



Carboplate[®] 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.

WHERE TO USE

- Interior/exterior

- Restores structural capacity to damaged or deteriorated concrete surfaces
- Increases load-bearing capacity of concrete beams, slabs, columns and walls
- Improves seismic performance of masonry and concrete shear walls
- Improves blast resistance of concrete and masonry structures
- Provides additional strength and/or stiffness to steel and timber structures in some limited applications

SUITABLE SUBSTRATES

- Cured concrete (28 days old), masonry, 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*, *Epojet™* and/or *Epojet LV*.
- 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

Before product use, take appropriate safety precautions. Refer to the Safety Data Sheet for details.

- Use only *MapeWrap 11* or *MapeWrap 12* as the adhesive for *Carboplate E 170* installations. Refer to the applicable Technical Data Sheet for mixing instructions.

PRODUCT APPLICATION

Read all installation instructions thoroughly before installation.

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 (such as MEK, xylene or toluene). There is no front or back of the plates, so either side may be used for bonding to the substrate.
4. *MapeWrap Primer 1* may be required on some surfaces. Consult with MAPEI's Technical Services Department for project-specific recommendations. 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 40°F and 70°F (4°C and 21°C), and *MapeWrap 12* should be used in temperatures above 70°F (21°C) because it has a longer pot life.
5. 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.

6. 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.
7. 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.
8. When a coating is required, do not remove the peel-ply from the exposed surface of the *Carboplate E 170* until just before applying the coating. This will eliminate the need to wipe the plates clean with solvent before coating over the system.

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.

LIMITATIONS

- Application temperature of the epoxy adhesive being used should be between 40°F and 90°F (4°C and 32°C). Contact MAPEI's Technical Services Department for installation recommendations when ambient temperatures fall above or below this temperature range.
- 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.

Product Performance Properties

Laboratory Tests	Results
Density	0.0582 lbs. per cu. in. (1.61 g per cm ³)
Available widths:	
For 0.047" (1.2 mm) thickness	2" (50 mm) 3" (80 mm)* 4" (100 mm)
For 0.055" (1.4 mm)	2" (50 mm) 3" (80 mm)* 4" (100 mm) 5" (120 mm)* 6" (150 mm)*
Tensile strength	
Mean value	4.496 x 10 ⁵ psi (3,100 MPa)
Design value	4.061 x 10 ⁵ psi (2,800 MPa)
Modulus of elasticity	
Mean value	24.66 x 10 ³ ksi (170,000 MPa)
Design value	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)

* Made-to-order

Design properties are based on the ASTM 3039 tensile tests in addition to the requirements listed in ACI 440.2R-17.

Shelf Life and Product Characteristics

Shelf life	Unlimited when stored in cool, dry place out of direct sunlight. Protect from freezing in shipment and storage.
Physical state	Laminate: Carbon fiber bound in an epoxy matrix
Color	Black

Physical Properties

Product	Thickness	Width	Cross-Sectional Area	Tensile Strength
Carboplate E 170/50/1.2	0.047" (1.2 mm)	2" (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" (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)	4" (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)	2" (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" (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)	4" (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)	5" (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)	6" (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.

**Carboplate[®]
E 170**

CSI Division Classification

Composite Reinforcing	03 25 00
-----------------------	----------

Approximate Product Coverage for MapeWrap 11 and MapeWrap 12*

Substrate	Plate Width	Coverage
Concrete	2" (50 mm)	60 to 75 linear ft. per 1 U.S. gal. (18.3 to 22.9 m per 3.79 L)
	4" (100 mm)	30 to 40 linear ft. per 1 U.S. gal. (9.14 to 12.2 per 3.79 L)

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

Packaging

Size
Roll: 0.047" x 2" x 82 ft. (1.2 mm x 50 mm x 25 m)
Roll: 0.047" x 4" x 82 ft. (1.2 mm x 100 mm x 25 m)
Roll: 0.047" x 4" x 164 ft. (1.2 mm x 100 mm x 50 m)
Roll: 0.055" x 2" x 82 ft. (1.4 mm x 50 mm x 25 m)

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

For information on MAPEI's commitment to sustainability and transparency, as well as how MAPEI meets the health and well-being requirements of product certification programs, contact the MAPEI Sustainability Team at 1-800-992-6273.

LEGAL NOTICE

The contents of this Technical Data Sheet ("TDS") may be copied into another project-related document, but the resulting document shall not supplement or replace requirements per the TDS in effect at the time of the MAPEI product installation. For the most up-to-date TDS and warranty information, please visit our website at

www.mapei.com. ANY ALTERATIONS TO THE WORDING OR REQUIREMENTS CONTAINED IN OR DERIVED FROM THIS TDS SHALL VOID ALL RELATED MAPEI WARRANTIES.

Before using, the user must determine the suitability of our products for the intended use,

and the user alone assumes all risks and liability. **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:



ICRI



TTMAC ACTM



American Concrete Institute®



CTDA



MAPEI Headquarters of North America

1144 East Newport Center Drive
Deerfield Beach, Florida 33442
1-888-US-MAPEI (1-888-876-2734) /
(954) 246-8888

Technical Services

1-888-365-0614 (U.S. and Puerto Rico)
1-800-361-9309 (Canada)

Customer Service

1-800-42-MAPEI (1-800-426-2734)

Services in Mexico

0-1-800-MX-MAPEI (0-1-800-696-2734)

Edition Date: October 22, 2019

MK 3001001 (19-2514)