PRODUCT DATA SHEET
SikaWrap®-231 C

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

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

PRODUCT INFORMATION
<table>
<thead>
<tr>
<th>Construction</th>
<th>Fibre orientation</th>
<th>0° (unidirectional)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Warp</td>
<td>Black carbon fibres 99 %</td>
</tr>
<tr>
<td></td>
<td>Weft</td>
<td>White thermoplastic heat-set fibres 1 %</td>
</tr>
<tr>
<td>Fibre Type</td>
<td>Selected high strength carbon fibres</td>
<td></td>
</tr>
<tr>
<td>Packaging</td>
<td>Fabric length per roll</td>
<td>100 m</td>
</tr>
<tr>
<td></td>
<td>Fabric width</td>
<td>500 mm</td>
</tr>
<tr>
<td>Shelf life</td>
<td>24 months from date of production</td>
<td></td>
</tr>
</tbody>
</table>
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/cm³

**Dry Fibre Thickness**
0.129 mm (based on fibre content)

**Area Density**
235 g/m² ±10 g/m² (carbon fibres only)

**Dry Fibre Tensile Strength**
4 900 N/mm² (ISO 10618)

**Dry Fibre Modulus of Elasticity in Tension**
230 000 N/mm² (ISO 10618)

**Dry Fibre Elongation at Break**
1.7 % (ISO 10618)

### TECHNICAL INFORMATION

**Laminate Nominal Thickness**
0.129 mm

**Laminate Nominal Cross Section**
129 mm² per m width

**Laminate Tensile Strength**

<table>
<thead>
<tr>
<th></th>
<th>Average</th>
<th>Characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4 300 N/mm²</td>
<td>3 850 N/mm²</td>
</tr>
</tbody>
</table>

(EN 2561*)

(ASTM D 3039*)

**Laminate Modulus of Elasticity in Tension**

<table>
<thead>
<tr>
<th></th>
<th>Average</th>
<th>Characteristic</th>
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<tbody>
<tr>
<td></td>
<td>225 kN/mm²</td>
<td>210 kN/mm²</td>
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</table>

(EN 2561*)

(ASTM D 3039*)

* 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 in Tension**
1.91 % (based on EN 2561)

(based on ASTM D 3039)

**Tensile Resistance**

<table>
<thead>
<tr>
<th></th>
<th>Average</th>
<th>Characteristic</th>
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<tbody>
<tr>
<td></td>
<td>555 N/mm</td>
<td>497 N/mm</td>
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</tbody>
</table>

(based on EN 2561)

(based on ASTM D 3039)

**Tensile Stiffness**

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<tr>
<th></th>
<th>Average</th>
<th>Characteristic</th>
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<tbody>
<tr>
<td></td>
<td>29.0 MN/m</td>
<td>27.1 MN/m</td>
</tr>
</tbody>
</table>

(based on EN 2561)

(based on ASTM D 3039)

**SYSTEMS**

**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, please refer to the Sikadur®-330 or Sikadur®-300 Product Data Sheet and the relevant Method Statement.
**APPLICATION INFORMATION**

<table>
<thead>
<tr>
<th>Consumption</th>
<th>Dry application with Sikadur®-330</th>
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<tbody>
<tr>
<td></td>
<td>First layer including primer layer</td>
</tr>
<tr>
<td></td>
<td>Following layers</td>
</tr>
<tr>
<td></td>
<td>0.8–1.2 kg/m²</td>
</tr>
<tr>
<td></td>
<td>0.7 kg/m²</td>
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</tbody>
</table>

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

<table>
<thead>
<tr>
<th></th>
<th>Primer layer</th>
<th>Fabric layers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.4–0.6 kg/m²</td>
<td>0.6 kg/m²</td>
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</tbody>
</table>

Please also refer to the relevant Method Statement for further information.

**APPLICATION INSTRUCTIONS**

**SUBSTRATE QUALITY**

Minimum substrate tensile strength: 1.0 N/mm² or as specified in the strengthening design. Please also refer to the relevant Method Statement for further information.

**SUBSTRATE PREPARATION**

Concrete must be cleaned and prepared to achieve a laitance and contaminant free, open textured surface. Please also refer to the relevant Method Statement 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. Please refer to the relevant Method Statement for details on the impregnating / laminating procedure.

**FURTHER DOCUMENTS**

Method Statements
- 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 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 or Sikagard®-680 S.
- Please refer to the Method Statement of 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.

**BASIS OF PRODUCT DATA**

All technical data stated in this 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 declared data and recommended uses for this product may vary from country to country. Please consult the local Product Data Sheet for the exact product data and uses.

**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

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