



Notus EPFR-609

Fire Retardant Epoxy Prepreg System



DESCRIPTION

Notus EPFR-609 is a market leading fire-retardant epoxy prepreg system that combines exceptional FST performance with user-friendly handling characteristics and a long out life.

EPFR-609 is ideal for small to very large structural parts that require a Tg in the range of 90 to 120°C. It can be cured at temperatures from 80 to 120°C and is suitable for low pressure/vacuum curing processes. Notus EPFR-609 has a very long out life at room temperature (60 days at 21-23°C) and can be kept frozen for up to 18 months at -18°C.

Notus has carried out extensive testing, with EPFR-609 complying with FAR 25.853 and NFPA 285 as well as ASTM E84 Class A and UL94 V0.

Controlled resin flow and high peel strength on honeycomb cores mean EPFR-609 is well suited to sandwich structures as well as monolithic laminates. EPFR-609 is available in all prepreg and N1-Preg formats and can also be supplied as a supported resin film.

FEATURES AND BENEFITS

- Exceptional fire performance, passes NFPA 285 and Class A for ASTM E84 (with NE11FR film).
- Low exotherm risk, even for thick laminates.
- Long out-life & shelf-life.
- High strength bonding with honeycomb and foam cores.

APPLICATIONS

EPFR-609 is the perfect choice for Architecture, Aerospace, Rail and other Industrial sectors where reaction to fire and low smoke toxicity are required.

