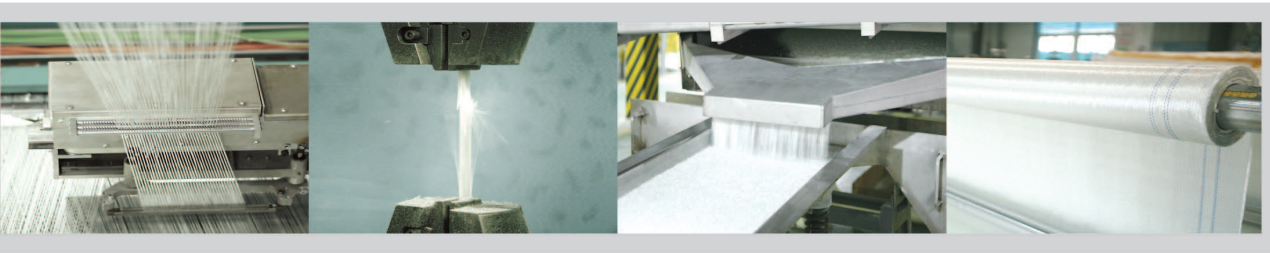




# Fiberglass Solutions to **WIND ENERGY**



## **Manufacturing Process for Wind Energy**

Hand Lay-up

Prepreg (Pre-forming)

Vacuum Infusion (Vacuum Bagging)

## **Fiberglass Products for Wind Energy**

Roving for Wind Energy

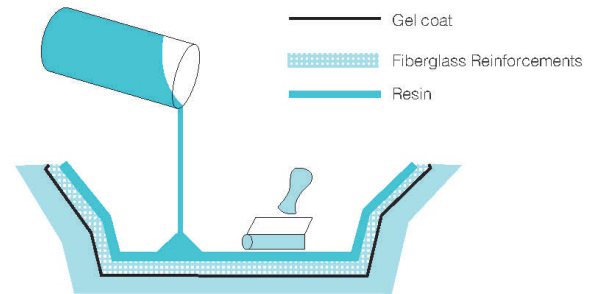
Multi-axial Fabrics for Wind Energy

PP Core Mat

## Manufacturing Process for Wind Energy: Hand Lay-up, Prepreg (Pre-forming), Vacuum Infusion (Vacuum Bagging)

### Hand Lay-up

Resin mix and fiberglass reinforcements are laid into mold layer by layer, completely impregnated with air bubble removed, laminated to designed thickness and cured.



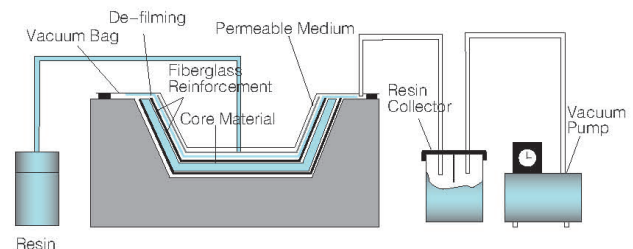
Hand Lay-up

### Prepreg (Pre-forming)

An intermediate molding process where fiberglass reinforcements (roving or fabrics) and resin are impregnated evenly and partially cured as pre-formed materials, which can be directly processed for final products without adding more resin.

### Vacuum Infusion (Vacuum Bagging)

Air is extracted completely from inside the vacuum bag with fiberglass reinforcements, and resin is forced by pressure into the reinforcements, uniformly impregnated and cured to form the laminates after vacuum bag removal.



Vacuum Infusion

## Fiberglass Products for Wind Energy

### Roving for Wind Energy



Fiberglass roving for wind energy is compatible with EP, VE and UP resins and used to produce wind fabrics with fast wet-out and high strength & modulus. It is available with E-glass, TCR glass and S-1HM™ glass, a high-performance glass manufactured under AGY technology, to meet the demands of wind market on roving of higher strength & modulus.

#### 【 Products 】

Product Code	Linear Density tex	Linear Density yield	Resin Compatibility	Product Features
920W	300, 600, 1000 1500, 1200, 2400	1656, 828, 496 414, 207, 331	EP	Complete and fast wet out; good process performances, high laminate strength and excellent modulus
921N	300, 600, 1000 1500, 1200, 2400	1656, 828, 496 414, 207, 331	VE, UP	Complete and fast wet out, low fuzz, good process performances, high laminate strength and excellent modulus

## Multi-axial Fabrics for Wind Energy



### 【 Description 】

Multi-axial fabrics are non-crimp fiberglass reinforcements made on a warp knitting loom where fiberglass weft and warp are oriented at set angles by one or multiple layers and stitched-bonded. Each multi-axial fabric can be combined with chopped fiber, veil, etc. for enhanced performances.

