



# VL 8101 Pultrusion Reinforcement Mat

### PRODUCT DESCRIPTION

A Uniform Pultrusion Reinforcement Mat VL 8101 Pultrusion Reinforcement Mat is an Advantex® glass fiber reinforcement mat designed to add bulk to a pultruded laminate while providing uniform reinforcement. The structure of VL 8101 consists of uniformly dispersed individual filaments which ensure a smooth surface appearance. The lofty, high die filling capability of VL 8101 at lower mat basis weights reduces cost by replacing heavier reinforcements with less expensive resins on a cost per unit volume basis. The performance of the mat gives comparable structural performance to A Glass Continuous Filament Mat (CFM) with a lower basis weight mat. The two primary applications for VL 8101 in pultrusion are as a laminate bulking as a center mat and as a uniform surface mat reinforcement. In laminates where high transverse structural properties are required, VL 8101 can be used as a center mat to bulk the laminate in combination with a more structural E Glass CFM or fabrics to give required cross machine

direction properties. In laminates with less demanding structural requirements, VL 8101 can be used as a surface mat to give uniform surface appearance in a light-weight mat.

### PRODUCT OVERVIEW

VL 8101 is composed of chopped filaments of Advantex® glass fiber reinforcements bonded together with a styrene insoluble binder system designed for pultrusion processes. VL 8101 is available in 3/8 oz/sqf (115 gsm) to 1 oz/sqf (300 gsm) versions. At these weights, VL 8101 can fill a laminate thickness from 0.015" (0.4 mm) to 0.040" (1.0 mm) as a layer of a pultruded composite. VL 8101 utilizes 16 and 23-micron diameter glass fibers and a small bundle size to give a uniform and relatively closed veil-like appearance. The fiber architecture remains relatively open to enable it to easily wet out with the pultrusion resin. A chemical sizing is applied to the glass fibers to insure compatibility with common resin systems and long-term durability in a composite laminate.

### FEATURES

### PRODUCT BENEFITS

<b>High loft reinforcement mat</b>	<ul style="list-style-type: none"> <li>. Serves as laminate bulker in the center of tick laminates</li> <li>. Effective die filling capability</li> <li>. Reduces cost of pultruded parts</li> </ul>
<b>Fully disperse filament structure</b>	<ul style="list-style-type: none"> <li>. Highly uniform weight variability</li> <li>. Uniform surface appearance</li> </ul>
<b>Advantex® glass fiber reinforcement</b>	<ul style="list-style-type: none"> <li>. Corrosion resistant</li> <li>. Long-term environmental durability</li> <li>. Much higher reinforcement efficiency and quality than a glass</li> </ul>
<b>High Small scale weight uniformity</b>	<ul style="list-style-type: none"> <li>. Minimizes pultruded part variability on Small scale features</li> <li>. Consistent slitting at narrow widths</li> </ul>
<b>High strength styrene insoluble binder</b>	<ul style="list-style-type: none"> <li>. High strength for reduced mat breaks</li> <li>. Consistent mat tensile strengths</li> <li>. Consistently Bright white appearance for colored laminates</li> </ul>





## PULTRUSION DIE FILLING CHARACTERISTICS

VL 8101 brings several beneficial features to the process including volume filling capacity and mechanical strength at lower glass percentage. The resulting mat can fill greater thickness in a pultruded laminate with lower basis weight. **Figure 1** illustrates the uncompressed and compressed thickness of VL 8101 compared to other reinforcements. The figure shows the thickness of a 1 oz/sqf (300 gsm) mat in each reinforcement compressed with typical pressures seen in pultrusion. VL 8101 results in the highest compressed thickness, demonstrating the laminate bulking characteristics of this reinforcement. In typical pultruded laminates the resulting glass content is 15-20% glass by weight in the mat layer. By replacing higher glass content with lower density resin, the overall part weight is reduced. The lower level of reinforcement in the laminate yields less structural laminate performance compared to E Glass CFM, but higher than A glass at a lower level of reinforcement.

