



CarboplateTM E 170

Pultruded Carbon Fiber Plate Pre-impregnated in Epoxy-Based Resin



DESCRIPTION

Carboplate E 170 is a range of pultruded carbon-fiber-reinforced polymer (CFRP) plates designed for external structural strengthening of existing concrete, wood, masonry and steel members. *Carboplate E 170* is externally bonded onto the surface of the substrate to strengthen and stiffen existing structures, using an epoxy resin specifically designed for the application. *Carboplate E 170* is protected on both sides by a plastic film, eliminating the need for solvent cleaning of the plates before installation.

FEATURES AND BENEFITS

- Ease of installation with limited or no downtime of structure
- High tensile strength and modulus of elasticity
- Extremely lightweight with high strength-to-weight ratio
- High static, flexural and shear capacity
- Non-corrosive and alkali-resistant
- Excellent fatigue resistance
- Low aesthetic impact (easy to conceal)
- Non-intrusive; will not significantly change existing dimensions of structural member
- Removable "peel-ply" protective plastic film; no wiping with solvent required
- Plates can be cut to length on-site, or ordered in most lengths

WHERE TO USE

For post-reinforcing of wood, steel, existing concrete beams and slabs, and masonry shear walls in parking garages, bridge structures, industrial

warehouses, cooling towers, tanks and buildings due to:

- Corrosion damage of aging structures
- Changes in use
- Blast resistance
- Seismic improvement
- Insufficient reinforcement
- Fire damage or vehicle impact
- Removal of slab sections

LIMITATIONS

- Do not use on uncured concrete.
- Ensure that concrete substrate has a minimum tensile strength of 200 psi (1,38 MPa) before installation.
- Design calculations and project review should be carried out by an independent licensed engineer with CFRP design experience, and in accordance with all state, provincial and federal building codes. Additional design examples/guidelines are available upon request from MAPEI's Technical Services Department.
- Ensure that *MapeWrapTM Primer 1* is used on all surfaces.

SUITABLE SUBSTRATES

- Use in interior/exterior vertical, overhead and horizontal applications on fully cured, properly prepared concrete and masonry, as well as on wood and steel.



Consult MAPEI's Technical Services Department for installation recommendations regarding substrates and conditions not listed.

SURFACE PREPARATION

- Surface must be fully cured, clean, sound and dry.
- Mechanically prepare the substrate to provide a proper surface profile, as determined by the engineer. The surface profile should have an International Concrete Repair Institute (ICRI) concrete surface profile (CSP) of 3 to 5.
- Uneven surfaces should be leveled with a fast-setting repair mortar such as *Planitop® X* or *Planitop XS*, or with an epoxy putty such as *MapeWrap 11* or *MapeWrap 12*. Allow 2 to 3 days for the cementitious repair mortars to cure before installation of the plate.
- The surface flatness must be smooth (at no more than 40 mils [1 mm] in profile) and not vary by more than 1/4" (6 mm) in a 6-ft. (1,83-m) length. Any sharp edges must be ground smooth and flush.
- Remove all bond-inhibiting materials – including dust, laitance, oils, impregnations, paints, form-release agents and any surface contaminants – before installation.
- Seal any surface cracks with MAPEI's epoxy injection products, such as *Planibond® AE* and/or *Planibond CR 50*.
- Clean all exposed reinforcement in accordance with The Society for Protective Coatings (SSPC) to an SP-5 specification and coat with *Planibond 3C* or *Mapefer™ 1K*.
- Adhesive strength to concrete should meet concrete substrate failure at a minimum tensile strength of 200 psi (1,38 MPa). Random pull-off testing (per ACI 503R) should be completed after the appropriate surface preparation has been achieved.

MIXING

Note: Choose all appropriate safety equipment before use. Refer to Material Safety Data Sheet (MSDS) for more information.

