PileMedic™ PLG9.7

HYCHEM
Infrastructure

Product Description

PileMedic® PLG9.7 is a high-strength Glass Fiber Reinforced Polymer (FRP) laminate constructed with bidirectional glass fabrics providing strength in both longitudinal and transverse directions. The laminate is wrapped around the host structure and the overlapping portions are bonded together using QuakeBond™ 220UR (Universal Resin) to create a strong shell around the existing structure.

PileMedic® is unique in that it allows construction of a seamless structural shell around an existing column, utility pole or submerged pile. The annular space between the PileMedic® Jacket and the host structure can be filled with an array of QuakeWrap® fill materials, including resins, epoxy grouts, and non-shrinking grouts and reinforced with conventional mild steel or glass fiber reinforced polymer (GFRP) reinforcing bars or high-strength unidirectional carbon laminates such as GU50C. The thin laminate is flexible enough to be wrapped around smaller diameter piles 8 inch (200mm) or larger in diameter.

Uses

- Repair and strengthening of underwater piles
- Repair and strengthening of bridge piers or piles
- Repair and strengthening of corroded or damaged structural columns
- Repair and strengthening of utility poles
- Applicable to all materials: concrete, steel and timber

Advantages

- One flat sheet can be used to construct a custom shell of any shape (e.g. circular, oval, etc.) in the field, eliminating the expense and delays of special-order jackets.
- The jacket provides lateral confining pressure in the hoop direction under code compliant conditions.
- Increases the axial compressive capacity of the structure under code compliant conditions
- Provides flexural (bending) enhancement under code compliant conditions
- The seamless shell prevents migration of moisture and oxygen into the structure, significantly reducing future rate of corrosion and deterioration.
- Eliminates the need for ties around longitudinal reinforcing bars.
- The laminates incorporate a special chemical coating that eliminates the need for scuffing of the surface in the field.
- Annular space is easily maintained in the field, minimizing the waste of fill material.
- Reduces the diving time in underwater repairs
- System does not corrode and is chemical resistant
- Laminates can be installed as 4-ft (1220 mm) tall shells with overlapping joints along the height of the structure.
- Strengthening system may be designed as a contact critical application where surface preparation requirements of the host structure are significantly reduced.

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Fiber & Laminate Properties

		US UNITS	SI UNITS
Longitudinal (0°) Direction:			
Tensile Strength	(ASTM D3039)	26.1 ksi	180 MPa
Breaking Force		940 lb/in.	165 N/mm
Modulus of Elasticity	(ASTM D3039)	1,755 ksi	12,100 MPa
Ultimate Elongation	(ASTM D3039)	1.49 %	1.49%
Transverse (90°) Direction:			
Tensile Strength	(ASTM D3039)	20.3 ksi	140 MPa
Breaking Force		740 lb/in.	130 N/mm
Modulus of Elasticity	(ASTM D3039)	1,731 ksi	11,930 MPa
Ultimate Elongation	(ASTM D3039)	1.17 %	1.17 %
Laminate Properties:			
Ply Thickness		0.035 in	0.9 mm
Barcol Hardness	(ASTM D2583)	75 min	75 min
Water Absorption	(ASTM D570)	0.8% max	0.8% max
IZOD Impact (Notched)	(ASTM D256)	26 ft.-lb/in	1390 J/m
Carbon Arc Weathering	(ASTM G152)	Passes 500 hr	UV Resistance

Force Equivalency

A double layer (two plies) of PileMedic® PLG9.7 provides the following equivalent forces:
No. 4 Gr. 40 tie placed at 4.2 inches on center
No. 4 Gr. 40 bars placed vertically at 5.4 inches on center

Jacket Diameter Inches (mm)[1]	Nominal Confining Pressure psi (MPa)		
	Two plies	Three plies	Four plies
8 (200)	470 (3.2)	705 (4.9)	940 (6.5)
10 (255)	375 (2.6)	560 (3.9)	750 (5.2)
12 (305)	310 (2.2)	470 (3.2)	625 (4.3)
18 (455)	210 (1.4)	310 (2.2)	415 (2.9)
24 (610)	155 (1.1)	235 (1.6)	310 (2.2)
30 (760)	125 (0.9)	185 (1.3)	250 (1.7)

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Application

The following steps outline a typical application of the PileMedic® system. Project-specific requirements may vary.

1. Cut the required length of PileMedic® laminate considering the number of layers necessary and the overlap length.
2. Wipe laminate using a clean cloth.
3. Apply the appropriate QuakeBond™ 220 epoxy paste on the over-lapping regions of the laminate sheet.
4. Wrap the laminate around the host structure to create a multi-layer jacket. PileMedic® spacers may be used to control the size of the annular space between the host structure and the laminate.
5. Use straps to temporarily hold the jacket in the desired shape.
6. Seal the bottom of the annular space, as required.
7. Fill the annular space with approved fill material using the tremie method or a pump connected to grout ports. The hydrostatic pressure from the weight of the fill material will press the laminate plies against each other for improved bonding. For underwater applications, the fill material must be compatible for such applications.
8. For longer piles, repeat the above steps for additional 4-ft (1.22 m) tall jackets along the height of the pile; overlap the new jacket as required with the previous jacket.
9. Leave the installation undisturbed for 24 hours before removing the straps.
10. Apply appropriate coating on the exterior of the jacket, if required.

Installation of PileMedic® products must be performed only by specially-trained and approved contractors.

Laminates can be cut to appropriate length using commercial quality heavy duty shears. Care must be taken to support both sides of the laminate during cutting to avoid splintering. Since dull or worn cutting tools can damage, weaken or fray the fiber, their use should be avoided.

Packaging

Laminates are available in 48-in. (1.22 m) wide x 120 m (393.7 ft) long rolls. Shorter lengths are available with a cutting fee. PileMedic® laminates can be custom manufactured in widths up to 126 inches (3200 mm). The laminates include a UV-protective pigment and are grey in color.

Rolls of PileMedic® 4-ft wide x ~ 400-ft long ready for shipment

Shelf life and Storage

PileMedic® laminates have unlimited shelf life when stored properly.
Store in dry place at 30°-120° F (0°-50° C).

Limitations

If required, design calculations must be provided and certified by a licensed professional engineer.

When repairing rectangular piles, the minimum bend radius of the jacket around the corners of such piles should not be less than 2 in. (50 mm).

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Caution

PileMedic® PLG9.7 laminates are non-reactive. However, caution must be used when handling since a fine dust may be present on the surface. Gloves and safety glasses are recommended to protect against skin and eye irritation. Care must also be taken when cutting the laminates to protect against airborne dust generated by the cutting procedure. Use of an appropriate, properly fitted NIOSH approved respirator is recommended.

First Aid

Appropriate Personal Protective Equipment (PPE) should be worn at all times when handling product. Consult SDS for more information.

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