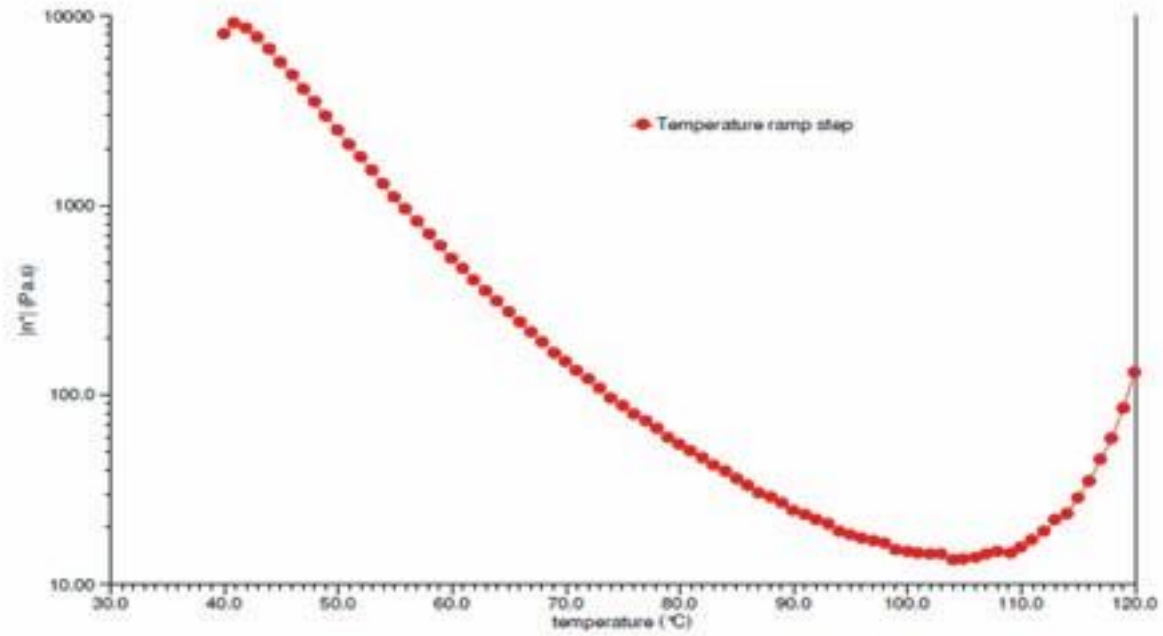
CURE SCHEDULE

Minimum cure requirements

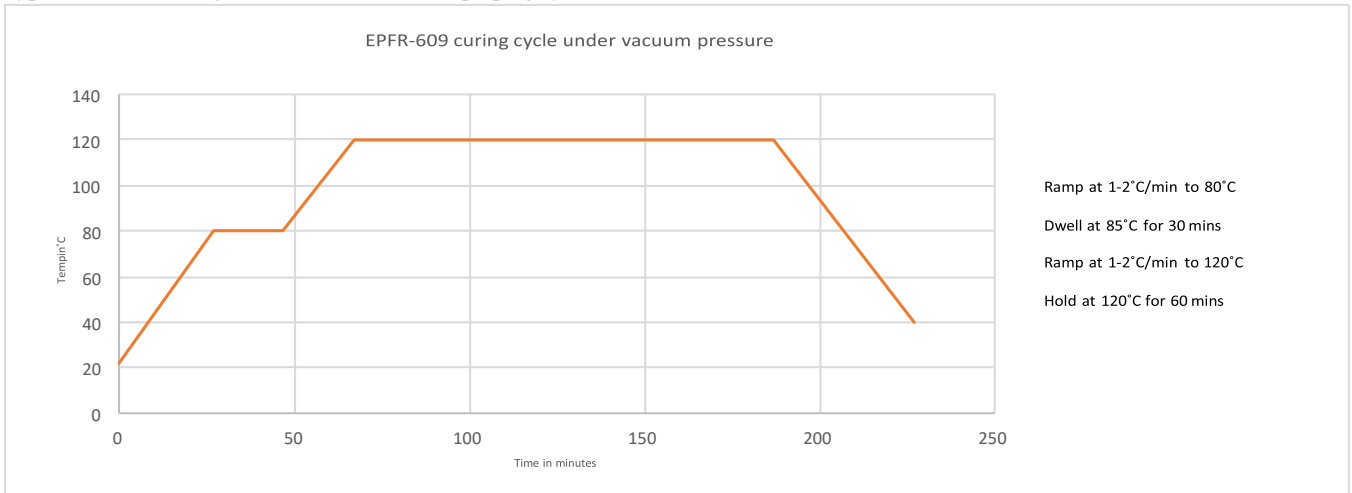
Property	Result	Test Method
Minimum cure temperature (°C)	80	DSC
Cure time (hours:mins) at min temperature	12:00	DSC
Glass transition temp, Tg (°C)	95	DSC

RHEOLOGY

Rheology profile for EPFR-609 prepreg system



Typical vacuum curing schedule for EPFR-609 prepreg system



CURED MATRIX PROPERTIES

(85°C for 30 Minutes & 120°C for 90 Minutes)

Property	Result	Test Method
Tensile Strength (MPa)	57	ISO 527
Tensile Modulus (GPa)	3.9	ISO 527
Flexural strength (MPa)	92	ISO 178
Flexural Modulus (GPa)	4.87	ISO 178
Density (g/cc)	1.41	ASTM D 792



Glass Transition Temp(°C)	112	DSC
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LAMINATE PROPERTIES

Typical Mechanical Properties of EPFR-609 Prepreg (Glass UD 600gm, 50% RC)

Property	Test Standard	Result
Tensile strength (MPa)	ISO 527	700
Tensile modulus (GPa)	ISO 527	36.49
Flexural strength (MPa)	ISO 14125	965
Flexural modulus (GPa)	ISO 14125	33
Compression strength (MPa)	ISO 14126	800
Compression modulus (GPa)	ISO 14126	34
Inter laminar shear strength (MPa)	ISO 14130	37

Typical Mechanical Properties of EPFR-609 Prepreg (Glass-Biax 600gm, 50% RC)

Property	Test Standard	Result
Tensile strength (MPa)	ISO 527	308
Tensile modulus (GPa)	ISO 527	27
Flexural strength (MPa)	ISO 14125	509
Flexural modulus (GPa)	ISO 14125	23
Compression strength (MPa)	ISO 14126	420
Compression modulus (GPa)	ISO 14126	21
Inter laminar shear strength (MPa)	ISO 14130	29

REACTION TO FIRE TESTING RESULTS

NFPA 285 - EPFR-609 prepreg (E-glass UD 600 & Biax 600, 50%RC) with NE11FR film¹

Satisfies all horizontal and vertical flame spread criteria and thermocouple temperature limits - **Pass**

ASTM E84 - EPFR-609 prepreg (E-glass UD 600 & Biax 600, 50%RC) with NE11FR film¹

ASTM E84 test result class	Class A
Flame spread index	5
Smoke developed index	200

¹ NE11FR was formerly known as FR Film 609.