It is widely used in wind energy to produce moulds, wind blades and nacelle, etc.

### 【 Properties 】

- ◎Crimp-free construction and higher fabric strength
- ◎Excellent molding property and impregnation
- ◎Enhanced surface aesthetics of finished products and no print-through
- ◎Optimized composites directional fiber content
- ◎Enhanced mechanical properties for lighter laminates

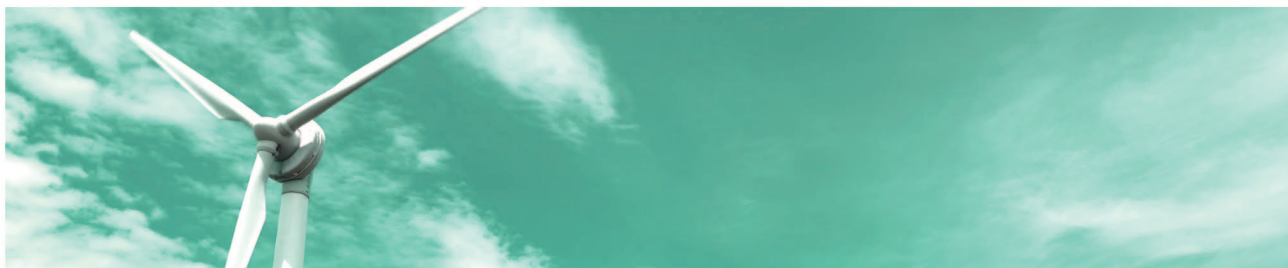
### 【 Identification of Product Code 】

E TL 1215 (0/+45/-45) T30 EP - 1270 E6  
 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧

①	Fiberglass Type		E (E-glass) or TCR (TCR glass)
②	Fabrics Type	UD	UL: warp unidirectional fabrics UT: weft unidirectional fabrics
		Biaxial	BX: ( $\pm 20^\circ \sim \pm 80^\circ$ ) Biaxial Fabrics BLT: ( $0^\circ / 90^\circ$ ) Biaxial Fabrics
		Triaxial	TL: $0^\circ$ with ( $\pm 20^\circ \sim \pm 80^\circ$ ) Triaxial Fabrics TT: $90^\circ$ with ( $\pm 20^\circ \sim \pm 80^\circ$ ) Triaxial Fabrics
		Quadraxial	QL: $0^\circ$ single layer quadraxial fabrics QT: $90^\circ$ single layer quadraxial fabrics
③	Area Weight		400 ~ 2000g/m <sup>2</sup>
④	Angle		$0^\circ$ , $+45^\circ$ , $90^\circ$ , $-45^\circ$ etc.
⑤	Type & Area Weight of Additional Inputs		C: Chopped Fiber 50 ~ 600g/m <sup>2</sup> T: Surface mat 30 ~ 50g/m <sup>2</sup> H: Hot melt yarn
⑥	Resin Compatibility		EP: Epoxy resin UP: Unsaturated Polyester VE: Vinyl Ester
⑦	Width		100 ~ 2540mm
⑧	Density of Stitching Yarn		E: number of stitching yarn in 1 inch

【 Products 】

Type	Specification
UD	EUL1200(0)EP
	EUL1200(0)C50EP
Biaxial	EBX808(+45/-45)EP
	EBX1200(+45/-45)EP
	EBLT600(0/90)C300UP
	EBLT800(0/90)C240UP
Triaxial	ETL973(0/+45/-45)EP
	ETL973(0/+45/-45)T30EP
	ETL1200(0/+45/-45)EP
	ETL1215(0/+45/-45)EP
	ETL1215(0/+45/-45)T30EP
	ETT1215(+45/90/-45)EP
Quadaxial	EQL800(0/+45/90/-45)UP
	EQLT800(0/+45/90/-45)EP
	EQL2000(0/+45/90/-45)EP
	EQT2000(0/+45/90/-45)EP



## PP Core Mat



### 【 Description 】

PP Core mat is a combination of a non-woven PP (polypropylene) core, binder-free chopped fiber and warp & weft layers, stitch-bonded with polyester yarn on a warp knitting loom. It is compatible with UP & EP resins and typically used to produce nacelle for wind energy.

### 【 Properties 】

- ◎Special resin conductive layer, high resin flow and fast curing;
- ◎Optimum thickness, less reinforcement placement and higher working efficiency;
- ◎Capable for high part flexibility, multi-thickness and excellent part integrity;
- ◎Special fabric construction, higher mechanical properties for composites with reduced weight.

