

## LÁMINA CARBOTEK

Carbon fibre filament sheets on epoxy resin base



### DESCRIPTION

Carbotek sheets are manufactured through a pultrusion process from carbon fibre filaments arranged in an epoxy resin matrix. There are three different types of sheets: with an elasticity of 170 GPa module (Most commonly used: low modules: LM), of 200 GPa (high module: HM) and 250 GPa (of very high module, for specific applications: UHM).

### TECHNICAL CHARACTERISTICS

Unidirectional Carbon fibre filament sheets on epoxy resin base, specially formulated. The carbon fibre content is approximately 68% of the sheet section.

### ADVANTAGES AND USES

- Great freedom of design.
- Clear advantages over steel sheets, in certain applications.
- Suitable for beams, columns, floors and concrete walls.
- Durable reinforcement against both positive and negative bending deformations.
- Reinforcement in wooden beams.
- Light and flexible: It does not require any heavy machinery.
- Corrosion resistant: no additional treatment required.
- No difficulty in connections or transitions.
- Low aesthetic impact.
- Only high-quality fibres are used in manufacturing.

#### Application field:

These carbon fibre elements are calculated and designed for a predetermined load. These loads may change throughout the life of the building, and initial calculations may be insufficient due to:

- Openings by cutting slabs in floors or beams.
- Increase in loads due to the change in use of the building.
- Ageing of construction materials.
- Reinforcement corrosion.
- Concrete degradation.
- Cutting of pre- or post-tensioned cables.
- Reparation of fire damage in certain points of the construction.
- Reparation of damages caused by earthquakes or improvement of earthquake behaviour.

The external application of extruded carbon fibres increases the load capacity of the elements (increase in bending load). The increased flexural load capacity reduces flexural strain and crack formation.

### SUITABLE SUBSTRATES

- Carbotek are Carbon Fibre sheets, especially indicated for the subsequent reinforcement of concrete, wood and masonry elements.
- Minimum adhesive tensile strength of the support: 1,5 Nmm<sup>2</sup>.
- Maximum humidity content: < 4%.
- Controlled flatness. The tolerance is a maximum of 5 mm for a length of 2 m and 1 mm for a length of 30

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### APPLICATION PROCEDURE

cm.

- Temperature of the element in question should be at least 8°C, and at least 3°C above the dew point temperature.

#### Wood:

- Surface should be brushed.
- Dust should be removed with the help of a vacuum cleaner.

#### 1. Preparing the surface

- To ensure an optimal distribution of loads from the substrate to the Carbotech sheet, the surface must be slightly rough, which can be achieved by sandblasting. All damaged areas (cracks, voids and surface deficiencies) must be repaired prior to the application of Carbotech laminate.
- The roughness of the substrate, when excessive, must be corrected and levelled with suitable materials.
- The adhesion of the prepared substrate must be verified by random spot adhesion tests. Concrete should have a minimum adhesion of 1,5 N/mm<sup>2</sup>.
- It is advisable to apply EPW Implarest, when the quality of the concrete is strong enough.

#### 2. Preparing the sheet

- Carbotech is provided in rolls. Carefully unroll the sheets, using a specific tool. Be careful not to break the ends of the sheets. Always wear suitable security clothes and equipment.
- Carbotech sheets can be cut with specific cutting tools such micro-dented scissors or radial. Both sides of the sheet should be placed on a base during the cutting process.
- Eliminate the "peel-ply" treatment layer to promote adherence on the face of the sheet that is to be adhered to the substrate to be coated, before gluing it.
- The surface should be clean before adding the glue (once the sheet is completely clean).

#### 3. Epoxy adhesive preparation

- Carbotech sheet should be adhered on the surface using Adhesivo Carbotech Lámina.
- Mix component A and B in a clean container and mix it meticulously for 3 minutes with a low-speed mixer until getting a grey mixture. Only mix the amount of product that is going to be used.

#### 4. Applying the adhesive

- The surface must be dry, clean and free of dust to apply the Adhesivo Carbotech Lámina. Preferably apply the adhesive on the Carbotech carbon fibre. Apply the layer of glue in a triangular section (for example 1 mm at the ends and 4 mm in the centre) on the side of the sheet that has been cleaned.
- Press the Carbotech carbon fibre evenly against the concrete to even out the distribution of the adhesive. Use a ribbed metal or rubber roller to remove trapped air and ensure a perfect application of the sheet. Apply enough pressure to remove all excess adhesive to the sides. Clean up excess adhesive before it hardens.
- The average thickness of the adhesive layer must be approx. 1.5 mm to 2 mm.
- Press the Carbotech sheet against the substrate until the adhesive is cured enough. Carbotech adhesive sheet can be applied using a hooper. Construct the hooper with a spatula shape bridge. The Carbotech sheet slides under the hopper and the adhesive is applied using the spatula.
- The material must not be touched until 24 hours after its application. Carbotech Sheet Adhesive reaches full mechanical resistance after 7 days from the application.

