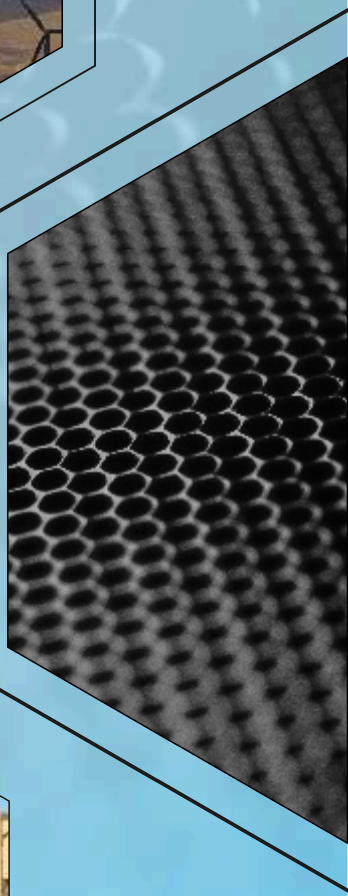
ABC PREPREG

THE PREPREG OF THE 3rd millennium



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ABC PREPREG

ABC Prepreg has introduced to the composite market alternative prepregs solutions that allow faster curing cycles, more cost-effective production, and environmental friendly working conditions.

Through 30 years of R&D, Dr. Halim Chtourou, Eng., MSc, PhD. which relies on a dynamic and professional team, which has proven its great competence, And they managed to make our Prepreg " The Prepreg of the 3rd millennium " technology patented in the United States, Canada and Europe, Thanks to our whole R&D department wisdom and diligence.

ABC PREPREG, as the owner of this advanced technology, has three families of thermosetting prepregs; Simprex®, Ep-Preg® and Phepreg®, and we also have UV-preg® products which is cured with UV light, as well as Surfex® is Surface Films, Adhex® is Bonding Films and Sheetex® (SMC) is filler film they are all compatible with our phenolic, epoxy, and vinyl-ester prepregs.

When you use ABC Prepreg, your composite products will be lighter and stronger …To respond to our customers' demands, we have introduced more products to our portfolio, including Surfacing films, Adhesive films, and Sheet molding compounds.At ABC Prepreg, we believe that it is our duty to support our customers by providing high quality products and prompt comprehensive technical support to achieve the highest performance in their finish composite parts.

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Composites products category

ABC Prepreg manufactures four kinds of products commonly named prepregs, adhesive films, surfacing films, and sheet moldings compounds.

Prepregs:
Our prepreg products involve the use of epoxy, phenolic, vinyl ester, and polyester resins…

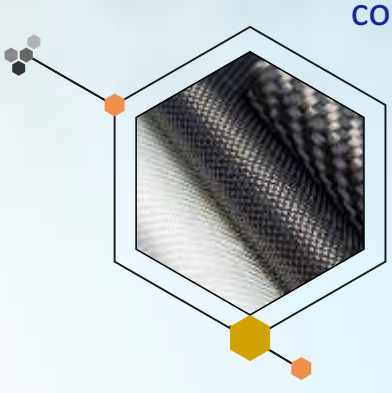
Adhesive Films:
We produce adhesive films compatible with our epoxy, phenolic, and vinyl ester prepregs, suitable for sandwich panel constructions…
:

Sheet Molding:
CompoundsWe produce SMC compatible with our phenolic and vinyl ester prepregs, suitable for press compression molding…

Surface Films:
We produce surface films compatible with our epoxy, phenolic, and vinyl ester prepregs, suitable for getting ready to paint parts…

Prepreg	Surface Films	AdhEsif Films	Sheet molding compounds
Simprex®	Surfex®	Adhex®	Sheetex®
Ep-preg®			
Phepreg®			
UV-preg®			

- Storage and transport at room temperature . ***1 year***
- Polymerization at 120 ° C in 20 minutes maximum.
- Mechanical characteristics equal to or better than those of conventional fabrics.



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Wind Energy

E-preg S153 has been qualified by Vestas standards Using E-Glass fiber. Prepreg allows for added strength and longevity.

Military

E-preg F64-A1 creating a balance between mechanical properties and fire retardancy.
Prepreg allows less weight and therefore less fuel consumption.

Aircraft Interior

Phepreg® FP-721, qualified by FAR-25.853, is very fire resistant and releases very low smoke and toxic gas release in case of fire.

Automotive

EP-Preg T353 was used with 12K carbon fiber for making racing car. Light weight and high performance has been reported by customers.