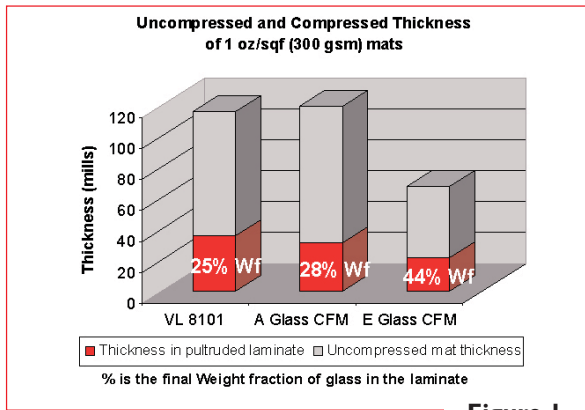


Figure 1

## TYPICAL LAMINATE PROPERTIES

Structural performance at lower glass content VL 8101 uses boron-free Advantex® glass fiber reinforcements which brings with it all of the mechanical and electrical benefits of E-glass and corrosion resistance of ECR glass. VL 8101 is composed of 1-1/2" (38 mm) chop glass fibers, and is not intended to displace other E-glass CFM products where the CFM performs a critical structural need. However, it is an excellent replacement for A-glass CFM products in less structural applications.

When substituting for A glass, typically a lighter weight mat can be used to obtain similar structural properties. A relative summary of certain physical properties is shown in **Figure 2**. This figure compares key physical properties normalized to the performance VL 8101. The complete mechanical properties data shown in this graph are also contained in Table 1.

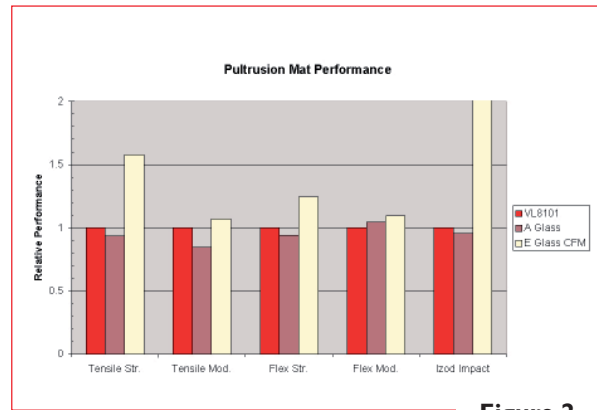


Figure 2

PULTRUSION MAT PERFORMANCE - TABLE 1

LAMINATE PERFORMANCE ATTRIBUTE	UNITS	REINFORCEMENT TYPE					
		VL 8101		A-GLASS CFM		E-GLASS CFM	
		IMPERIAL	METRIC	IMPERIAL	METRIC	IMPERIAL	METRIC
Mat Basis Weight	oz/sqf (gsm)	5/8	190	3/4	225	1oz.	300
Glass wt. %	%	25%		28%		44%	
Laminate Thickness	in/(mm)	0.020	5	0.024	6	0.02	5
Tensile Strength TD	psi/(kPa)	13300	93	11900	83	14200	99
Tensile Strength MD	psi/(kPa)	9200	64	9200	64	21200	148
Tensile Modulus MD	Msi/(kpa)	1.3	8.7	1.0	7.0	1.1	7.8
Tensile Modulus TD	Msi/(kpa)	1.0	7.0	0.9	6.3	1.3	9.1
Flexural Strength MD	psi/(kPa)	24500	171	21000	147	36000	251
Flexural Strength TD	psi/(kPa)	18100	126	16600	116	50000	349
Izod Impact	ft-lbs	6.9		6.6		13.1	

MD = machine direction - TD = transverse direction (cross machine direction)

