.1 MN/m 27.1 kN/m per ‰ elongation	(EN 2561)

SYSTEM INFORMATION

System Structure

The system build-up and configuration as described must be fully complied with and may not be changed.

Concrete substrate adhesive primer	Sikadur®-330
Impregnating / laminating resin	Sikadur®-330 or Sikadur®-300
Structural strengthening fabric	SikaWrap®-231 C

For detailed information on Sikadur®-330 or Sikadur®-300, together with the resin and fabric application details, refer to the Sikadur®-330 or Sikadur®-300 Product Data Sheet.

APPLICATION INFORMATION

Consumption

Dry application with Sikadur®-330

First layer including primer layer	0.8–1.2 kg/m²
Following layers	0.7 kg/m²

Wet application with Sikadur®-300, primer Sikadur®-330

Primer layer	0.4–0.6 kg/m²
Fabric layers	0.6 kg/m²

Refer to the relevant Technical Information Manual for further information.

APPLICATION INSTRUCTIONS

SUBSTRATE QUALITY

Minimum substrate tensile strength: 1.0 N/mm² or as specified in the strengthening design.
Refer to the relevant Technical Information Manual for further information.

SUBSTRATE PREPARATION

Concrete must be cleaned and prepared to achieve a laitance and contaminant free, open textured surface.
Refer to the relevant Technical Information Manual for further information.

APPLICATION METHOD / TOOLS

The fabric can be cut with special scissors or a Stanley knife (razor knife / box-cutter knife). Never fold the fabric.
SikaWrap®-231 C is applied using the dry or wet application process.
Refer to the relevant Technical Information Manual for details on the impregnating / laminating procedure.

FURTHER DOCUMENTS

Technical Information Manuals
Ref. 850 41 02: SikaWrap® manual dry application
Ref. 850 41 03: SikaWrap® manual wet application
Ref. 850 41 04: SikaWrap® machine wet application

LIMITATIONS

- SikaWrap®-231 C shall only be applied by trained and experienced professionals.
- A specialist structural engineer must be consulted for any structural strengthening design calculation.
- SikaWrap®-231 C fabric is coated to ensure maximum bond and durability with the Sikadur® adhesives / impregnating / laminating resins. To maintain and ensure full system compatibility, do not interchange different system components.
- SikaWrap®-231 C can be over coated with a cementitious overlay or other coatings for aesthetic and / or protective purposes. The over coating system selection is dependent on the exposure and the project specific requirements. For additional UV light protection in exposed areas use Sikagard®-550 W Elastic, Sikagard® ElastoColor-675 W GB or Sikagard®-680 S.
- Refer to the Technical Information Manual for SikaWrap® manual dry application (Ref. 850 41 02), SikaWrap® manual wet application (Ref. 850 41 03) or SikaWrap® machine wet application (Ref. 850 41 04) for further information, guidelines and limitations.

VALUE BASE

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 this 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

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