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Construction

More frequently composites are used in large-scale commercial construction. Prepreg and flame retardant Sheetex are suitable for the construction and manufacture of sandwich panels.

Marine

Simprex and UV-Preg are very suitable for all marine fabrications. Simprex is particularly suitable for the manufacture of carbon masts.

Mass Transit

EP-Preg F64-A1 and Phepreg FP-721 are designed perfectly to build a high-speed train, having high fire retardant levels for structural and interior components.

Much more...

Sheetex products are very suitable for variety of application where the cost and the mechanical parameter and performance are not so important.

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PATENT

Patented Prepreg in the United States, Canada and Europe

COUNTRY	APPLICATION NUMBER	TITLE
United States	6436856	Thickenable vinyl ester resin compositions
Canada	2311661	Thickenable vinyl ester resin compositions
Belgium	1294807	Thickenable vinyl ester resin compositions
Swiss	1294807	Thickenable vinyl ester resin compositions
Germany	1294807	Thickenable vinyl ester resin compositions
Europe	1294807	Thickenable vinyl ester resin compositions
Spain	1294807	Thickenable vinyl ester resin compositions
France	1294807	Thickenable vinyl ester resin compositions
United Kingdom	1294807	Thickenable vinyl ester resin compositions
Italy	47974BE2006	Thickenable vinyl ester resin compositions
Japan	2002-510599	Thickenable vinyl ester resin compositions
Luxemburg	1294807	Thickenable vinyl ester resin compositions
The Netherlands	**1294807**	Thickenable vinyl ester resin compositions

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	Heat Curing			UV Curing
Base Resin	Vinylester	Epoxy	Phenolic	Vinylester
Prepregs	M655; M745; M850; M960 H425; 1355; 1555; 1755	S153; F64-A1 T353; T433	FP-721 FP-920	IP54*; M160; H536 M460; N600
Sheet Molding Compounds	IP-1000*; V-1000; VFR-1000; V-1700	E-1000; EFR-1000	FP-1000	
Adhesive Films	V-320; VFR-350	E-320; EFR-350	FP-350	
Surface Films	V-280; VFR-330	E-280; EFR-330	FP-400	UV-280; UVFR-330

* Polyester

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ABC PREPREG

Vinylester Prepregs

ABC's vinylester prepregs, **Simprex**®, are particularly formulated from a selection of vinyl ester resins, to offer matchless shelf life, up to 1 year @ 68°F (20°C), and short curing cycle. ABC **Simprex**® products are categorized as below.

Simprex®	T_g (°C)	Molded Part Features
1. Bisphenol A type		
M745 **M850** **M960**	120±3 140±3 150±3	Superior resistance to aqueous solutions and organic solvents Excellent mechanical properties Great toughness and impact strength
2. Brominated Bisphenol A type		
H425	132±3	Fire retardant (UL-94, V-0 flammability rating) Great toughness and fatigue resistance
3. Elastomer modified type		
M655	117±3	Superior resistance to abrasion Excellent impact and fatigue resistance High adhesion to core materials
4. Novolac type		
1355 **1555** **1755**	177±3 187±3 225±3	Superior chemical resistance Excellent mechanical properties with glass fiber Great strength and toughness retention at elevated temperature

