SUPERLOC® Polyester Matrix Sheet Pile Specification for Pultruded Sheet Piling Series 1432 VE

Part 1 – General

1.1 This specification addresses the use and minimum physical and mechanical requirements of pultruded Fiber Reinforced Polymer (FRP) sheet piling.

1.2 The FRP Sheet Piles shall be manufactured by a manufacturer with at least five years of experience in manufacturing and supplying FRP sheet piling and be pultruded in an ISO 9001:2015 certified facility.

1.3 The FRP Sheet Piles shall meet the visual requirements of the latest version of ASTM D4385.

1.4 Sheet Pile and Accessories shall be Manufactured By:
Creative Pultrusions, Inc.
214 Industrial Lane, Alum Bank, PA
www.creativepultrusions.com

Part 2 – References

2.1 American Society for Testing and Materials (ASTM) Test Identification

A. ASTM D 7290 - Standard practice for evaluating material property characteristic values for polymeric composites for civil engineering structural applications

B. ASTM D 638 - Standard test method for tensile properties of plastics

C. ASTM D 6641 - Standard test method for compressive properties of polymer matrix composite materials using a combined loading compression test fixture

D. ASTM D 5379 - Standard test method for shear properties of composite materials by the V-notched beam method

E. ASTM D 2344 - Standard test method for short-beam strength of polymer matrix composite materials and their laminates.

F. ASTM D 4385 - Visual Standard for Pultruded Profiles

Part 3 – Materials

3.1 Resin - FRP Sheet Piles shall be pultruded with Vinyl Ester resin which contains UV inhibitors.

3.2 Reinforcement - The FRP Sheet Pile sections shall be reinforced with E-glass commercial grade fiberglass meeting the minimum requirements of ASTM D578.

3.3 The sheet pile sections shall contain a polyester surfacing veil, 10 mils in thickness which encapsulates the FRP sheet pile fiberglass reinforcements.

Part 4 – Properties

The manufacturers documented design properties shall be characteristic values as determined and defined by **ASTM D7290**. The minimum characteristic values shall be equal to or greater than the values noted below.

Mechanical Properties	Test Method	ASTM D7290 Characteristic Value Vinyl Ester Resin	Units
Tensile Modulus (LW)	ASTM D638	3.62	Msi
Tensile Modulus (CW)	ASTM D638	0.52	Msi
Compression Modulus (LW)	ASTM D6641	3.62	Msi
Compression Modulus (CW)	ASTM D6641	0.87	Msi
Tensile Strength (LW)	ASTM D638	63.92	ksi
Tensile Strength (CW)	ASTM D638	8.49	ksi
Compression Strength (LW)	ASTM D6641	55.31	ksi
Compression Strength (CW)	ASTM D6641	19.05	ksi
Inplane Shear Strength	ASTM D5379	8.27	ksi
Inplane Shear Modulus	ASTM D5379	0.50	Msi
Short Beam Shear Strength	ASTM D2344	3.08	ksi

The minimum physical properties shall meet or exceed the following:

Physical Properties	Value	Units
Section Modulus	30.05	in^3/ft
Moment of Inertia	240.54	in^4/ft
Typical Thickness	0.340	in
Depth of Sheet	14.00	in
Width of Sheet	32.00	in
Weight (single pile)	6.70	lbs/ft^2
Angle of the web	20	°
Cross Sectional Area of Sheet	22.1	in^2
Standard Color	Graphite Gray	

The ultimate capacity shall meet or exceed the values noted below for the Polyester sheet. Note: The EOR shall factor the Allowable Stress Design (ASD) moments or utilize the LRFD moment capacities noted.

Moment Capacity Polyester ASD*	61,000 lb-ft/ft. of wall
Moment Capacity Polyester LRFD[1]	17,576 lb-ft/ft. of wall
Shear Strength Polyester ASD*	16,927 lbs per ft. of wall
Shear Strength Polyester LRFD[2]	4,875 lbs per ft. of wall
Average Full Section Modulus of Elasticity Vinyl Ester	4.62 Msi
Minimum EI	1.11 E9 lb*in^2
Web Buckling Capacity from Wale Force based on ASTM D2790 Testing (based on 8" wale section)	12,790 lbs/ft of wall

*Ultimate Capacity based on ASTM 7290 Characteristic Values, A Minimum Safety Factor of 2.5 is Recommended and Shall be Applied to the ASD Noted Moment Capacity. A Safety Factor of 3 is Recommended for Shear.
[1]LRFD Factored for long term water exposure; Time effect factor λ of 0.4 applied;ø factor of .80 applied.
[2] LRFD Factored for long term water exposure; Time effect factor λ of 0.4 applied;ø factor of .80 applied.
[3]Average based on 30 data points; lesser of the flange or web modulus. Value shall be utilized for serviceability calculations for predicting sheet pile wall deflections.

Note: All Capacities developed based on the equations and design methodologies described in the Pre-Standard Load & Resistance Factor Design (LRFD) of Pultruded Fiber Reinforced Polymer (FRP) Structures.

Part 5 – Construction Method

The contractor shall use an appropriately sized vibratory hammer to install the **FRP Sheet Piles** based on the soil conditions outlined in the Geotechnical Report.

The **FRP Sheet Piles** shall be installed using a template to insure proper alignment.

Installation shall be per Manufacturer's Recommendations.

Part 6 – Storage and Handling

Proper care should be taken while handling the material as to not damage the sheet pile.

Upon delivery of the FRP Sheet Pile the material should be inspected for damage that could affect the long-term performance of the sheet pile. ASTM D4385 is a pultrusion industry recognized visual specification and can be used for inspection of the sheet piles.

Store material on a level surface where the potential for damage can be reduced.