EP-PREG® F64-A1
194-250ºF (90-121ºC) CURING EPOXY PREPREG

DESCRIPTION

Ep-preg® **F64-A1** is a fire-retardant epoxy prepreg suitable for vacuum curing process. Its fire behavior meets with **FAR 25.853**- F part 1. It has been designed to offer a great harmonizing between mechanical and fire resistance performances.

F64-A1 is a great choice offering cost affective prepreg solution for manufacturing industrial and building composite parts that have to comply with **ASTM E84 Class A**. It can be used with Surfex® **EFR-330** to get the best surface quality from a vacuum bag process.

F64-A1 has long shelf life at normal ambient room temperature and long out of the bag tack time. It has medium to high flow and allows very good quality surface when processed and cured properly.

KEY FEATURES AND BENEFITS

Long storing life, 10-12 weeks @ 20-23°C & 18 months @ -18°C.

Versatile curing temperature 194-250ºF (90-121ºC).

Suitable for low pressure curing (1 bar).

Self-adhesive for core materials and secondary bonding.

Good flexibility and easy handling.

Environmentally friendly and retains its tack for several weeks.

Suitable for thin and thick laminates.Superior FST performance.

Excellent surface finish.

Good mechanical properties.

BURNING PERFORMANCE AS PER FAR 25.853

Flammability

Extinguishing time	Nil
Burn length	Nil
Drip extinguishing time	No dripping

Smoke Density @ 4 min.

With pilot flame	29.08
Without pilot flame	24.05

CO Toxicity -ppm ppm @ 4 min.

With pilot flame	380
Without pilot flame	230

PHYSICAL PROPERTIES WITH E-GLASS 7781

Standard resin content: 52±3% by weight.

Standard weight: 625±42 g/m2.

Standard tack: medium from one side and low from the other.

Cured ply thickness at 38% FVF: 0.31 mm.

TYPICAL APPLICATIONS

Mass-transit applications.

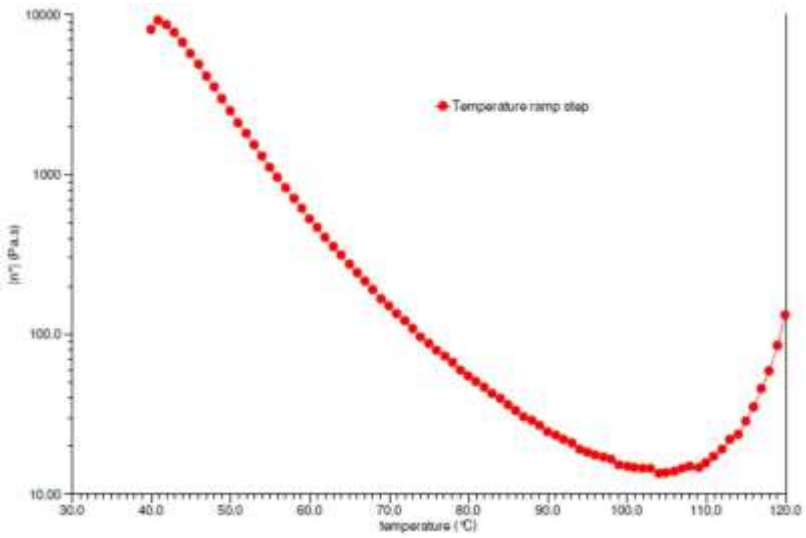
Structural and building components.

General composites with self- extinguishing properties.

CURING SPECIFICATIONS

Minimum		Method
Curing temperature (°C)	90	DSC
Gel time (min)	15-17	-
Curing time (Hrs.) @ minimum temp.	4	DSC
Glass transition temp. T_g (°C)	95-100	DSC
Viscosity – 40 to 120°C @ 1°C/min – (Poise)	134.3	Rheometer
Temperature @ minimum viscosity (°C)	104	Rheometer

Rheology Profile



Cured Matrix Properties

	2 hrs @ 120°C	Method
Tensile Strength (MPa)	60 ± 5	ISO R527
Tensile Modulus (GPa)	5.0± 0.2	ISO R527
Strain (%)	1-2	ISO R527
Flexural Strength (MPa)	95 ± 5	ISO R178
Flexural Modulus (GPa)	5.5 ± 0.5	ISO R178
Strain (%)	2-3	ISO R178
Glass Transition Temp. (°C)	115 ± 2	DSC - 10°C/min
Density (g/cm^3)	≈1.46	
Cured glass laminate – 300 gsm Prepreg	M2 F3	NF T 16.101

PRESS CURING CYCLE

- Heat the mold tool to 176°F (80°C).
- Place the prepreg material in the mold and apply light pressure, 1 bar (14-15 psi), while raising the temperature to 212°F (100°C), at a rate 5-9°F (3-5°C).
- Hold the part in the mold at 212°F (100°C), for 10-15 min, and then raise the temperature to 250°F (121°C), while increasing the pressure gradually up to 3-5 bar (42-70 psi).
- Hold the part in the mold at 250°F (121°C), for 100-120 min, while maintaining the applied pressure.
- Cool the part to at least 176°F (80°C), and then release the pressure gradually for part removal.