Deduction

Continuous quest for Innovation and Perfection

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ABC PREPREG

Vinylester Prepregs Main Features

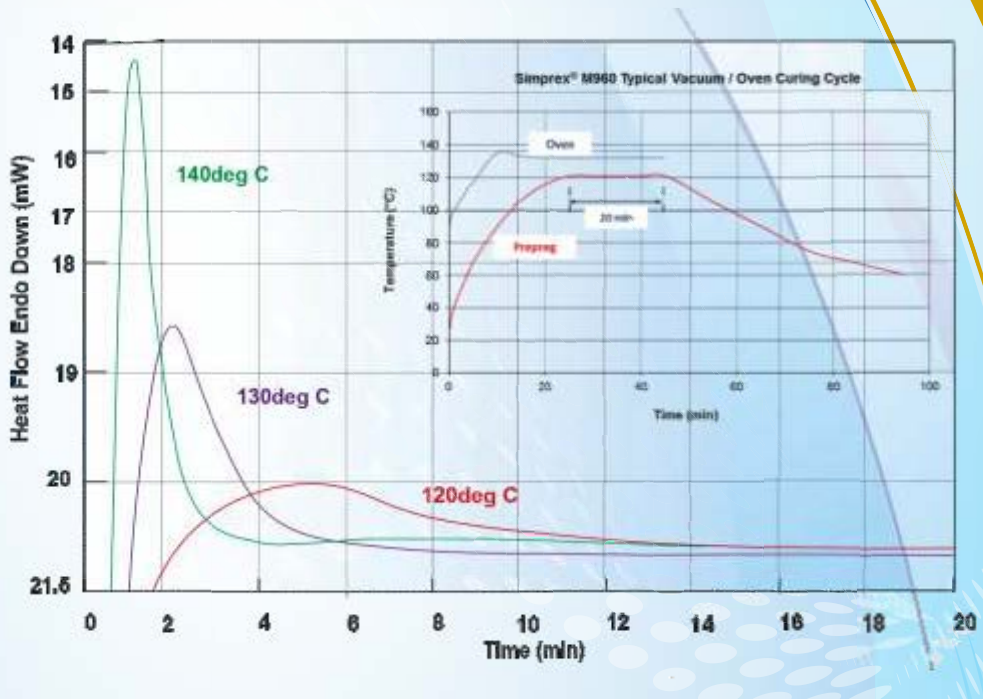
Fast curing cycles

20 min @ 250°F (121 °C)

12 min @ 266°F (130°C)

7 min @ 284° F (140° C)

Up to 12 months shelf life at 68°F (20°C)



Trust
Going the extra mile to meet customer's needs

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ABC PREPREG

Epoxy Prepregs

ABC epoxy prepregs, **Ep-preg®**, are especially formulated from advanced epoxy resins.

ABC Composite **Ep-preg®** products are categorized as below.

Ep-preg®	T_g (°C)	Typical Applications
1. Bisphenol A type		
S153	112±3	Wind blades manufacturing Boats hulls and decks Automobile and Sports Industries
2. Fire Retardant		
F64-A1	115±3	Automotive and Mass-transit applications Structural and building components General composites where self-extinguishing could add value
3. Toughened Bisphenol A type		
T353	105±3	Advanced composites requiring high impact resistance High performance sporting goods Racing vehicles Aircraft structural parts
T433	132±3	

Value
Being the most competi-tive by offering unique

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ABC PREPREG

Ep-preg® S153

A 185-250°F (85-120°C) Curing Epoxy Prepreg

Vacuum Cured Stitched Fabric Laminates

(30 min @ 85°C & 2 hrs. @ 120°C)

Properties	E-Glass						T 700	Test Method
	Stitched UD		Biax ± 45				12K UD	
Fiber weight (g/m²)	1152	1594	950		600		309	
Resin Content by weight (%)	32	32	38		50		44	
Number of layers	2	2	3		4		5	
Cured laminate thickness (mm)	1.8	2.2	2.4		2.5		1.9	
Laminate fiber volume (%)	50.3	57.8	45.9	45.9	37.8	37.8	50	
Tensile & Flexural Values in (°)	0	0	45	0	45	0	0	
Tensile strength (MPa)	1023	1217	440	151	348	125	1570	BS EN ISO 527-4
Tensile modulus (GPa)	39.5	45.9	33	12	18.2	7.5	115	BS EN ISO 527-4
Flexural Strength (MPa)	1074	-	620	293	490	231	-	BS EN ISO 14125
Flexural Modulus (GPa)	47	-	19	12.6	16.8	8.1	-	BS EN ISO 14125
Normalized properties @ 53% FVF								
Cured laminate thickness (mm)	1.71	2.37	2.12	2.12	1.78	1.78	1.78	
Tensile strength (MPa)	**1077**	**1080**	**498**	**171**	**488**	**175**	1628	BS EN ISO 527-4
Tensile modulus (GPa)	**41.6**	**42.2**	**32.1**	**11.8**	**25.5**	**10.6**	120	BS EN ISO 527-4
Tensile Stiffness Coef. (GPa*m)	37.6	-	-	-	-	-	-	BS EN ISO 527-4
Flexural Strength (MPa)	1137	-	702	352	688	261	1775	BS EN ISO 14125
Flexural Modulus (GPa)	49.9	-	18.6	12.4	19.6	9.2	120	BS EN ISO 14125
Inter-laminar Values in (°)	0	0	45	0	45	0	0	
Shear Strength (MPa)	75	75	45	28	-	-	90	ASTM D-2344
Shear Strength (MPa)	-	-	-	-	51.5	-	-	EN-2377

■ 8 layers; L = 26.06 mm; b = 13.45 mm; d = 4.11 mm.