FAR 25.853



Satisfies all fire, smoke and toxicity criteria - **Pass**

Test	Parameters / Test Condition	Results
Flammability	Extinguishing time	Nil – did not ignite
	Burn length	Nil – did not ignite
	Drip extinguishing time	No dripping
Smoke Density at 4 minutes	With pilot flame	28.79
	Without pilot flame	23.9
CO Toxicity – ppm at 4 minutes	With pilot flame	376
	Without pilot flame	239

FAR 25.853 Toxicity concentration measurements in ppm at 4 minutes

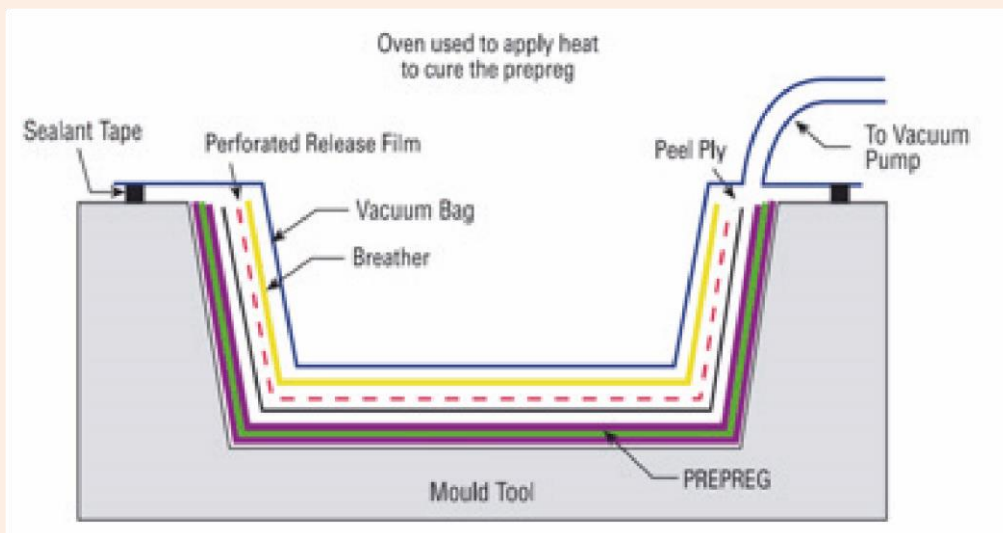
Toxin	CO	NO/NO2	HCN	HCl	HF	SO2	HBr
FAA Requirements	<1000	<100	<150	<150	<100	<100	-
EPFR-609 results	376/239	0.9/0.4	7/5	0	0	0	0
Comments	Pass	Pass	Pass	Pass	Pass	Pass	Pass

PROCESSING METHOD

- Take the prepreg roll out of sealed plastic bags.
- Cut the prepreg to the desired size on a cutting table.
- Pull off the protective polyethylene film and lay the prepreg onto the mould. If multiple layers are required, pull off protective film and lay prepreg layers one on top of each other. Make sure that a roller is applied to each layer to avoid any wrinkling or air voids between layers.

- When the desired thickness or lay-up is completed, make the vacuum bag on the mould to cover the entire laminate and apply vacuum.
- Apply full vacuum (approx. 760mm Hg) for 10 minutes before starting the heated cure cycle
- When all air is removed, place the mould in the oven or turn on heat source.
- Complete the cure cycle (as per the defined cure cycle chart).
- After completing the cure cycle, turn off the heat source whilst maintaining vacuum pump pressure.
- Turn off the vacuum pump only when part temperature has dropped to 60°C or below.
- After turning of the vacuum pump, the part can be removed from the mould.

Typical Vacuum Bagging Arrangement





TRANSPORTATION, HANDLING AND STORAGE

EPFR-609 prepregs should be kept in the original packaging during transport and storage. Transport should be at -18°C to maximise the life of the product. EPFR-609 prepregs should be stored, wrapped and sealed in polythene, at -18°C for maximum shelf life.

Temperature	Maximum Storage Time
-18°C	18 months
21°C	60 days

The material must be fully thawed before breaking the polythene seal to avoid moisture contamination.

Handling of the prepreg should be at a clean area where relative humidity is $\leq 55\%$ and ambient temperature is 20-23°C.

Only take out the quantity required for immediate production usage, the remaining material should be wrapped up and sealed and returned to the freezer. This will extend the shelf life of the EPFR-609 prepreg.

The backing film should be removed from the EPFR-609 prepreg only when it is ready to be laminated or positioned in the mould. Remove the backing film from the side which is going to touch the mould surface. Remove the remaining backing film only when the next prepreg layer is ready to be placed

HEALTH AND SAFETY PRECAUTIONS

Prepregs are low risk in terms of handling hazards, however, the usual precautions should be applied. Gloves and protective clothing should be worn.

To avoid eye contamination, safety glasses should be worn. In the case of any contamination, eyes must be flushed for 15 minutes with clean water and a doctor should be consulted or further medical advice should be sought. Use mechanical exhaust ventilation when heat curing the EPFR-609 product.

Hands and contaminated skin must be cleaned properly with soap and warm water after finishing work.

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