

Maperod System

Pre-Impregnated, Pultruded Carbon or Glass Fiber Bars Used with Epoxy Resins for Structural Strengthening

PRODUCTS USED IN THIS SYSTEM

Maperod C or Maperod G • MapeWrap 11 or MapeWrap 12 • MapeWrap Primer 1

DESCRIPTION

Maperod® System can include *Maperod C* pre-formed, pultruded carbon fiber bars in an epoxy matrix or *Maperod G* deformed, pultruded glass fiber bars in epoxy-modified, vinyl-ester matrix. They are installed with *MapeWrap*® *Primer 1* as well as a high-strength nonsagging epoxy resin – either *MapeWrap 11* or *MapeWrap 12*. *Maperod* System is used as an alternative to metal rebar for structural strengthening of reinforced concrete, masonry and timber elements.

FEATURES AND BENEFITS

- High tensile strength and modulus of elasticity
- Extremely lightweight and high strength-to-weight ratio
- High flexural and shear capacity
- Low aesthetic impact (easy to conceal)
- Noncorrosive
- Removable “peel-ply” protective plastic film; no wiping with solvent required
- Bars can be cut to length on-site.
- *Maperod C* has good alkali resistance.
- *Maperod G* is recommended for masonry applications.
- Can be used in areas where vehicular traffic is present when rods are countersunk into the concrete (in near surface mounted [NSM] applications)

WHERE TO USE

- Interior/exterior
- Repairs and structural strengthening for reinforced concrete, masonry, stone and timber elements
- Slabs and decks
- Upgrading seismic performance of structures in high-risk zones

- Strengthening negative moment sections in slabs and decks
- Setting terminal anchors and anti-delamination connectors in composite systems
- Studding and micro-stitching
- As a valid substitute for metal through tie-rods in masonry for reinforced structural strengthening (reinforced stitching method)
- Reducing deformation under service loads (increase in stiffness)
- Increasing load-bearing capacity (such as re-qualifying structures due to a change in final use)
- Increasing fatigue strength
- *Maperod C* and *Maperod G* can be used in new construction such as seawalls where corrosion of traditional steel reinforcement is a concern.

SUITABLE SUBSTRATES

- Cured concrete (at least 28 days old), stone, timber and masonry

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

SURFACE PREPARATION

- Concrete and masonry surfaces must be fully cured, clean, sound, and dry.

For use in NSM applications

- Using a double-bladed saw, cut a groove into the concrete that is at least 1.5 times the diameter of the bar in both directions (width and depth).
- After cutting is completed, ensure that the groove is completely clean, dry and free of dirt, dust and debris before installing the *Maperod C* or *Maperod G* bar.

For use as an anchor

- Drill a hole into the substrate that is to receive the *Maperod C* or *Maperod G* bar. The diameter of the hole should be a minimum of 1.5 times the bar diameter. The depth of the hole must be determined by the design professional to ensure development of the required tensile capacity of the *Maperod* bar.
- Use compressed air to clean any dust, water and loose material from the hole before installing the *Maperod* bar.

MIXING

Before product use, take appropriate safety precautions. Refer to the Safety Data Sheets for *MapeWrap Primer 1*, *MapeWrap 11* or *MapeWrap 12* for details.

- Refer to individual Technical Data Sheets (TDSs) for the epoxies required for the application type as detailed below.
- Do not dilute or modify epoxies. Mix only full units.

PRODUCT APPLICATION

Read all installation instructions thoroughly before installation.

For use in NSM applications

1. Using a brush, apply a coat of *MapeWrap Primer 1* in the groove. If the surface is particularly absorbent, apply a second coat of *MapeWrap Primer 1* over the first coat that has been completely absorbed. Using a margin trowel or similar, fill the properly prepared and clean groove 3/4 full with *MapeWrap 11* or *MapeWrap 12*. Alternately, *MapeWrap 11* or *MapeWrap 12* can be filled into an empty sealant container and applied using an extrusion or bulk load gun.
2. Remove the peel ply from the bar just prior to installation, to ensure that the *Maperod* bars are clean when installed. Place the *Maperod C* or *Maperod G* bar into the groove, ensuring that it is completely encapsulated by the *MapeWrap 11* or *MapeWrap 12* epoxy.
3. Fill the remainder of the groove with *MapeWrap 11* or *MapeWrap 12*. Then use a margin trowel or a similar tool to strike the surface flush with the substrate.