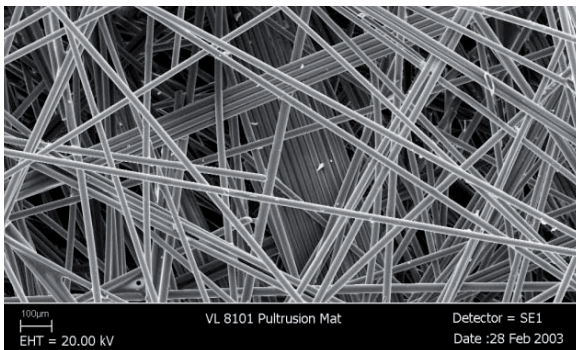


### VL 8101 PRODUCT PERFORMANCE INFORMATION

#### Pultruded Part Cost Savings Cost Savings per Length of Pultruded Part

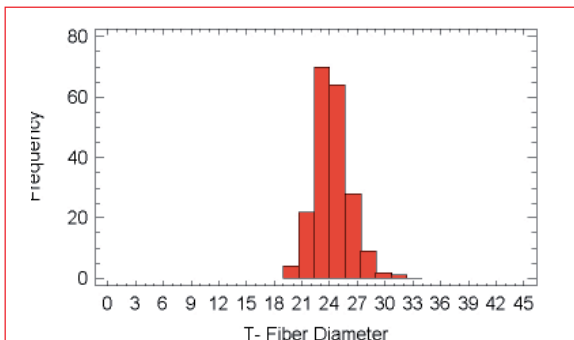
The substitution of lighter basis weight reinforcements with similar structural performance allows cost to be taken out of the pultruded part. In a pultruded part, glass fiber typically costs twice as much as the resin per unit of volume. Due to this, the placement of VL 8101 in nonstructural or modestly structural areas of the laminate can reduce the cost of the part on a cost-per-length basis.

VL 8101 can be viewed as a structural bulking and lightweight reinforcement mat for pultrusion. The key to the cost savings is the thickness and space filling capability of VL 8101 coupled with the ability to wet out completely with resin in the process. In addition to the opportunity for direct material cost saving, the highest cost savings come from the increased consistency of this type of reinforcement.



SEM Micrograph of OC VL 8101 Mat Fiber Structure - open, lofty structure builds laminate bulk while maintaining permeability to wet out well with resin systems.

Figure 3



Histogram chart of fiber diameter distribution shows tight control on fiber diameter for processing and part performance consistency.

Figure 4

### ADDED BENEFITS OF VL 8101

#### Pultrusion Process Benefits

The high loft and high uniformity of VL 8101 result in a reinforcement mat that is very well suited for the pultrusion process. The following advantages are found in this type of reinforcement :

- Slitability - the good small-area weight uniformity allows the mat to be slit down to narrow widths easily while still maintaining integrity.
- Spliceability - VL 8101 is able to be split and spliced for smooth transitions between rolls in the pultrusion process.
- Resin Compatibility - VL 8101 is compatible with the common pultrusion resin systems including Polyester, Vinylester, Epoxy and Polyurethane. VL 8101 is not compatible with phenolic or thermoplastic pultrusion systems.

#### Pultruded Part Performance Benefits

In addition to processing ease, VL 8101 offers some unique characteristics in the pultruded part laminate.

- The Uniform distribution yields a pultruded part with consistent level of reinforcement even in small features and tight radiuses. This small area weight consistency yields parts with consistent reinforcement and resists warpage and bowing associated with non uniform reinforcements.
- Whiteness - The binder system used on VL 8101 is highly consistent and white in color. This translates to color consistency in finished laminates, especially when VL 8101 is used as a surface mat.
- Corrosion Performance - Advantex® E Glass fiber reinforcements add corrosion resistance to the finished part. Advantex® is resistant to both acid and alkaline corrosion. In addition, Advantex® does not adsorb moisture or degrade with humidity exposure.
- Electrical Performance - the E Glass reinforcement provides high dielectric performance for any applications involving exposure to electrical environments. The good hydrolytic resistance limits moisture degradation when exposed.



