

MEGAWRAP-200

Unidirectional carbon fabric for structural strengthening

Description

MEGAWRAP-200 is a reinforcement fabric with all the carbon fibers aligned in the same direction. In combination with the epoxy resin EPOMAX-LD, it forms a Composite Material (FRP) that is used for 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 and ductility of concrete nodes in repairing or strengthening works, concerning:

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

Composite Materials are used in strengthening applications of concrete, wooden and steel elements, and load-bearing masonry walls.

Technical data

Fabric properties:

Weight of carbon fibers:	200 g/m ²
Total fabric weight:	224 g/m ²
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 ²)
90°	E-Glass (10 g/m ²)
Stitch	Polyesteric (6 g/m ²)
Binder	(8 g/m ²)

Carbon fiber properties (Panex-35):

Tensile strength f_{fib} :	4.137 MPa
Modulus of elasticity E_{fib} :	242 GPa
Ultimate strain ϵ_{fib} :	1.5%
Density:	1.81 g/cm ³

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 with a resin injection process, using materials like EPOMAX-L10, EPOMAX-L20 or DUREBOND.
- The outside edges should be rounded off to a radius of 10-30 mm.
- The substrate should be as flat as possible. Any surface imperfections must be repaired using MEGACRET-40 fiber-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 to the desired dimensions. After careful placing (well stretched) on the wet surface, the fabric is slowly pressed with special plastic roller to achieve better contact with the substrate, full impregnation and removal of air bubbles. The fabric direction should follow the direction of principal tensile forces and its fibers should be as straight as possible. During column confinement, a 15-20cm overlap between edges of the same fabric is required.
- If more than one layer of fabric is specified, the 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.

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- Subsequently, the last fabric layer is externally coated with EPOMAX-LD and then quartz sand is broadcast 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 durability.
- High resistance to moisture, alkaline and acid environment and fatigue.
- Very high tensile strength and modulus of elasticity of fibers.
- Protection of reinforcement from corrosion.

Package

MEGAWRAP-200 carbon fabric is available in rolls of 50 m long (± 0.5 m) and 60 cm wide (± 1 cm).

Remarks

- In some cases, the Pull-off method is required in order to test the substrate's tensile strength.
- Special attention should be paid 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" to support the design process. Please, ask for the program as well as for the relevant technical guidelines signed by the Civil Engineering Dept. of the University of Patras 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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