1. Use only *MapeWrap 11* or *MapeWrap 12* as the adhesive for *Carboplate E 170* installations.
2. Mix the Part A and Part B individual components that make up the *MapeWrap 11* or *MapeWrap 12*. For details on which product is applicable, refer to the Technical Data Sheets for *MapeWrap 11* and *MapeWrap 12*.
3. Pour Part B into Part A and mix with a low-speed mixer (300 to 550 rpm) and Jiffy mixing paddle for a minimum of 3 minutes until the mix has a smooth, homogenous consistency (with the same shade of gray throughout). The A and B components are provided in the correct proportion, and using partial quantities is prohibited.

PRODUCT APPLICATION

1. Use special care when unpacking *Carboplate E 170* plates. Each plate is rolled under tension and, before

it is unpacked, it should be braced so as not to uncoil. Uncoil the required length of plate to be installed, and cut to the desired length.

2. *Carboplate E 170* should be cut with a guillotine-type cutting tool or industrial shears. Other cutting methods may be used, but special care must be taken to support both sides of *Carboplate E 170* to avoid splintering.
3. Because *Carboplate E 170* is protected with a plastic film, this film must be removed before installation from the side to be bonded to the substrate with the selected epoxy adhesive. Should a plate become dusty or dirty, wipe it clean with a solvent-based cleaner (e.g., MEK, xylene, toluene, etc).
4. Prime the surface with a brush or roller and with an even coat of *MapeWrap Primer 1*. Very porous substrates may require a second coat.
5. Apply a uniform 40- to 60-mil (1- to 1,5-mm) thick layer of *MapeWrap 11* or *MapeWrap 12* with a flat trowel over *Carboplate E 170* on the side where the protective film has been removed. *MapeWrap 11* should be used in temperatures between 41°F and 68°F (5°C and 20°C), and *MapeWrap 12* should be used in temperatures above 68°F (20°C) because it has a longer pot life.
6. Apply a 40-mil (1-mm) layer of *MapeWrap 11* or *MapeWrap 12*, depending on the temperature, with a 3/32" (2,5 mm) V-notched trowel on the clean and dry substrate that will receive the plate. The application of *MapeWrap 11* or *MapeWrap 12* must be carried out while *MapeWrap Primer 1* is still "fresh" or tacky.
7. Install *Carboplate E 170* onto the concrete surface using a hard-rubber roller, applying constant pressure to the entire surface until the excess adhesive is forced out on both sides. Remove the excess adhesive with a steel trowel, paying special attention not to move the plate.
8. The consistency of the adhesive typically allows the plates to be installed in vertical and overhead applications without the need for supports to hold the plates. Do not disturb the plates or apply a protective coating over the plates for at least 24 hours after installation.
9. Apply and maintain *Carboplate E 170* at ambient or surface temperatures between 41°F and 68°F (5°C and 20°C) for *MapeWrap 11*, or above 68°F (20°C) for *MapeWrap 12*, for 24 hours after installation. Protect the structure from rain and dust for at least 24 hours.
10. Installers must wear waterproof rubber gloves, protective goggles and clothing while preparing and installing *Carboplate E 170* and its adhesive systems, *MapeWrap 11* or *MapeWrap 12*.
11. Due to the epoxy resin used in *MapeWrap 11* and *MapeWrap 12*, provide good ventilation when *Carboplate E 170* is applied in a closed environment. For further information, carefully read the MSDSs of the products.

Product Performance Properties

Laboratory Tests	Results
Physical state	Laminate: carbon fiber bound in an epoxy matrix
Color	Black
Shelf life	Unlimited when stored in cool, dry place out of direct sunlight. Protect from freezing in shipment and storage.
Density	0.0582 lbs. per cu. in. (1,61 g per cm ³)
Available widths: For 0.047" (1,2 mm) thickness	1.97" (50 mm) 3.15" (80 mm)* 3.94" (100 mm)
For 0.055" (1,4 mm)	1.97" (50 mm) 3.15" (80 mm)* 3.94" (100 mm) 4.72" (120 mm)* 5.91" (150 mm)*
Tensile strength: Mean value Design value	4.496 x 10 ⁵ psi (3,100 MPa) 4.061 x 10 ⁵ psi (2,800 MPa)
Modulus of elasticity: Mean value Design value	24.66 x 10 ³ ksi (170,000 MPa) 23.64 x 10 ³ ksi (163,000 MPa)
Ultimate elongation	1.88%
Design strain	1.5%
Shearing strength	145 psi (1 MPa)
Fiber volumetric content	> 68%
Temperature resistance	> 300°F (149°C)

* Make-to-order

Design properties are based on ACI 440 suggested guidelines.