### VL 8101 PRODUCT DETAIL

VL 8101 is currently available in a product to meet the needs of pultruders as a drop-in substitution. The roll sizes match the typical equipment used to slit the product to final use widths. Typical properties are shown in Table 2.

- The product is typically supplied in 54 inch (137 cm) wide rolls
- 4 inch (100 mm) inside diameter cardboard cores
- 22-inch (56 cm) outside diameter rolls
- Rolls typically weigh 110 lb (50 kg)
- 23 micron diameter fibers for heavier weight mats for optimized wetting. 3/8 oz/sqf (115 gsm) uses 16 micron diameter x 1-1/4" (32 mm) long fibers for added tensile strength and uniformity.

### OWENS CORNING GLOBAL QUALITY STANDARDS

Owens Corning continues to meet ongoing customer demands for higher productivity, higher value products and excellent support. VL 8101 is a high-quality product able to be produced and supplied with a multi-regional process that helps to ensure consistent a product in many regions of the world while meeting performance and cost requirements. The Owens Corning worldwide technical and marketing network provides our customers with products and services that continue to meet evolving needs. VL 8101 is appropriate for applications with global or regional specifications, and is optimized to meet customer's cost and performance needs.

PULTRUSION MAT PERFORMANCE - TABLE 2

MAT WEIGHT		THICKNESS IN PULTRUDED LAMINATE		MINIMUM MAT TENSILE STRENGTH		LINEAR QUANTITY ON ROLL	
OZ/SQF	GSM	IN	MM	LB/3"	N/75 MM	FEET	METERS
3/8	115	0.015	0.40	35	155	925	281
1/2	150	0.020	0.50	35	155	710	216
5/8	190	0.025	0.60	40	180	560	170
3/4	225	0.030	0.75	40	180	475	144
1	300	0.040	1.00	40	180	355	108

VL 8101 is produced in the Owens Corning Global network of Composite reinforcements. With capacity globally, Owens Corning can serve the needs of the composites markets in all regions of the world. VL 8101 is produced in a wet process.



OWENS CORNING  
 COMPOSITE MATERIALS, LLC  
 ONE OWENS CORNING PARKWAY  
 TOLEDO, OHIO 43659  
 1.800.GET.PINK™  
[www.owenscorning.com](http://www.owenscorning.com)  
[www.owenscorning.com/composites](http://www.owenscorning.com/composites)

OWENS CORNING  
 FIBERGLAS, SPRL.  
 166, CHAUSSÉE DE LA HULPPE  
 B-1170 BRUSSELS - BELGIUM  
 +32.2.674.82.11

OWENS CORNING - OCV ASIA PACIFIC  
 SHANGHAI REGIONAL HEADQUARTERS  
 2F OLIVE LVO MANSION  
 620 HUA SHAN ROAD  
 SHANGHAI CHINA 200040  
 +86.21.62489922

Contact :  
[nonwovensinfo@owenscorning.com](mailto:nonwovensinfo@owenscorning.com)

Contact :  
[nonwovensinfo@owenscorning.com](mailto:nonwovensinfo@owenscorning.com)

Contact :  
[nonwovensinfo@owenscorning.com](mailto:nonwovensinfo@owenscorning.com)

This information and data contained herein is offered solely as a guide in the selection of a reinforcement. The information contained in this publication is based on actual laboratory data and field test experience. We believe this information to be reliable, but do not guarantee its applicability to the user's process or assume any responsibility or liability arising out of its use or performance. The user agrees to be responsible for thoroughly testing any application to determine its suitability before committing to production. It is important for the user to determine the properties of its own commercial compounds when using this or any other reinforcement. Because of numerous factors affecting results, we make no warranty of any kind, express or implied, including those of merchantability and fitness for a particular purpose. Statements in this publication shall not be construed as representations or warranties or as inducements to infringe any patent or violate any law safety code or insurance regulation.