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## CONSUMPTION ACCORDING TO DIMENSIONS (KG/M²)

| Carbotec Sheet Adhesive Consumption |                  |
|-------------------------------------|------------------|
| Width (mm)                          | Consumption      |
| 50                                  | Aprox. 300 gr/m  |
| 80                                  | Aprox. 500 gr/m  |
| 100                                 | Aprox. 700 gr/m  |
| 120                                 | Aprox. 800 gr/m  |
| 150                                 | Aprox. 1.000 g/m |

## PACKAGING AND STORAGE

Presented in sheet rolls.

Minimum order 25 linear meters and from 25 linear meters multiples of 25.

Carbotec Sheet must be stored in a dry and dust-free environment.

## TECHNICAL DATA

| Sheet type                                                                                    | Cross section | Tensile strength at elongation                                             |                                                                            |
|-----------------------------------------------------------------------------------------------|---------------|----------------------------------------------------------------------------|----------------------------------------------------------------------------|
|                                                                                               |               | 0,6 %                                                                      | 0,8 %                                                                      |
| <b>LM (Low Module)</b><br>Resistance to traction: > 2.595 N/mm²<br>Elasticity module: 170 GPa | mm²           | Resistance to theoretical traction for its calculation:<br><br>1.038 N/mm² | Resistance to theoretical traction for its calculation:<br><br>1.384 N/mm² |
| 50 / 1,4                                                                                      | 70            | 72,80 kN                                                                   | 97,06 kN                                                                   |
| 80 / 1,4                                                                                      | 112           | 116,40 kN                                                                  | 155,20 kN                                                                  |
| 100 / 1,4                                                                                     | 140           | 145,20 kN                                                                  | 193,60 kN                                                                  |
| 120 / 1,4                                                                                     | 168           | 174,40 kN                                                                  | 232,53 kN                                                                  |
| 150 / 1,4                                                                                     | 210           | 218,00 kN                                                                  | 290,66 kN                                                                  |

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| Type of sheet                                                                                              | Cross section   | Traction resistance<br>0,6 %                                                       | Traction resistance<br>0,8 %                                                       |
|------------------------------------------------------------------------------------------------------------|-----------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| <b>HM (High module)</b><br>Resistance to traction: > 1.800 N/mm <sup>2</sup><br>Elasticity module: 200 GPa | mm <sup>2</sup> | Resistance to theoretical traction for its calculation:<br>1.200 N/mm <sup>2</sup> | Resistance to theoretical traction for its calculation:<br>1.600 N/mm <sup>2</sup> |
| 50 / 1,4                                                                                                   | 70              | 84,00 kN                                                                           | 112,00 kN                                                                          |
| 80 / 1,4                                                                                                   | 112             | 134,66 kN                                                                          | 179,55 kN                                                                          |
| 100 / 1,4                                                                                                  | 140             | 168,00 kN                                                                          | 224,00 kN                                                                          |
| 120 / 1,4                                                                                                  | 168             | 201,33 kN                                                                          | 268,44 kN                                                                          |
| 150 / 1,4                                                                                                  | 210             | 252,00 kN                                                                          | 336,00 kN                                                                          |

| Type of sheet                                                                                                    | Cross section   | Traction resistance<br>0,6 %                                                          | Traction resistance<br>0,7 %                                                       |
|------------------------------------------------------------------------------------------------------------------|-----------------|---------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| <b>UHM (Very high module)</b><br>Resistance to traction: > 1.800 N/mm <sup>2</sup><br>Elasticity module: 250 GPa | mm <sup>2</sup> | Resistance to theoretical traction for its calculation:<br>1.542,85 N/mm <sup>2</sup> | Resistance to theoretical traction for its calculation:<br>1.800 N/mm <sup>2</sup> |
| 50 / 1,4                                                                                                         | 70              | 108,00 kN                                                                             | 126,00 kN                                                                          |
| 100 / 1,4                                                                                                        | 140             | 216,00 kN                                                                             | 252,00 kN                                                                          |
| 150 / 1,4                                                                                                        | 210             | 324,00 kN                                                                             | 378,00 kN                                                                          |

## Technical features:

|                        | LM (Low module)           | HM (High module)          | UHM (Very high module)    |
|------------------------|---------------------------|---------------------------|---------------------------|
| Density of the sheet   | 1,6 g/cm <sup>3</sup>     | 1,6 g/cm <sup>3</sup>     | 1,6 g/cm <sup>3</sup>     |
| Resistance to traction | ≥ 2.595 N/mm <sup>2</sup> | ≥ 1.800 N/mm <sup>2</sup> | ≥ 1.800 N/mm <sup>2</sup> |
| Elasticity module      | ≥ 170 KN/mm <sup>2</sup>  | ≥ 200 KN/mm <sup>2</sup>  | ≥ 250 KN/mm <sup>2</sup>  |
| Elongation at break    | ≥ 15 ‰                    | ≥ 9 ‰                     | ≥ 7 ‰                     |

# CONCRETE REPAIR LÁMINA CARBOTEC

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