Physical Properties

Product	Thickness	Width	Cross Sectional Area	Tensile Strength
Carboplate E 170/50/1,2	0.047" (1,2 mm)	1.97" (50 mm)	0.094 sq. in. (61 mm ²)	37.8 x 10 ³ lbs. (168 kN)
Carboplate E 170/80/1,2**	0.047" (1,2 mm)	3.15" (80 mm)	0.149 sq. in. (96 mm ²)	60.5 x 10 ³ lbs. (269 kN)
Carboplate E 170/100/1,2	0.047" (1,2 mm)	3.94" (100 mm)	0.186 sq. in. (120 mm ²)	75.5 x 10 ³ lbs. (336 kN)
Carboplate E 170/50/1,4	0.055" (1,4 mm)	1.97" (50 mm)	0.109 sq. in. (70 mm ²)	44.1 x 10 ³ lbs. (196 kN)
Carboplate E 170/80/1,4**	0.055" (1,4 mm)	3.15" (80 mm)	0.174 sq. in. (112 mm ²)	70.4 x 10 ³ lbs. (313 kN)
Carboplate E 170/100/1,4	0.055" (1,4 mm)	3.94" (100 mm)	0.217 sq. in. (140 mm ²)	88.1 x 10 ³ lbs. (392 kN)
Carboplate E 170/120/1,4**	0.055" (1,4 mm)	4.72" (120 mm)	0.260 sq. in. (168 mm ²)	105.7 x 10 ³ lbs. (470 kN)
Carboplate E 170/150/1,4**	0.055" (1,4 mm)	5.91" (150 mm)	0.326 sq. in. (210 mm ²)	132.2 x 10 ³ lbs. (588 kN)

** Referenced products are special-order items with minimal lead times and all laminate sizes are available in 328-ft. (100-m) lengths.

CSI Division Classification

Composite Reinforcing	03 25 00
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Packaging

Product Code	Size
7329976	0.047" (1,2-mm) x 1.97" (50-mm) x 82-ft. (25-m) roll
7330476	0.047" (1,2-mm) x 3.94" (100-mm) x 82-ft. (25-m) roll
7330477	0.047" (1,2-mm) x 3.94" (100-mm) x 164-ft. (50-m) roll
7330076	0.055" (1,4-mm) x 1.97" (50-mm) x 82-ft. (25-m) roll
7330576	0.055" (1,4-mm) x 3.94" (100-mm) x 82-ft. (25-m) roll

Note: Made-to-order rolls and 328-ft. (100-m) rolls are available with minimal lead times.

Approximate Product Coverage for MapeWrap 11 and MapeWrap 12*

Substrate	Plate Width	Coverage
Concrete	1.97" (50 mm)	60 to 75 linear ft. per 1 U.S. gal. (18,3 to 22,9 m per 3,79 L)
	3.94" (100 mm)	30 to 40 linear ft. per 1 U.S. gal. (9,14 to 12,2 m per 3,79 L)

* Coverage shown is for estimating purposes only. Actual jobsite coverage may vary according to substrate conditions and setting practices.

CLEANUP

Due to the high bond strength of *MapeWrap 11* and *MapeWrap 12* on metal, clean tools with solvents (ethyl alcohol, toluene, etc.) before the product dries.

Refer to the MSDS for specific data related to VOCs, health and safety, and handling of product.

STATEMENT OF RESPONSIBILITY

Before using, user shall determine the suitability of the product for its intended use and user alone assumes all risks and liability whatsoever in connection therewith.

ANY CLAIM SHALL BE DEEMED WAIVED UNLESS MADE IN WRITING TO US WITHIN FIFTEEN (15) DAYS FROM DATE IT WAS, OR REASONABLY SHOULD HAVE BEEN, DISCOVERED.

We proudly support the following industry organizations:



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