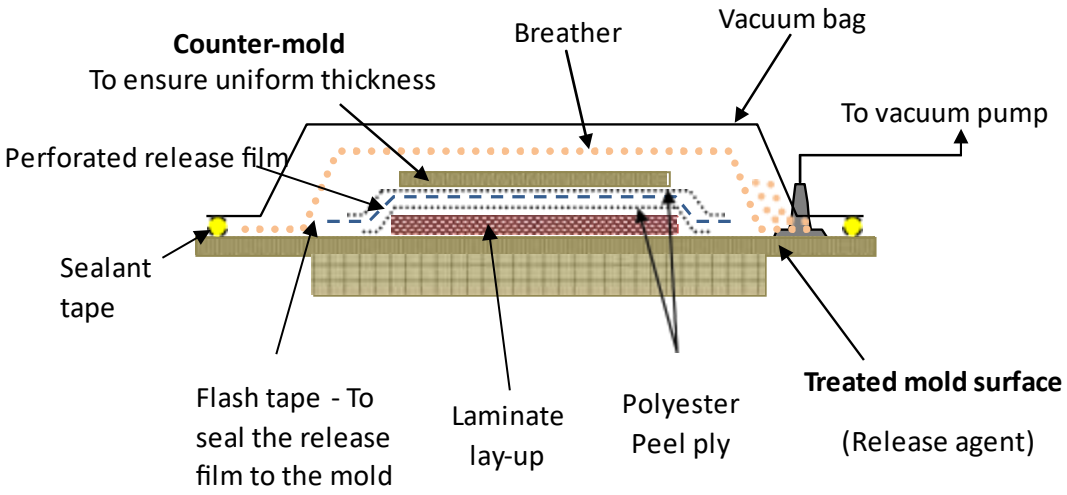
TYPICAL OVEN VACUUM CURING CYCLE

- Apply 24" Hg vacuum for 5-10 minutes before beginning heat cycle.
- Raise laminate temperature from room temperature to 194°F (90°C) within 30-45 min.
- Hold laminate at 194°F (90°C) for 30 min.
- Raise laminate temperature from 194°F (90°C) to 250°F (121°C).
- Hold laminate at 250°F (121°C) for 120 min.
- Cool the laminate to at least 176°F (80°C), prior to release vacuum pressure.

Notice:

- It must be understood that the curing time starts only after the prepreg temperature achieves the recommended temperature. The use of a thermocouple is a must to monitor the actual prepreg temperature.
- In case of vacuum bag processing, one ply of lightweight breather, 120 gsm, is recommended. A heavyweight breather, 340 gsm, has to be used in case of Autoclave processing. In both cases, two or three additional layers of breather have to be applied locally beside the vacuum ports.

Recommended Bagging Arrangement



OTHER VACUUM CURING CYCLES

Temperature (°C)	Gel time (mins)	Dwell time (Hrs:mins)	DSC Tg (°C)
85	-	6:00	95-100
90	-	4:00	95-100
100	-	6:00	110-115
110	13-15	-	-
120	7-9	2:00	110-115

VACUUM CURED STITCHED FIBER LAMINATES

20 min @ 90°C & 2 hrs @ 120° C

Properties	E-Glass			T700	ASTM
Fiber style	8 Harness	TFX UD	NCS 0/90	12K UD	
Fiber weight (gsm)	300	500	600	309	
Prepreg Resin Content by weight (%)	52	50	50	50	
Number of layers	12	7	6	10	
Cured laminate thickness (mm)	4.1	3.8	3.9	3.9	
Laminate FVF (%)	34.7	36.5	36.5	45.2	
Normalized thickness @ **51% FVF** (mm)	2.80	2.73	2.80	2.74	
Mechanical Values @ 25°C in	0°	0°	0°	0°	
Tensile strength (Mpa) (ksi)	300 43.5	615 89.2	346 50.2	1022 148.2	D-3039
Normalized Tensile strength (Mpa) (ksi)	440 63.8	850 123.3	480 69.6	1450 210.3	D-3039
Tensile modulus (Gpa) (msi)	21.7 3.1	41 5.9	22 3.2	117 16.9	D-3039
Flexural strength (Mpa) (ksi)	457 66.3	658 95.4	447 64.8	1093 158.5	D-790
Normalized Flexural strength (Mpa) (ksi)	667 96.7	910 131.9	620 89.9	1575 228.4	D-790
Flexural modulus (Gpa) (msi)	20.3 2.9	40.1 5.8	20.5 3.0	122 17.7	D-790
Inter-laminar Shear Strength (Mpa) (ksi)	46 6.7	60 8.7	45 6.5	68 9.9	D-2344

* Tensile strength is normalized to 60% FVF, in case of carbon, and 53% FVF, in case of glass.

TOXICITY PERFORMANCE AS PER FAR 25.853

	Toxicity (concentration in ppm @ 4 minutes)						
	CO	NO / NO_2	HCN	HCl	HF	SO_2	HBr
FAA requirements▪	<1000	<100	<150	<150	<100	<100	-
F64-A1	380* / 230**	0.8* / 0.5**	5* / 3**	0	0	0	0
Comment	Pass	Pass	Pass	Pass	Pass	Pass	Pass

STORAGE AND HANDLING

All Ep-preg® prepregs are wrapped in a barrier film immediately after impregnation. During storing and handling, the following notes must be considered:

- Ep-preg® prepregs should be stored in their original packaging barrier film, or an equivalent film, at -18°C.
- Before use, the prepreg roll has to be out of the freezer and remain tightly sealed for 48 hours, time required to reach ambient room temperature.
- It is highly recommended to handle the prepreg at a clean area where relative humidity is :5 52% and ambient temperature is 20-23°C.

SAFETY PRECAUTIONS

Usual precautions, as following, must be considered:

- During lamination, workers must avoid skin contact by wearing appropriate disposable protective gloves.
- Clean protective coveralls or equivalent clothes must be worn before laminating and also sanding.
- Protective glasses must be worn to avoid eyes contamination. In case of contamination, eyes must be flushed for 15 min and then medical treatment must be applied.
- After working, hands and contaminated skin, if any, have to be washed with soap and warm water. This has to be implemented as a routine practice.