### 【 Identification of Product Code 】

Eg.1: ECW600C/180PP/624 ( 0,90 ) -1270

E: E glass  
 CW: Multi Layer Fabrics  
 600: Area Weight of Chopped Fiber (g/m<sup>2</sup>)  
 C: Material Code of Chopped Fiber  
 180: Area Weight of PP Core (g/m<sup>2</sup>)  
 PP: Material Code of PP Core (g/m<sup>2</sup>)  
 624: Area Weight of Warp & Weft Layers (g/m<sup>2</sup>)  
 ( 0,90 ) Material Code of Warp & Weft Layers  
 1270: Roll Width (mm)

Eg.2: ECW600C/180PP/600C-1270

E: E glass  
 CW: Multi Layer Fabrics  
 600: Area Weight of Chopped Fiber (g/m<sup>2</sup>)  
 C: Material Code of Chopped Fiber  
 180: Area Weight of PP Core (g/m<sup>2</sup>)  
 PP: Material Code of PP Core (g/m<sup>2</sup>)  
 600: Area Weight of Chopped Fiber (g/m<sup>2</sup>)  
 C: Material Code of Chopped Fiber  
 1270: Roll Width (mm)

### 【 Products 】

Specification	Total Weight g/m <sup>2</sup>	Chopped Fiber g/m <sup>2</sup>	Warp & Weft g/m <sup>2</sup>	PP Core g/m <sup>2</sup>	Chopped Fiber g/m <sup>2</sup>	Num. of Layer
ECW300C/180PP/300C	780	300	—	180	300	3
ECW600C/180PP/600C	1380	600	—	180	600	3
ECW150C/180PP/600 ( 0,90 )	930	150	600	180	—	3
ECW300C/180PP/600 ( 0,90 )	1080	300	600	180	—	3
ECW600C/180PP/600 ( 0,90 )	1380	600	600	180	—	3
ECW300C/180PP/770 ( 0,90 )	1250	300	770	180	—	3
ECW600C/180PP/624 ( 0,90 )	1404	600	624	180	—	3



## About Us

Taishan Fiberglass Inc., is a subsidiary company of China National Building Material Group Corporation Ltd., and a National Key High-tech Enterprise.

Our products cover E-Glass, TCR (ECR) Glass, Alkali Resistant Glass Cem-FIL®, HMG Glass and S-1 HM™ series. The leading products such as Roving, Chopped Strand Mat, Yarn, Electronic Fabrics, Chopped Strands, Multiaxial Fabrics, Knitted Fabrics, Woven Roving, etc., are exported to over 70 countries and regions, including the US, Europe, ME, etc.

We are committed in scientific and standardized management and have acquired certificates of International Quality Management System (ISO 9001), Environmental Management System (ISO 14001), Occupational Health and Safety Management System (GB/T 28001) and products are awarded Det Norske Veritas Type Approval Certificate (DNV), Lloyd's Register of Shipping (LR), Germanischer Lloyd (GL) and China Classification Society (CCS), etc.

Taishan Fiberglass Inc., will adhere to sustainable development and provide customers with superior products and services, to keep contributing to the progresses of China fiberglass industry and in pursuit of becoming a globally prestigious fiberglass manufacturer.



Fiberglass Solutions to Pipes & Tanks	Filament Winding, Centrifugal Casting
	Direct Roving for Filament Winding, Chop Roving, Chopped Strand Mat, Woven Roving, Axial Tape, Knitted Mat, Surface Mat, Hobas Roving
Fiberglass Solutions to Open Molding	Spray-up, Hand Lay-up
	Spray-up Roving, CSM, Woven Roving, Combo Mat, Knitted Mat, Surface Mat
Fiberglass Solutions to Pultrusion	Pultrusion
	Direct Roving for Pultrusion, Knitted Mat, Surface Mat
Fiberglass Solutions to Continuous Panel Molding	Continuous Panel Molding
	Continuous Panel Roving, Chopped Strand Mat
Fiberglass Solutions to Compression Molding	SMC/BMC Compression Molding
	SMC Roving, Chopped Strands for BMC
Fiberglass Roving for Mats & Fabrics	Weaving Mat Production
	Direct Roving for Multi-axial Fabrics, Direct Roving for Geo-grids, Direct Roving for Fabrics, Roving for Mat
Fiberglass Solutions to Thermoplastics	Extrusion & Injection, LFT (Long Fiber Thermoplastic); LFT-G and LFT-D GMT (Glass Mat reinforced Thermoplastics)
	Continuous Roving for Thermoplastics, Chopped Strands LFT Roving, GMT Roving
Fiberglass Solutions to Wind Energy	Prepreg (Pre-forming); Vacuum Infusion (Vacuum Bagging); Hand Lay-up
	Multi-axial Fabrics for Wind Energy, PP Core Mat
Electronic & Industrial Fiberglass Yarns	
Electronic Fiberglass Fabrics	
HMG High Modulus High Strength Fiberglass	



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