

## Unidirectional carbon fabric for structural strengthening

### Description

MEGAWRAP-200 is a fabric made of continuous single-oriented carbon fibers. In combination with the epoxy resin EPOMAX-LD it forms a Composite Material (FRP) that is used for the strengthening of structural elements as externally bonded reinforcement, providing high tensile strength and confinement.

### Fields of application

The carbon fabrics MEGAWRAP-200 are used as external reinforcement, by impregnation and external bonding to structural elements with the epoxy resin EPOMAX-LD, to increase shear strength of beams and columns, confinement of columns as well as ductility of concrete crosspoints in repairing or strengthening works, concerning:

- Pro-seismic structural strengthening and adjustment to design code requirements.
- Ageing of construction materials, corrosion of reinforcement elements or/and construction defects.
- Load increase or change of use.
- Repairs in reinforced concrete elements after earthquakes.

Strengthening with Composite Materials could be obtained on concrete, wooden and steel elements, bearing masonry walls.

### Technical data

#### Fabric properties:

Weight of carbon fibers:	200 g/m <sup>2</sup>
Total fabric weight:	224 g/m <sup>2</sup>
Design thickness:	0,11 mm
Fabric width:	60 cm (± 1 cm)
Fabric length:	50 m (± 0,5 m)
Fabric weight:	6,72 kg (net)

#### Fabric construction:

0°	Carbon Panex-35 (200 g/m <sup>2</sup> )
90°	E-Glass (9,6 g/m <sup>2</sup> )
Stitch	Polyesteric (6,4 g/m <sup>2</sup> )
Binder	(8 g/m <sup>2</sup> )

#### Carbon fiber properties (Panex-35):

Tensile strength $f_{fib}$ :	3.800 MPa
Modulus of elasticity $E_{fib}$ :	235 GPa
Ultimate strain $\epsilon_{fib}$ :	1,5%
Density:	1,81 g/cm <sup>3</sup>

The mechanical properties refer to average test values (mean) and result from tensile tests made according to ASTM D4018-81.

### Directions for use

#### 1. Substrate

- The substrate must be free of loose parts, plaster, paint, oil or grease. After thorough cleaning, the surface is well rubbed with a hard brush.
- Any existing cracks in the concrete should be repaired by resin injections of EPOMAX-L10, EPOMAX-L20 or DUREBOND.
- The outside edges should be rounded in a radius of 10-30 mm.
- The substrate should be as flat as possible. Any surface imperfections must be repaired using MEGACRET-40 fibre-reinforced cement-mortar or EPOMAX-EK epoxy paste.

#### 2. Application

- The properly prepared surface is coated with EPOMAX-LD resin. Then, MEGAWRAP-200 is cut with scissors in the desired dimensions. After careful placing (well stretched) on the wet surface,

# MEGAWRAP-200



the fabric is slowly pressed with special plastic roller to achieve better contact with the substrate, thorough impregnation and removal of air bubbles'.

The fabric direction should follow the principal tensile forces direction and its fibers should be as straight as possible.

During the confinement of columns, overlapping of 15-20 cm is required between edges of the same fabric.

- If more than one layer of fabric is specified, aforementioned application process is repeated. In that case the previous layer should not be completely dry, otherwise good rubbing is required before the new application.
- Subsequently, the last fabric layer is brushed on the outside with EPOMAX-LD and then quartz sand is broadcasted on the still fresh resin coating in order to apply later a protective cementitious coating (plaster).

## Advantages

- Easy and fast work.
- Increase of the strength and ductility of structural elements without changing their geometry or increasing their rigidity.
- High resistance against time, moisture, alkaline and acid environment as well as fatigue.
- Very high tensile strength and modulus of elasticity of fibers.
- Protection of reinforcement against corrosion.

## Package

MEGAWRAP-200 carbon fabric is available in rolls of 50 m long ( $\pm 0,5$  m) and 60 cm wide ( $\pm 1$  cm).

## Remarks

- In some cases Pull-off method is required in order to test the substrate's tensile strength.
- Special attention should be given during cutting process of the fabric in order to prevent folding or crumpling.
- Working time of epoxy systems decreases when ambient temperature rises.

## Additional technical documentation

- ISOMAT in cooperation with University of Patras have developed a computer application program running under Windows 98/2000/XP named "COMPOSITE DIMENSIONING" so to support the design process. Please ask for the program as well as for the relevant technical guidelines signed by Civil Engineering dept. of Patras' University and published by ISOMAT.
- In most cases, strengthening works with Composite Materials are subject to advanced engineering design, therefore the experience of the staff involved as well as the close supervision of the project are in any case essential to ensure proper application.

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