For use as an anchor

1. Using a brush, apply a coat of *MapeWrap Primer 1* in the hole. If the surface is particularly absorbent, apply a second coat of *MapeWrap Primer 1* over the first coat that has been completely absorbed.
 2. Fill an empty sealant cartridge with *MapeWrap 11* or *MapeWrap 12*. Then completely fill the hole using an extrusion or bulk load gun.
 3. Remove the peel ply from the bar just before installation, to ensure that the *Maperod* bars are clean when installed. Insert the *Maperod C* or *Maperod G* bar while applying constant pressure along its entire length. Be sure to insert the bar completely into the hole.
 4. Remove excess *MapeWrap 11* or *MapeWrap 12* using a trowel without disturbing the bar.
 5. For installation on a curved surface, the bar must be clamped in place until *MapeWrap 11* or *MapeWrap 12* has completely hardened. This is typically around 24 hours after application, at which point the clamp may be removed.
- Apply and maintain *Maperod* System at ambient or surface temperatures between 50°F and 68°F (10°C and 20°C) for *MapeWrap 11*, or above 68°F (20°C) for *MapeWrap 12*, for 24 hours after installation.
 - The system reaches full strength after 7 days at 73°F (23°C) and 50% relative humidity (RH).

CLEANUP

MapeWrap 11 and *MapeWrap 12* form a strong bond, including on metals. Use solvent (such as ethanol or toluene) to clean any tools used before the material hardens. Dispose of material in accordance with local regulations.

LIMITATIONS

Permissible temperature ranges for installation are driven by the material chosen for encapsulation of the *Maperod C* or *Maperod G* bars. Refer to the relevant TDS for additional information.

Design calculations and project review should be carried out by an independent licensed engineer with carbon-fiber-reinforced polymer (CFRP) and/or glass-fiber-reinforced polymer (GFRP) 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 Characteristics

	<i>Maperod C</i> 5/16" (8 mm)	<i>Maperod C</i> 3/8" (10 mm)	<i>Maperod G</i> 3/8" (10 mm)	<i>Maperod G</i> 1/2" (12 mm)
Fiber material	High-strength carbon		High-strength E-glass	
Matrix	Epoxy resin		Epoxy-modified vinyl-ester	
Color	Black		White	
Density	0.06 lb/in ³ (1.54 g/cm ³)	0.06 lb/in ³ (1.54 g/cm ³)	0.07 lb/in ³ (1.995 g/cm ³)	0.07 lb/in ³ (1.995 g/cm ³)
Fiber content	71%	71%	75%	75%
Cross-sectional area	0.08 in ² (49.48 mm ²)	0.11 in ² (70.97 mm ²)	0.11 in ² (70.97 mm ²)	0.20 in ² (113.04 mm ²)
Nominal diameter	5/16" (8 mm)	3/8" (10 mm)	3/8" (10 mm)	1/2" (12 mm)

Product Performance Properties

per product material

	<i>Maperod C</i>	<i>Maperod G</i>
Tensile strength	290 ksi (2 000 MPa)	110 ksi (760 MPa)
Modulus of elasticity	22,500 ksi (150 GPa)	5,918 ksi (40.8 GPa)
Elongation at break	1.5%	2%
Shear strength	10.88 ksi (75 MPa)	2.18 ksi (15 MPa)
Coefficient of longitudinal thermal expansion	3.3 to 5.6 x 10 ⁻⁶ in/in/°F (6 to 10 x 10 ⁻⁶ mm/mm/°C)	3.3 to 5.6 x 10 ⁻⁶ in/in/°F (6 to 10 x 10 ⁻⁶ mm/mm/°C)
Coefficient of transversal thermal expansion	N/A	11.7 to 12.8 x 10 ⁻⁶ in/in/°F (21 to 23 x 10 ⁻⁶ mm/mm/°C)
Shelf life	Unlimited when stored in a cool, clean, dry place out of sunlight. Protect from freezing in shipment and storage.	

Packaging

Product	Size
<i>Maperod C 150/8</i>	5/16" x 19.7' (8 mm x 6 m)
<i>Maperod C 150/10</i>	3/8" x 19.7' (10 mm x 6 m)
<i>Maperod G 40/10</i>	3/8" x 19.7' (10 mm x 6 m)

Maperod G 40/12

1/2" x 19.7' (12 mm x 6 m)

ADDITIONAL INFORMATION

For information on MAPEI's commitment to sustainability and transparency, as well as how MAPEI products may contribute to green building standards and certification systems, contact sustainability_USA@mapei.com (USA) or sustainability-durabilite@mapei.com (Canada).

WARNING

The test results shown in the TECHNICAL DATA table were obtained in compliance with test methods and curing cycles, if applicable, defined in the industry standards referenced on the Technical Data Sheet. Please note that the use of test procedures or methods other than those indicated in the table could lead to different values and that, in such cases, any liability of our company is excluded.

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 nor 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.**

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For the most current product data and BEST-BACKEDSM warranty information,
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