Future
Bulding on the best availabletow ard new higher toward standars

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Phenolic Prepregs

ABC's phenolic prepregs, **Phepreg®**, are inimitably designed to be matchless in terms of fast curing cycle (**20 min @ 120°C**) and long shelf life at room temperature (**up to 6 months @ 20°C**). The following table presents cured Phepreg® typical features

Phepreg®	**FP-721**	**FP-920**
T_g (°C)	152±3	-
Max. T_g (°C) – Post Cure: 60 min @ 250°C	282±3	-
Flammability		
Extinguishing time	Nil	Nil
Burning length	Nil	Nil
Drip extinguishing time	No dripping	No dripping
Heat Release		
HR - till 3 min. (kW.min/m²)	Not measurable	-
HR @ 4 min. (kW.min/m²)	7.5	-
HR @ 4 min. (kW/m²)	30	-
Smoke Density		
With pilot flame	20.6	11.35
Without pilot flame	15.84	8.45
Toxicity (ppm)		
CO / NO_2 / HCN / H_2S / HCl / HF / HBr	40 / 2 / 0 / 0 / 0 / 0 / 0	40 / 0 / 0 / 0 / 0 / 0 / 0

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UV Curable Prepregs

ABC's UV-preg® products are aimed to cure only when exposed to sun light or UV rays. These prepregs are available only with glass reinforcements. We are using an assortment of polyester and vinylester resins for our below products.

UV-preg®	T_g (°C)	Molded Part Features
1. Isophthalic type PE		
IP54	145±3	Improved chemical resistance High mechanical properties and great resilience
2. Bisphenol A type VE		
M160	122±3	High chemical resistance Superior toughness, high impact and fatigue resistance
3. Brominated Bisphenol A type VE		
H536	132±3	Fire retardant (UL-94, V-0 flammability rating) Great toughness and fatigue resistance
4. Elastomer modified type VE		
M460	117±3	Superior resistance to abrasion Excellent impact and fatigue resistance High secondary bonding adhesion
5. Novolac type VE		
N600	172±3	Superior chemical resistance Great strength and toughness retention at elevated temperature

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ABC PREPREG

Sheet Molding Compounds

Thermoset SMC rolls are typically made from discontinuous Glass fiber, randomly oriented in highly filled resin. Usually used in high pressure compression molding, male/female molds, to mold nonstructural composite parts.

ABC's SMC products are designed to withstand room temperature for quite long time, up to 6 months for polyester and phenolic types, and up to 1 year for vinyl ester type.

Sheetex®	T_g (°C)	Molded Part Features
1. Isophthalic type PE		
IP-1000	152±3	Excellent fiber distribution Admirable flow control at high pressure Superior surface smoothness Superior adhesion to paint
2. Phenolic type		
FP-1000	122±3	Excellent fiber distribution Admirable flow control at high pressure Superior surface smoothness Superior adhesion to paint Exceptional burning resistance
3. Vinylester type		
V-1000; VFR-1000; V-1700	142±3; 175±3	Excellent fiber distribution Admirable flow control at high pressure Superior surface smoothness Superior adhesion to paint Good burning resistance (VFR-1000)
4. Epoxy type		
E-1000; **EFR-1000**	115±3	Excellent fiber distribution Good flow control Superior surface smoothness Superior adhesion to paint Good burning resistance (EFR-1000)

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Adhesive and Surface Films

ABC adhesive (**Adhex®**) and surface (**Surfex®**) films are made from light weight veils; typically from Glass or Polyester fibers, heavily saturated with accurate and uniform quan tity of resin.

Adhex® film resins have well controlled flow during curing to ensure effec tive bonding results.

When used before the first prepreg layer, in vacuum bagging, **Surfex®** films ensure the best surface quality for the molded parts and minimize the surface prepara tion before painting.

Adhex®	T_g (°C)	Film Features
1. Epoxy type		
E-320; **EFR-350**	112±3	Excellent adhesion to core materials and for secondary bonding laminates Superior burning resistance (EFR-350)
2. Phenolic type		
FP-350	150-285	Superior adhesion to core materials Exceptional burning resistance
3. Vinylester type		
V-320; **VFR-350**	125-145	Superior adhesion to core materials Superior burning resistance (VFR-350)

Surfex®	T_g (°C)	Film Features
1. Epoxy type		
E-280; **EFR-330**	112±3	Excellent smoothness and adhesion to paint Superior burning resistance (EFR-330)
2. Phenolic type		
FP-400	150-285	Superior smoothness and adhesion to paint Exceptional burning resistance
3. Vinylester type		
V-280; **VFR-330**	125-145	Excellent smoothness and adhesion to paint Superior burning resistance (VFR-330)

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